

Dec. 14, 1937.

J. T. COCHRAN

2,101,838

PRINTING CUT

Filed Oct. 28, 1935

Fig. 1.

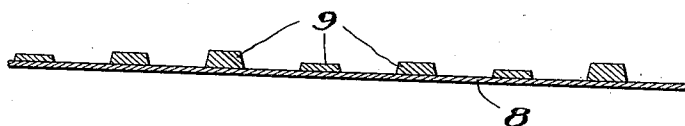


Fig. 2.

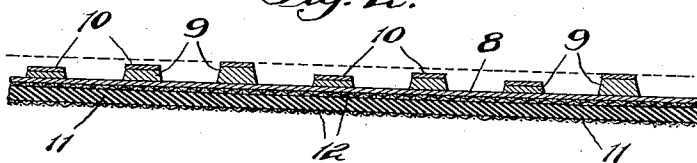


Fig. 3.

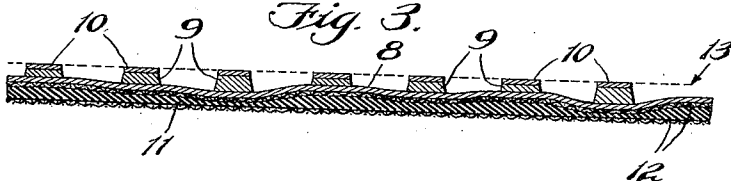
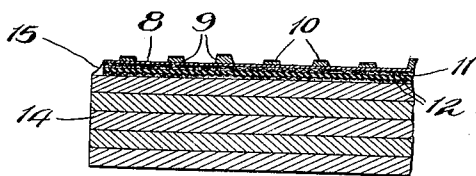


Fig. 4.



INVENTOR.
Joseph T. Cochran
BY *Kent W. Womell*
ATTORNEY.

UNITED STATES PATENT OFFICE

2,101,838

PRINTING CUT

Joseph T. Cochran, Chicago, Ill.

Application October 28, 1935, Serial No. 46,979

5 Claims. (Cl. 101-401.1)

This invention relates in general to improvements in the photoengraving process of producing a printing plate or cut and has more particular reference to the building up the relief in a cut of this kind, to get rid of the unexposed gelatin in a photographic plate and thereby preventing a blurring of the shadows, and in providing a relief plate mounted upon a resilient backing which is adapted to produce a printing cut in which the printing make-ready is obviated. In producing an inexpensive photographic printing plate of this type, a photographic negative is made from which a photographic copy or positive is produced with the surface broken up into dots, surfaces or lines. This positive is then chemically treated to form a relief plate in which the dots or lines stand out in relief while the other portions of the plate are etched below the printing surface.

When this process is applied to a positive film having a celluloid backing with a sensitized gelatin emulsion, the exposed positive film is treated in a warm bath which washes away the gelatin emulsion between the surfaces or dots which have been exposed and which form the printing surface. As the high-light dots swell considerably more than the shadow dots, a plate of this kind ordinarily makes a poor plate for printing due to the uneven printing surface which is presented.

By treating the high-light dots with a suitable solution containing lead nitrate or other photographic chemicals, the printing dots are built up to give a greater relief to the printing surface but the unevenness of the high-light and shadow dots makes the entire plate surface so uneven that it does not provide a satisfactory printing surface.

The present invention therefore relates to the preparation of a photographic plate of this kind which is then applied to and mounted upon a backing block or even upon a curved printing plate by means of a yielding cushion or blanket preferably of rubber or a similar yielding material in which is combined the softness of the backing with the hard treated printing surface of the film so that in the actual operation of printing the high-light dots are squeezed down into the rubber backing without distortion or the printing surface is leveled off by the resilient mounting so that a plate of this kind will print almost equally well upon a smooth paper or upon a very rough or coarse textured paper without requiring extra deep etching in the plate, without requiring an extra heavy pressure upon the cut which tends to objectionably emboss the paper, and thus also

providing an automatic make-ready plate applicable to any ordinary class of paper.

Another feature of this invention is that rubber and rubber solutions are affected to considerable extent by printing inks, chemicals and cleaning solutions containing benzine, but by mounting the film on top of a rubber blanket or cushion the rubber is protected by the film except at the edge, and a coating of shellac or other impervious material may be added about the exposed edge of the cushion which will further protect the exposed edges from any action which tends to loosen the contact of the rubber cushion with the printing block or the film, or to deteriorate the rubber about the edges thereof. It is also apparent that this same process or a suitable modification of it may be applied to a thin metal sheet which is suitably etched by photographic or other processes and mounted on a block with a rubber backing. Or a sensitized solution or film may be applied to a thin coating of metal, bakelite, linoleum, or the like, and backed with a resilient cushion for producing a printing cut which will operate in a similar manner. The photographic film and its rubber backing may also be applied equally well to a curved backing plate used in rotary printing presses.

Other objects of the invention will appear in the specification, the accompanying drawing illustrating somewhat diagrammatically the process of producing and the construction of the cuts, in which,

Figure 1 represents a sectional view of an ordinary positive film with high and low printing dots and the gelatin washed out between them;

Fig. 2 represents a sectional view of a portion of such a film treated with a solution which builds up the printing dots and with an applied resilient backing;

Fig. 3 represents a sectional view of a printing plate of this kind when subjected to printing pressure which distorts the resilient backing to bring all of the dots approximately into the same printing plane; and

Fig. 4 shows a section of a printing cut to which a resilient backed gelatin plate of this kind is applied for printing purposes.

Referring now more particularly to the drawing, a positive film plate of the type having a celluloid backing 8 has a number of high-light dots 9 which are produced in a well known manner by exposing a plate of this kind coated with gelatinous film impregnated with silver salts or silver bromide, exposed photographically, developed and fixed, then put into a hardening bath

which hardens only the silver sensitized by light, and the gelatinous substance between the high-light dots is then washed out in a bath of warm water, leaving the high-light dots extending to a greater or less degree above the surface of the backing 8 and above the shadow dots or shadow surface. If the gelatinous substance between the high-light and shadow dots is not well washed out, it tends to blur the shadows and to make a smear or dull surface which is not well defined and distinct in appearance.

The plate may therefore be further treated in a solution to build up the high-light dots more than the shadow dots and to render them both more clearly distinct even though the height of the dots and their difference in elevation from the backing plate 8 may be somewhat accentuated. A suitable bath for this purpose consists of lead nitrate, 1 ounce; potassium ferrocyanide, 1½ ounces; water, 24 ounces; glacial acetic acid, 1 ounce.

By treating the positive plate in this bath, the unevenness of the printing dots is increased or accentuated so that the actual printing surface may be more uneven as represented in Fig. 2, with the addition of the lead nitrate, than in the normal appearance of the plate as shown in Fig. 1, so that this plate would not make an equally pleasing impression upon different kinds of paper without considerable work on the variation of the cut known as the printing make-ready.

Instead of treating the exposed positive plate first with a hardening bath and then with the lead nitrate solution as above set forth, an exposed plate may be treated with a solution of vanadium or uranium chloride after developing and fixing the image which acts upon the sensitized silver salts, hardening and building them up at the top and also loosening the unexposed gelatin surfaces or dots so that when put in hot water of approximately 120° the unexposed gelatin comes out very readily, leaving the high-light and shadow dots at various heights as represented in Fig. 2, cleaning out the shadows to the celluloid base and thereby producing a good clear dot which makes a distinct printing surface. A suitable solution for thus hardening and building up the dots is; vanadium chloride, 16 grains; ferrocyanide, 16 grains; 1 dram iron chloride; dissolve the above in 15 ounces of water, then make a saturated solution of oxalic acid and add two ounces of the saturated solution to the above mixture.

Treatment of the positive film after the vanadium chloride bath seems to toughen the metal topped sensitized gelatin dots and when the positive plate thus produced or as produced with the lead nitrate bath is suitably dried it is ready for application to a printing block.

A resilient cushion 11 is applied to the back of the printing plate and to a printing block 14 or a suitable printing plate. At each side of the cushion 11 is a stiffening fabric layer 12 which prevents undue spreading of the rubber blanket and prevents the rubber from squeezing out between the plate and the block under high printing pressure. Preferably the fabric layers are vulcanized in place at the top and bottom surfaces where they provide better gluing attachment surfaces than the rubber itself. The top layer of non-resilient material also raises the printing plate high enough above the rubber to prevent the rubber from squeezing out at the edge and forming a printing blur at the edge of the plate.

When printing pressure is applied to a cut of this kind, the outer or printing surfaces of the

dots are all brought into the same plane because of the resilience of the cushion 11 which in effect is distorted as represented in Fig. 3 to bring the printing dots 9 into alignment at the printing surface as represented by the line 13, the bases of the dots and the base of the celluloid plate 8 being more or less distorted, depending upon the heights of the dots as compared with the other ones. Thus the application of the rubber cushion to a film with a backing plate, as 8, combines the stiffness of the plate and the softness of the cushion 11 to produce an even printing surface when printing pressure is applied to the cut.

This combination of a resilient backing and photographic film as applied to a printing block 14 usually of solid or laminated wood of such a height that the printing surface is at the proper level for cuts of this type. The resilient cushion 11 is attached to the upper surface of the block and to the back of the film by any suitable cement which is found to adhere more firmly to the vulcanized fabric 12 than to the rubber alone, and a protective coating or fillet of shellac or similar material 15 is commonly applied about the exposed edges of the resilient coating below the printing plate in order to prevent the detrimental effect of printing ink or the cleaning material for such printing ink from access to or contact with the resilient backing or by the cement by which the cushion is secured in place.

This invention therefore relates to the provision of a printing cut from a photographic plate in which the unevenness of the printing dots is accentuated and the printing surfaces thereof built up by a metal deposit, and then the unevenness is corrected by means of resilient backing which takes up the unevenness and provides a printing surface which under suitable pressure produces a high-class, clear-cut, distinctive print upon smooth or rough-textured paper without the necessity of extra work for printers make-ready and without requiring a high printing pressure or deeply etched plates which tend to distort and emboss a rough-textured paper.

If desired, the sensitive emulsion may be applied directly to a rubber or other soft or flexible material thereby eliminating the attachment of a film to a soft rubber layer and instead of being applied to a flat plate or block it is apparent that the emulsion upon such a rubber backing may be applied to a curved printing plate as commonly used.

I claim:

1. The process of producing a photographic printing plate from a thin flexible positive film coated with a sensitized gelatine emulsion which comprises the photographic formation of relief printing surfaces of high-light and shadow dots of varying heights on said film, in accentuating the height variation of the dots, and in applying a resilient backing to the film which will permit the latter to yield for bringing the printing surfaces of the dots into alignment when printing pressure is applied to the backing.

2. The process of producing a photographic printing plate which comprises producing a photographic positive upon a thin flexible sensitized gelatin film, in developing the image, in washing out the excess gelatin, in building up the high-light and shadow dots forming the image and allowing them to dry and harden with their outer surfaces at various heights on the film, in applying to the back of the film a resilient material which will yield with the film to such an extent that the outer printing surfaces of the

dots may be brought into alignment, and in mounting the resilient backing and film upon a printing block for applying printing pressure to bring the printing surfaces of the dots into alignment for printing.

5 3. A relief printing plate comprising a thin flexible photographic positive film having relief surfaces composed of high-light and shadow dots in which the high-light dots are higher than the
10 shadow dots, and means for equalizing the height of the dots for printing so that the high-light dots will not be unduly squeezed under the printing pressure, said means comprising a printing block and a resilient backing interposed between
15 the thin flexible film and the block whereby said resilient backing and film will yield under pressure to bring the printing surfaces of the dots substantially into alignment.

4. A relief printing plate comprising a thin
20 flexible photographic positive film having relief surfaces composed of high-lights and shadow dots in which the high-light dots are higher than the shadow dots, and means for equalizing the height of the dots for printing so that the high-
25 light dots will not be unduly squeezed under printing pressure, said means comprising a soft

rubber backing, and a layer of fabric interposed between the rubber backing and film, in association with a printing block, whereby the film, fabric, and rubber backing will yield under pressure to bring the printing surfaces of the dots
5 substantially into alignment and the layer of fabric will prevent undue spreading of the rubber backing.

5. A relief printing plate comprising a thin
flexible photographic positive film having relief
10 surfaces composed of high-light and shadow dots in which the high-light dots are higher than the shadow dots, and means for equalizing the height of the dots for printing so that the high-light
15 dots will not be unduly squeezed under printing pressure, said means comprising a soft rubber backing, a layer of fabric interposed between the backing and film, in association with a printing
20 block and a layer of fabric between the printing block and backing, whereby the film, backing, and interposed fabric will yield under pressure to
bring the printing surfaces of the dots substantially into alignment and the layers of fabric will
prevent undue spreading of the soft rubber
backing.

JOSEPH T. COCHRAN.