

July 8, 1941.

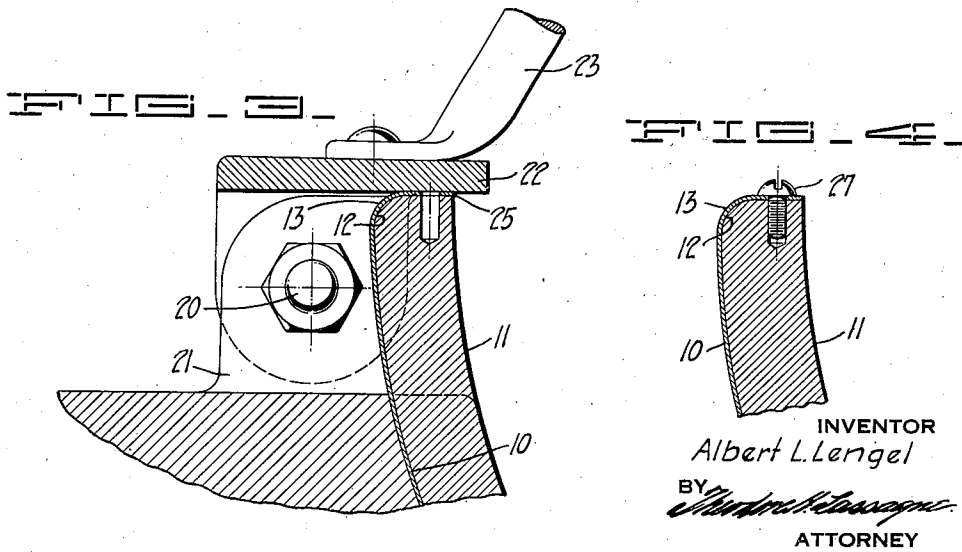
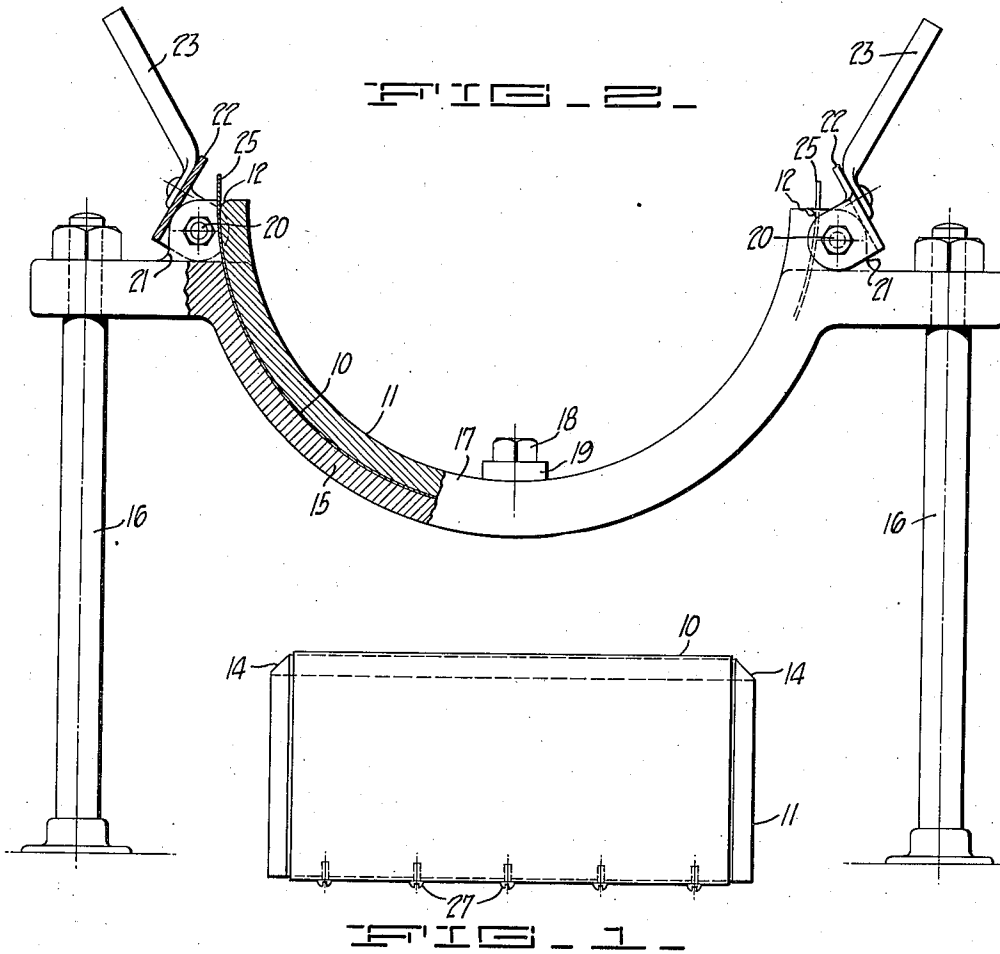
A. L. LENGEL

2,248,275

PRINTING PLATE

Filed Sept. 1, 1939

2 Sheets-Sheet 1



July 8, 1941.

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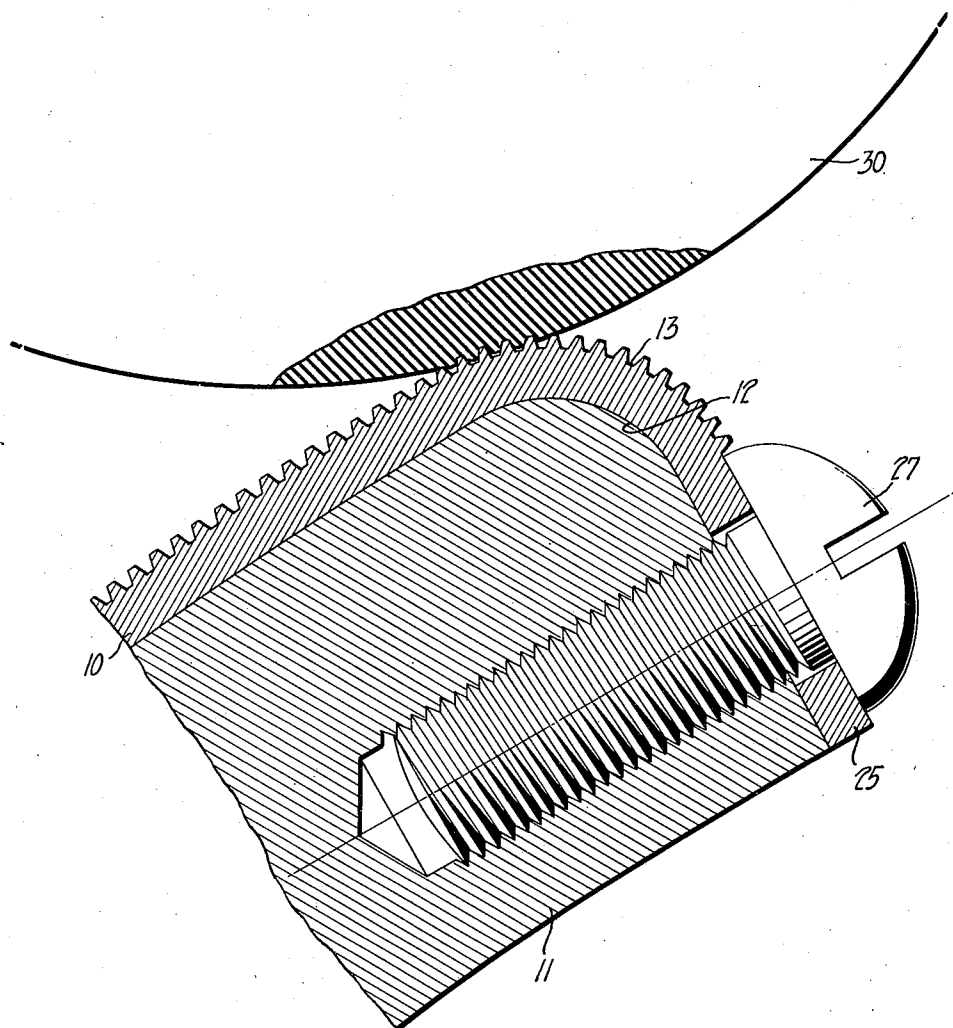
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2 Sheets-Sheet 2

FIG. 5.



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PRINTING PLATE

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3 Claims. (Cl. 101—395)

The present invention relates to printing plates, and particularly to a novel photoengraved plate especially adapted for use in high speed rotary web perfecting presses of the type used in newspaper production.

It is the principal object of the present invention to provide a substantially planographic letterpress plate of the direct printing type in which it is necessary only to bring the inking rollers and paper into contact with the plate in the proper sequence in the same manner as in printing with relief type plates, but by the use of which the causes of distortion of the printing incident to the use of relief type plates will be eliminated without requiring the special treatment and press equipment necessary with intaglio or lithographic plates.

It is a further object of the invention to make possible the use of a photographically reproduced uniform size of layout of material such as advertising or syndicated matter, particularly in full page newspaper sizes, by a plurality of publications using different page sizes, by transfer of such material to plates of the proper size by photographic enlargement or reduction.

It is an additional object of the invention to make possible the direct use, on high speed rotary web perfecting presses of the type used in newspaper production, of original photoengraved plates, thus eliminating losses of detail and contrast in illustrative matter, incident to successive generations thereof in mat and stereo-type.

Relief type letterpress plates, heretofore used in newspaper production in the form of stereo-type prepared from mats, consist of areas and characters in relief separated by recessed areas which must have a depth sufficient to prevent the inking roller from contacting any part thereof. The depth of the recessed areas of such a plate is therefore proportionate, within limits, to its area.

In the use of such plates, the paper is pressed more deeply into the recessed areas than is possible where planographic plates are used, and the extended edges of the relief areas receive excess ink as the inking roller rides up on them. Deformation of the paper by separation of its fibers resulting from the first of these causes, and blurring resulting from the second, adversely affects the quality of the printing obtainable from such plates.

Planographic plates of the intaglio and lithographic types, on the other hand, require special

treatment and special press equipment which renders their usefulness limited.

Plates embodying the present invention are distinguished from relief type plates by the dispersion, throughout the area of the plate which may be brought into contact with either the inking rollers or the paper, of printing elements of the character of halftone "dots." They are therefore planographic letterpress plates in the sense that they have no deeply recessed areas or relief areas comparable in the effects noted above with respect to relief type plates, but they may be used in the same manner in printing as relief type plates and without any such special treatment or special press equipment as is required for planographic plates of the intaglio or lithographic type.

The novel features of the invention are set forth with particularity in the appended claims, the invention itself, however, together with additional objects and advantages thereof, will be best understood from the following description of a preferred form of the novel plate, reference being had to the accompanying drawings in which:

Figure 1 is a view in end elevation of a preferred form of the novel plate mounted on a plate support;

Figure 2 is a view in side elevation of the plate and plate support, shown in connection with a device used for forming the leading and trailing edges of the plate into position to be secured to the plate support;

Figure 3 is a detail view of the device used for forming the leading or trailing edge of the plate into position to be secured to the plate support;

Figure 4 is a detail view of the leading edge of the plate, illustrating the preferable manner of securing the same to the plate support; and

Figure 5 is an enlarged view of the leading edge of the plate as mounted on its plate support, illustrating the manner in which it effects driving engagement with the inking roller of a press.

In order to attain the principal objects of the invention it is necessary to provide a plate having a letterpress printing surface without the recessed areas and marginal character edges which are characteristic of relief type plates. Accordingly the plate illustrated in the accompanying drawings, has dispersed over its entire impression area, printing elements in the form of dots which are preferably formed in the same manner as the dots of a conventional halftone plate and dispersed in comparable densities.

the minimum density being not less than that which would occur in a halftone photoengraving of a clear white surface. Since the maximum vertical distance between the apices and bases of such dots is of the order of only .005 of an inch, or less where screens finer than 60 lines are used, the present plate has no recessed areas comparable to those of a relief type plate, but is substantially planographic.

A plate embodying the present invention, therefore, will have, in all areas where no illustrative or textual matter appears, printing elements in the form of uniformly distributed dots the function of which is not to reproduce any tonal values, but merely to serve as mechanical supports for the inking rollers, paper, and impression members of the press. Being dispersed in a density comparable to the dispersion of printing elements in a halftone plate of a plain white surface, these printing elements are sufficiently closely spaced to eliminate any substantial gaps between printing characters such as are found in conventional relief type plates and which, if present, would cause uneven contact and distortion of the inking rollers, paper, and impression members of the press. At the same time, however, these printing elements print only a uniform light gray background for the grouped pictures and characters, and this actually improves the appearance of the page as a whole.

An important distinction between the plate of the present invention and conventional halftone plates is found, however, in the extension of the area covered by the printing elements to at least the line of contact between the plate and the inking roller and impression cylinder of the press. This insures that as soon as the leading edge of the plate is brought into engagement with the inking roller or the paper web, the minute dots will, as shown in Figure 5, impress the resilient surface of the roller or web, engaging the same in the manner of gear teeth on a line across the entire width of the plate to effect an exactly synchronized driving relationship whereby the ink is distributed absolutely uniformly over the plate surface, and transferred to the paper without any possibility of smearing by reason of relative slippage between the roller and the plate, or the web and the plate.

In order to more certainly insure smooth action of the inking roller and the resulting uniform distribution of its ink over the surface of the plate, particularly at the high speeds of operation desirable in rotary web perfecting presses used in newspaper production, the plate of the present invention preferably is provided with an inclined or curved leading edge, as shown at 13 in the accompanying drawings.

Since press inking rollers are ordinarily spring-pressed against the surface of the plate, this inclined or curved edge 13 insures that the inking roller 30, as shown in Figure 5, will ride up smoothly upon the surface of the plate 10, without jumping over the leading edge under the impact incident to contact therewith at high press speeds. It has also been found that, at lower press speeds, a more advanced transverse row of the plate dots will be inked and printed than at higher press speeds, when the roller and impression bear off from the plate to a greater degree. In either case, however, an even edge is printed and the difference in the longitudinal dimension of the printed page is negligible.

In the preferred form of the invention as illus-

trated in the accompanying drawings, comparatively thin plates of the order of .020 to .027 of an inch thickness and which are (as shown in the drawings) preferably of substantially the maximum size adapted for use in any press for which they may be prepared, are utilized for the printing mediums. Such plates may be mounted on plate supports for use directly in high speed rotary web perfecting presses of the type used in newspaper production, without the necessity of preparing mats and casting stereotype plates therefrom. This renders it possible to avoid loss of detail and distortion incidental to successive reproductions of illustrative material in mat and stereotype, before printing.

In preparing a plate of this character, a plate film somewhat larger than the final size of the plate to be made in order to allow for trimming, is first prepared by photographing a plain white background through a halftone screen of any desired fineness. This provides a background area and a marginal area containing uniformly dispersed dots capable of serving as mechanical supports for the inking rollers, paper, and impression members of a press as hereinbefore described. Since more or less of this marginal area may be trimmed away in preparing the plate for mounting as hereinafter described, it is conveniently referred to as salvage area. The standard halftone screen for newspaper work contains sixty or sixty-five lines to the inch, and for this plate screen, it is usually desirable to use such a screen, or even a coarser one, because as explained above, the purpose of forming halftone dots throughout the area of the plate, including that in which no printed matter appears, is to insure synchronous driving engagement of the plate with the inking rollers and the web, and it is therefore desirable to retain and transfer to the web as little ink as possible, while maintaining these portions of the surface of the plate substantially planographic.

Next, halftone films of the illustrative matter in the form of one or more photographs or the like, are prepared by photographing such illustrative matter with such enlargement or reduction of the size thereof as may be desired through a halftone screen of any desired fineness. Due to the fact that tonal values and detail are reproduced much more perfectly by the use of a plate prepared according to the present invention, it is not necessary to use a screen as coarse as sixty lines to the inch in preparing these films. Screens as fine as eighty-five lines to the inch have actually been used successfully in commercial newspaper production, and even finer screens may be used. It is important to note that the screen used in thus preparing the illustrative matter does not need to have any relationship whatever to the screen used in preparing the plate film.

The plate film described above is then, for convenience, placed upon a transparent working plate of glass or the like, and the films of the illustrative matter are inset into the first film by "stripping," which consists of cutting the illustrative matter films down to the desired dimensions and cutting an aperture in the plate film of the same size as the trimmed film of the illustrative matter, after which the film of the illustrative matter is set into the aperture of the plate film.

After the plate film with the illustrative matter inset has been prepared, a transparent sheet may be placed over it and characters such as

text matter, large type, any desired line drawings on an opaque medium placed on the transparent sheet in proper register with the illustrative matter on the main plate film, and a separate film made from the transparent sheet by photographing it from the rear without using any screen whatever, so that the lettering thereon will be reversed before the camera. In many cases it is practicable to avoid the use of two films by "stripping in" films containing line and text matter as in the case of illustrations, but when the two-film method is used, the two films, one containing the illustrative matter and dotted field, and the other containing the textual matter, are then printed successively on a flexible sheet of sensitized metal, each such printing being effected in the well known manner in which halftones are produced. The one-film method requires only one such printing. This sheet may be of zinc, jem metal, or the like, and should be thin enough to be capable of being readily bent around a plate support. Sheets as thin as .020 to .027 of an inch have been successfully used, and since these are much thinner than any printing plates commonly used in newspaper presses or the like, it is possible to effect substantial economies in metal used, as well as to render the plates much easier to handle.

It will be apparent that since all portions of the film containing the textual matter made from the transparent sheet, except those occupied by lettering or drawing, are opaque, the sensitized metal surface underlying the opaque portion will not be exposed or reexposed during the printing of this negative. Only the lettering and drawing appearing on this negative will be printed on the sensitized metal, but if the negative of the main layout sheet has been printed first, the lettering and drawing will be overprinted thereon.

As is well known in the art of producing halftones, the sensitized coating of the metal plate is rendered insoluble where it is exposed to light, and this insoluble material received a well known "roll up" treatment, rendering it sufficiently strong to resist acid, after which the plate is exposed to the action of acid which etches the bare portions thereof to a maximum depth of the order of .005 of an inch. All methods of photoengraving are in essentials done in this way, differing merely in detail, and any well known method may be used in this step of the preparation of the plate.

The photoengraved plate prepared in the manner described above, is then prepared for press use by mounting upon a plate support of either the tubular, semi-cylindrical, or flat bed type, according to the character of the press in which it is intended to be used. In the accompanying drawings the plate is illustrated, by way of example, as mounted on a plate support of the semi-cylindrical type.

As illustrated in Figures 1 and 2, the photoengraved plate 10 is mounted upon a semi-cylindrical plate support 11 manufactured in accordance with the specifications for stereotype plates for use on the press on which the novel plate is to be used, but with an allowance for the thickness of the photoengraved plate 10. The plate support 11 is also preferably provided with rounded leading and trailing edges 12, so that the plate 10 will not be bent at a right angle in attaching it to the plate support 11, but will be bent upon a radius of the order of $\frac{1}{8}$ of an inch as at 13, to obviate the risk of cracking the plate

10, and to provide a smooth, gradual pickup of the ink rollers and impression rollers when the plate is in operation in the press. The plate support 11 should also be ground inside and out to precise dimensions determined by the press upon which it is to be used, and provided with the usual bevel edges 14 for the attachment of press clips, as is well known in the art.

For mounting, the plate 10 may be placed in a mounting device such as that illustrated in Figures 2 and 3, which comprises a mounting block 15 curved to fit the periphery of the plate support 11, and preferably mounted upon a standard 16 as illustrated in Figure 2.

The plate support 11 is then placed in the mounting block 15 on top of the plate 10, bending the plate 10 to the curvature of the block 15, and aligning the plate 10 with the plate support 11 by means of the side flanges 17 of the block 15, in which position the members are held by bolts 18 and dogs 19 mounted on the flanges 17.

Pivotally mounted at 20 on lugs 21 of the block 15, are bails 22 to which are attached levers 23 by means of which the bails may be rocked around their pivots 20 into engagement with the projecting edges 25 of the plate 10, to engage said edges with a wiping action and bend the same around the ends of the plate support 11 to the position in which the edge 25 is shown in Figure 3, whereupon the plate 10 is firmly attached to the plate support 11 by means such as screws 27, as shown in Figure 4, being jig-bored to alignment with the plate support for this purpose. The wiping action of the bail 22 against the edges 25 of plate 10, tensions the plate 10 firmly against the plate support 11 so that after the insertion of screws 27 the two form a compact unit adapted for mounting in a press.

The assembled plate 10, with its plate support 11, is mounted and used in the press for which the selected type of plate support is adapted, in exactly the same manner as stereotype plates have heretofore been universally used in such presses; but since the printing elements of the plate 10 extend beyond the line of contact of the ink roller and the impression cylinder of the plate, the ink roller 30, as illustrated in Figure 5, will be engaged by printing elements as soon as it engages the plate 10. The individual printing elements will, as shown, indent the resilient surface of the ink roller, and the coefficient of friction between the plate and the roller will immediately be substantially as great as if the friction driven roller were geared to the plate throughout its travel over the entire surface thereof. This insures a direct inking rather than a slurred one, and results in a faithful laying on of ink, with the result that exceptionally fine screens can be actually reproduced without misshapen dots.

By making the plate of the maximum size adapted for use in any given press for which the plate is prepared, a substantially planographic printing area coextensive with the effective area of the impression members of the press is provided, and the entire printed area is uniformly inked and impressed against the paper although the printing is accomplished by the letterpress as distinguished from the lithographic method and can therefore be done more economically and at higher speed.

The same effect ensues when the leading edge of the plate 10 comes into contact with the paper web backed up by the impression roller (not shown), the line of contact being substantially

the same as in the case of the ink roller. The printing elements will, by microscopically indenting the surface of the paper, so increase the coefficient of friction between the plate and the paper as to produce the effect of a geared relationship between them, without the possibility of relative motion which would otherwise be allowed by the back lash of the press gears driving the respective cylinders.

Plates prepared and mounted as herein described are thus adapted to fulfill the objects indicated in the introductory portion of this specification, and while certain advantages of the invention can be realized by using generated plates made from plates embodying the invention, or by using plates embodying the invention in any letter press type of printing equipment, they are especially adapted for use in high speed rotary web perfecting presses of the type used in the production of newspapers. The invention therefore is not to be considered as restricted to the form shown and described herein, except as required by the prior art and the spirit of the appended claims.

I claim:

1. A thin flexible metal plate for letter press printing, having significant design areas etched on the surface thereof, such areas covering a portion only of the entire surface of the plate, and having uniformly dispersed etched projections of the character of halftone printing elements in all of the portions of the surface of the plate and not occupied by the aforesaid significant design areas; said plate being of a thickness of the general order of 0.027 of an inch; none of

the etched areas of the plate extending more than a distance of the order of 0.005 of an inch below the surface thereof; and the plate, due to its thinness, being readily flexible whereby it may be readily bent around a plate support.

2. A plate of the character defined in claim 1 in which the leading edge of the plate is bent at substantially a right angle to the body of the plate on a radius of the general order of one eighth of an inch, providing an anchoring flange adjoined by a portion merging gradually into the printing face of the plate.

3. A thin flexible metal plate for letter press printing having its leading edge bent at substantially a right angle to the body of the plate on a radius of the general order of one eighth of an inch, providing an anchoring flange adjoined by a portion merging gradually into the printing face of the plate; said plate having significant design areas etched on the printing face thereof, such areas covering a portion only of the entire printing face of the plate, and having uniformly dispersed etched projections of the character of halftone printing elements in all of the portions of the printing face of the plate not occupied by the aforesaid significant design areas and also in the aforesaid portion of the leading edge merging gradually into the printing face of the plate; none of the etched areas of the plate extending more than a distance of the order of 0.005 of an inch below the surface thereof; and the plate, due to its thinness, being readily flexible whereby it may be readily bent around a plate support.

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