Dec. 2, 1947. O. R. SCHULTZ ET AL 2,431,710

GRAVURE PLATE

Filed July 22, 1943

Fig. 1.

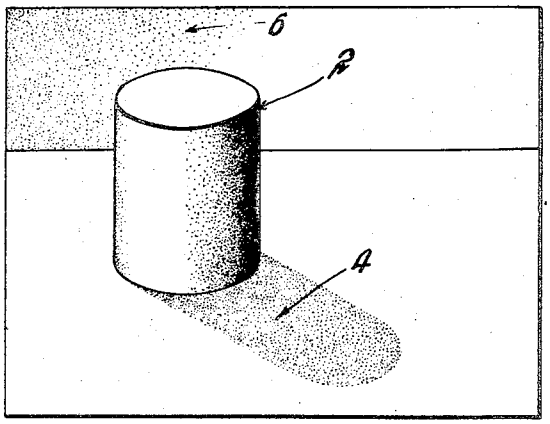



Fig. 2.

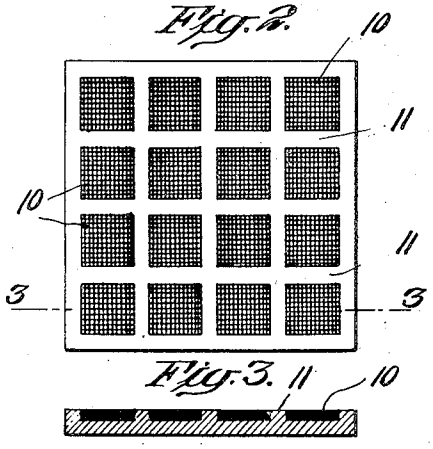



Fig. 3.




Fig. 6.

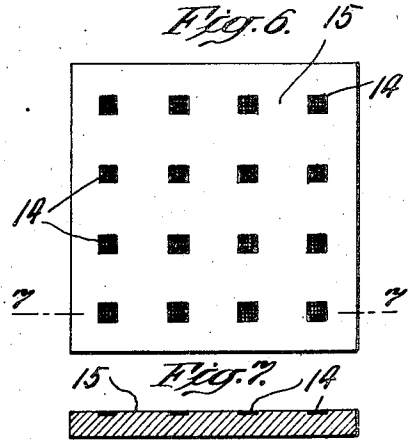



Fig. 7.




Fig. 4.

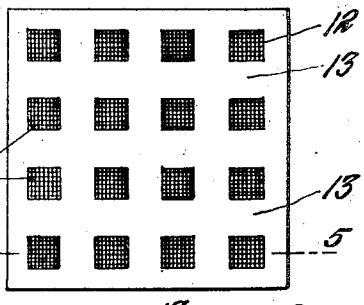
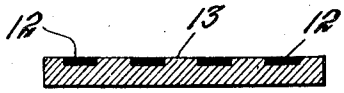



Fig. 5.




INVENTORS
OSWALD R. SCHULTZ
ROBERT F. NESTLE
BY MATTHEW J. ROMANO
Sawyer & Kennedy
ATTORNEYS

Patented Dec. 2, 1947 2,431,710

# UNITED STATES PATENT OFFICE

2,431,710

## GRAVURE PLATE

Oswald R. Schultz, New York, N. Y., and Robert F. Nestle, Ardmore, and Matthew J. Romano, Philadelphia, Pa., assignors to The Philadelphia Inquirer Co., Philadelphia, Pa., a corporation of Delaware

Application July 22, 1943, Serial No. 495,700

4 Claims. (Cl. 101—401.1)

1

This invention relates to improvements in intaglio printing surfaces.

It is an object of the invention to provide an improved intaglio printing surface in which the advantages of conventional rotary intaglio printing in the reproduction of dark tones are retained and in which, at the same time, the reproduction of the light tones or tints is improved.

With this and other objects which will appear in the following full description in mind, the invention consists in the novel printing surface which will now first be described in connection with the accompanying drawing and then more particularly pointed out in the appended claims.

In the drawing:

Figure 1 is a representation of a picture to be printed and takes the form of a conventional representation of a cylinder with the various shadows and lighted and shaded areas indicating the different tones to be produced;

Figure 2 is a schematic plan view showing the cell structure in a portion of the printing surface which is intended to produce a dark tone;

Figure 3 is a cross section taken on the line 3—3 of Figure 2;

Figures 4 and 5 are views similar to Figures 2 and 3 respectively, but showing a cell structure appropriate for printing a middle tone; and

Figures 6 and 7 are views similar to Figures 2 and 3 respectively, but showing a cell structure suitable for printing a light tone.

A printing surface according to the invention will normally be prepared by photogravure, utilizing for this purpose suitable photographic and etching techniques. A suitable technique is described fully in our copending application, Serial No. 482,712, filed April 12, 1943, for improvements in Photogravure.

The improved printing surface is similar to those hitherto used in that it consists of a large number of ink cells which are etched into the plate or cylinder to be used in printing and which are separated by unetched walls so as to form ink retaining pockets and to provide a bearing surface for the doctor blade between the same. While the invention is not restricted to use with such printing mechanism, it will normally be employed in connection with a rotary printing cylinder which carries a thin copper shell or film on the surface of which the ink cell pattern is etched. Figures 2 to 7 of the drawing may thus be regarded as illustrating pieces of such a shell or film removed from the printing cylinder at locations corresponding to areas of different tone densities. Such areas are indicated in Figure 1

2

by the reference numerals 2, 4 and 6, corresponding respectively to Figures 2, 4 and 6 of the drawing.

As will be understood by those skilled in the art, the screen pattern employed will consist of a large number of small elements, a pattern consisting of 150 lines to the inch being normal. Figures 2 to 7 accordingly represent views of portions of the printing surface magnified approximately one hundred times.

As appears from Figures 2 and 3, the printing surface in the deep tones is composed of square, or approximately square, ink retaining cells 10 which are separated by walls 11 forming the bearing surface for the doctor blade and serving to separate the cells 10 from each other and to form suitable ink retaining pockets. The depth of the cells 10 will normally be only a few thousandths of an inch. The width of the walls may be, as indicated, much less than the width of the cells, a ratio of approximately 1 to 5 being practical, so that approximately seventy per cent of the entire printing surface is occupied by the ink carrying cells where the darkest tones are to be reproduced.

In the middle tone, as illustrated in Figure 4, the cells 12 will be smaller and the cell walls 13 will be wider so that the ink carrying area of the printing surface is reduced. The cells 12 are, in addition, shallower than the cells 10 so that the quantity of ink deposited upon the paper, or other material being printed, is further reduced by comparison with that deposited upon it in the deep tones.

As shown in Figures 6 and 7, still lighter tones are reproduced by portions of the printing surface in which the ink carrying cells 14 are still further reduced in area and in depth while the cell walls 15 are correspondingly broadened.

In all tones, from the deepest to the lightest, the centers of the ink cells are correspondingly spaced and positioned, the difference in the printing surface being obtained by varying the area and depth of the cells rather than the number of cells included in a given area of the printing surface.

As is apparent from the drawing, the printing surface consists in all its parts of cells forming a typical gravure pattern but in which the relative widths of the cell walls and the cells, as well as the depth of the latter, are varied. This feature of the use of the characteristic gravure pattern is essential in the dark tones, as the ink carrying cells must be placed with their sides parallel rather than in half-tone formation or diagonal

patterns, if sufficient ink carrying capacity is to be obtained. As is well known, an intaglio printing surface having a half-tone pattern in the deep tones cannot be used satisfactorily for monotone printing or for two-color printing. The characteristic gravure pattern is not, however, essential in the lighter tones since the reduced requirements as to ink carrying capacity in these tones permits the orientation of the ink carrying cells in any desired manner. In fact, it is practical to have the ink carrying cells of a different shape, as for example circular, from that of the ink carrying cells in the deep tones.

While only three depths of tones have been specifically illustrated, it will be understood that a printing surface according to the invention will normally contain a continuous gradation of tones from the very deepest to the highlights and in areas of varying tone will consist of ink cells of progressively or gradually varying diameter and depth.

The improved printing surface of the invention may be employed either for monotone or multicolor printing and in the latter case a number of sets of printing surfaces will be employed in the conventional and well understood manner. As will be apparent from the foregoing description, the printing surface of the present invention extends the range of tones which can be printed very largely by comparison with known intaglio printing surfaces. By comparison with conventional photogravure, equal depth is achieved in deep tones while the range of reproduction in the light tones is largely extended. On the other hand, by comparison with any of the various reverse half-tone surfaces, equal reproduction is obtained in the light tones while the range of reproduction in the dark tones is very greatly extended.

What is claimed is:

1. An intaglio printing surface having ink carrying cells varying effectively in both area and depth according to the depth of tone to be printed and the cells of greatest area being arranged in a gravure screen pattern, all the said cells being separated by walls providing a doctor blade bearing surface between the said cells.



2. An intaglio printing surface having ink carrying cells varying effectively in both area and depth according to the depth of tone to be printed and the cells of greatest area being square and arranged in a cross-line gravure screen pattern, all the said cells being separated by walls providing a doctor blade bearing surface between the said cells.

3. An intaglio printing surface having ink carrying cells arranged in a gravure screen pattern and varying effectively in both area and depth according to the depth of tone to be printed, all the said cells being separated by walls providing a doctor blade bearing surface between the said cells.

4. An intaglio printing surface having square ink carrying cells arranged in a cross-line gravure screen pattern and varying effectively in both area and depth according to the depth of tone to be printed, all the said cells being separated by walls providing a doctor blade bearing surface between the said cells.

OSWALD R. SCHULTZ.
ROBERT F. NESTLE.
MATTHEW J. ROMANO.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 2,182,559 | Henderson | Dec. 5, 1939 |
| 2,039,195 | Sterling | Apr. 28, 1936 |
| 2,040,247 | Dultgen | May 12, 1936 |
| 2,060,640 | Shaw | Nov. 10, 1936 |

OTHER REFERENCES

Commercial Engraving and Printing, 1921, Hacklemar, published by Commercial Engraving Publishing Company, Indianapolis, Indiana, U. S. A., page 567.