

A. HOEN.
Lithographic Process.

No. 227,782.

Patented May 18, 1880.

Fig. 1.

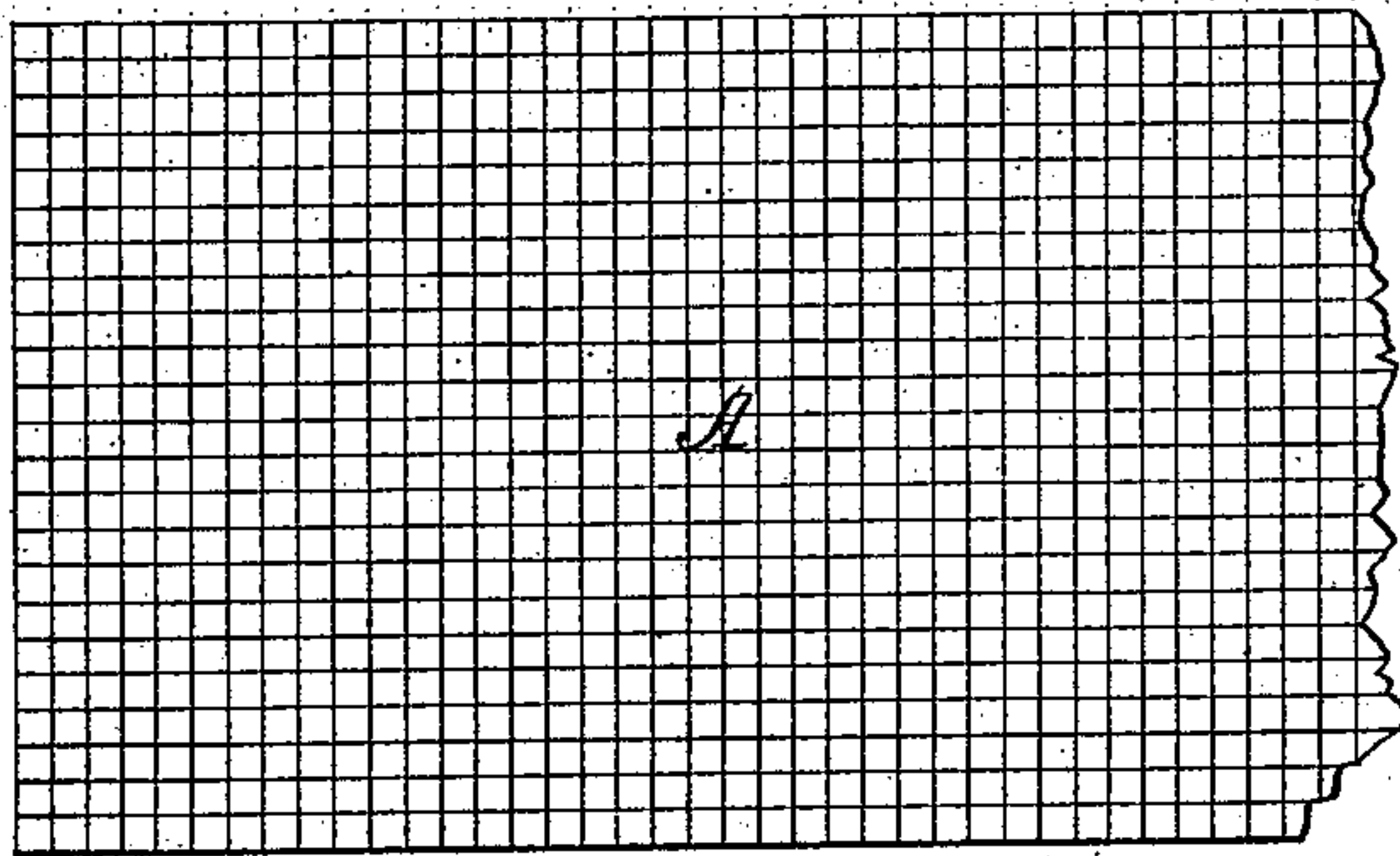


Fig. 2.

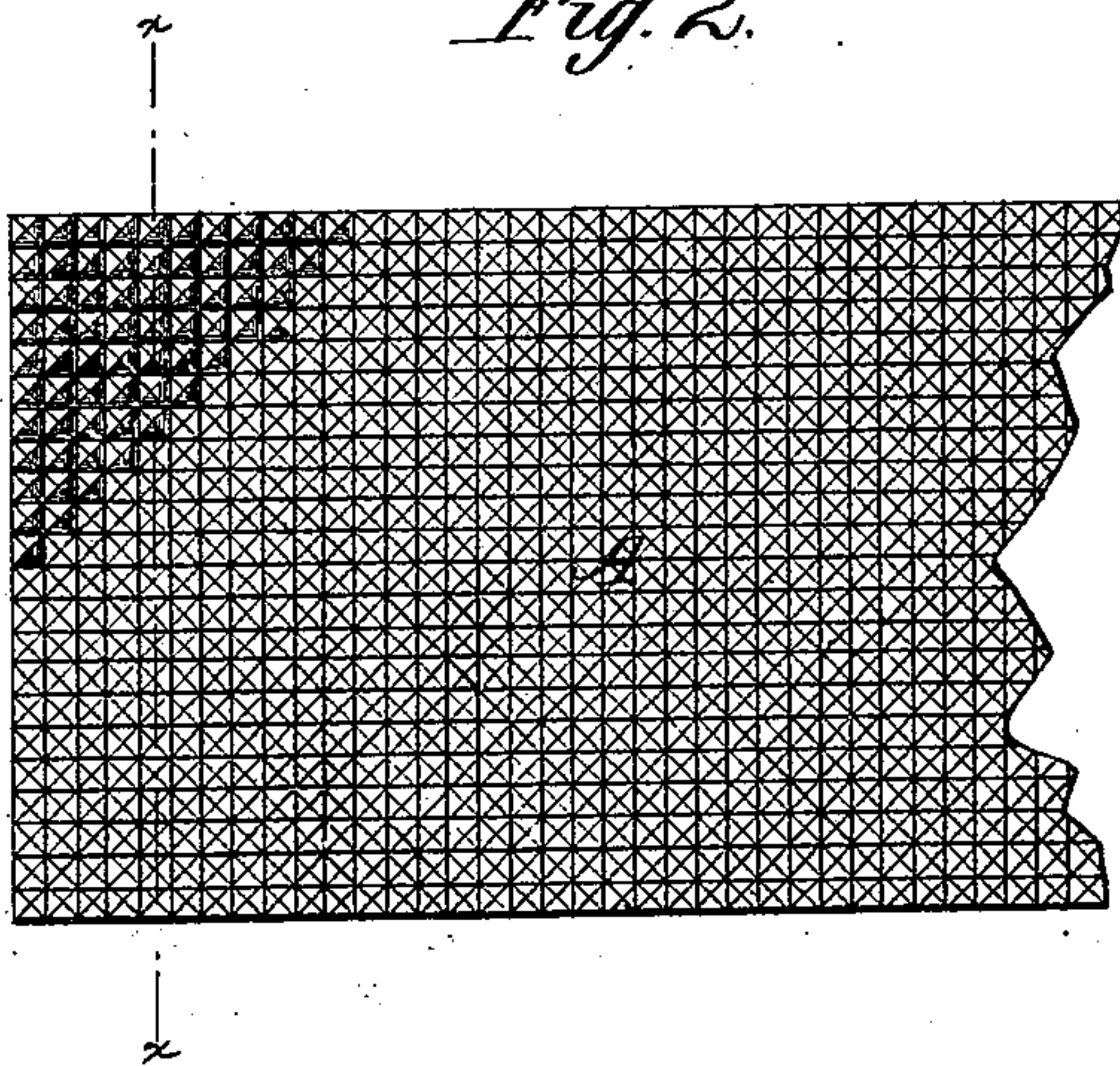
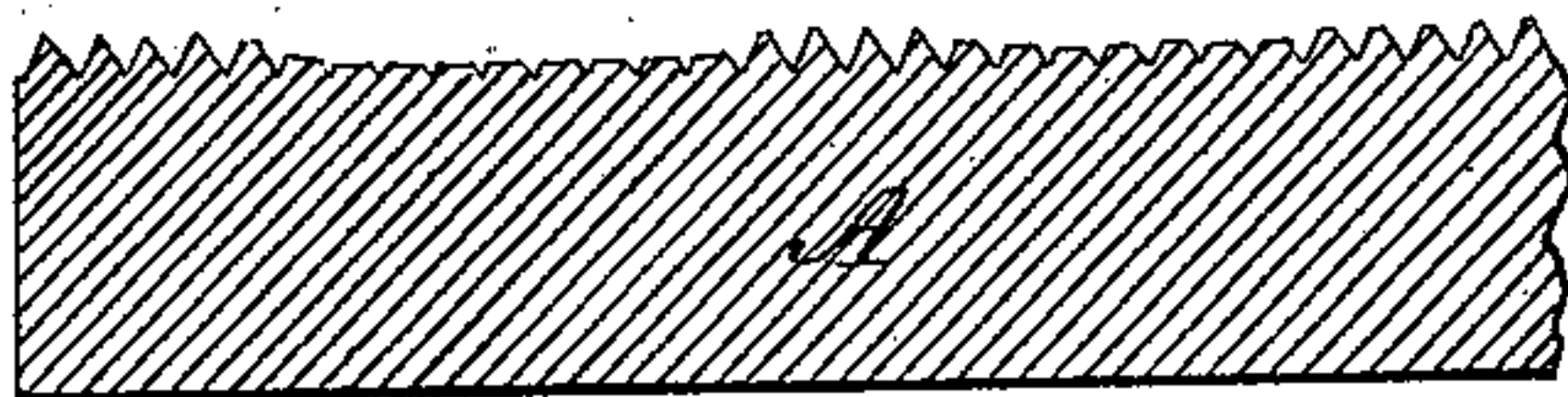


Fig. 3.



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LITHOGRAPHIC PROCESS.

SPECIFICATION forming part of Letters Patent No. 227,782, dated May 18, 1880.

Application filed October 17, 1879.

To all whom it may concern:

Be it known that I, AUGUST HOEN, of Baltimore city, State of Maryland, have invented a new and Improved Lithographic Process; and I do hereby declare that the following is a full, clear, and exact description of the same.

Letters Patent of the United States were granted to me April 24, 1860, for an improvement in lithographic engraving in the nature of a lithocaustic process.

My present invention is an improved lithocaustic process, which consists in the following-described steps, reference being had to accompanying drawings, in which—

Figure 1 is a plan view of a fragment of a lithographic stone having lines drawn therein according to my invention. Fig. 2 is a plan view of such stone, showing the appearance of a portion of its surface after the lines have been etched by an acid and a series of fine pyramidal points produced. Fig. 3 is a cross-section of the stone on line *xx*, Fig. 2.

In all three figures the spaces between the lines are greatly exaggerated.

A finely-polished lithographic stone, A, is first prepared, in the usual manner, with acid and gum-arabic, to prevent its taking ink, as practiced for ordinary engraving. After the gum has been washed off with water and the surface has become dry, the stone is covered with an asphaltum varnish, or, as technically termed, an "etching-ground." Parallel lines are now drawn (by a diamond point attached to a ruling-machine) equidistant both longitudinally and transversely of the stone, all over the space in this etching-ground which will be occupied by the design to be engraved, as shown in Fig. 1. These lines can be drawn more or less close, according to the fineness of the work to be produced; but in any case a very even and fine net-work of rectangular cross-lining is obtained. These fine lines are then etched with any acid (hydrochloric being most suitable and effective) deeper and broader, to such an extent that only the very finest points of the original surface of the stone are left untouched.

From the fact that the diamond point has only cut through the asphaltum varnish or etching-ground, merely exposing the stone in

these places, the action of the acid on the lines is not only to etch them deeper, but also to attack them on the sides, eating under the etching-ground to make them broader. By the prolonged action of the acid on these lines in the peculiar manner stated they will gradually assume the form of regular V-shaped grooves, as shown in Figs. 2 and 3. In this manner a most remarkably even and regular grain is imparted to the stone. From the nature of the grooved lines crossing each other, this grain consists of a number of very small pyramids, all of the same height and of the same width at the base.

The next step in the preparation of the stone is novel and dissimilar from any known method. It consists in covering the surface of the stone and the afore-described etched lines with a solution of gum-arabic, to prevent them from receiving the ink in the next part of the process.

The gum may be conveniently mixed with the acid while the etching is going on, thus simplifying the operation.

The stone thus prepared, after the surplus gum has again been washed off with water, and after any of the adhering etching-ground has been removed with turpentine, presents a roughened but perfectly clean surface, impervious to fatty matters by virtue of the gum preparation, which has chemically combined with the stone, leaving on its surface only a very thin insoluble coating of calcic gummate—that is to say, a substance formed by the chemical union of the gummic acid with the calcium of the stone. The stone is now, for the second time, covered with asphaltum, which fills the etched lines, and is then suffered to become well dried and hardened. After this has taken place the varnished ground is gently rubbed with a flattened piece of os sepia, or any similar substance, for the purpose of removing the etching-ground or asphaltum from the extreme points of the aforementioned small pyramids.

It is evident, now, that these very fine points, not being covered by the protecting varnish, are susceptible of being attacked and acted upon by an acid for the purpose of cutting them down. From the fact that these points are the apexes of the described pyra-

mids, it is also manifest that they will become broader in a regular ratio the more they are cut down or the nearer their base is approached, from the nature of their formation.

5 The cutting down of these pyramidal projections for the purpose of forming the design is readily accomplished, either by the use of acid, as in the lithocaustic process, or by the employment of tools in the shape of scrapers—
10 *i. e.*, flat and pointed needles.

Both methods can be advantageously employed in conjunction with each other, the broad and graduated tints being produced by etching, while the articulation of the subject
15 and the definite lines and touches are produced with great accuracy and facility by the proper use of the tools—that is to say, the etching process may be made use of precisely as heretofore commonly practiced, and the effect
20 will be to cut down the pyramidal points on the different parts of the stone where the acid is applied and where it is desired to produce the aforesaid broad or graduated tints. The design can then be perfected or completed
25 by scraping-tools, which are used to reduce the height of the pyramidal points wherever it is desired to increase the shades of the picture; but instead of availing myself of the etching process I may make use of mechanical
30 means (scrapers) exclusively—that is to say, either of the above means, separately or in conjunction, will accomplish the object. The artistic effects of light and shade are thus produced by a greater or less abrasion of the pyramidal projections, and in the results thus obtained
35 lies one of the improvements herein described.

The execution of the work by the above process offers great advantages to the artist, for
40 while the work is in progress he has the whole of it continually before his eye, and can form a correct judgment of the effect which his engraving will produce, from the circumstance that the dark etching-ground and the greater
45 or less whiteness of the dots, which increase as the projections are cut down, form a strong contrast, and hence an excellent guide to regulate the shading to the exact depth of tint desired.

50 Besides accomplishing by the last operation the artistic result described, another one of great importance in a technical aspect is gained. It has been stated that the etched lines and the whole face of the stone before it
55 came under the artist's hands had been prepared in such a manner as to be impervious to fatty matters, and would reject printing-ink. While the artist is working in the design he is obliged to cut to some extent by tool or acid
60 into the stone, thereby removing the insoluble gum preparation and exposing the natural stone, which in those places is again in a fit condition to be impregnated with fatty matters. This may be accomplished by means of
65 any greasy substance incapable of dissolving the etching-ground by rubbing it over the fin-

ished design, which is thereby converted into a condition which enables it to absorb printing-ink and furnish impressions. When this
70 impregnation of the design with fatty matter has been accomplished the whole of it, together with the etching-ground, is washed off with turpentine, the stone then appearing perfectly clean; but when a roller charged with litho-
75 graphic printing-ink is rolled over it, in the same way as in ordinary lithographic printing, the design, which has been impregnated with fatty matter, will attract the ink and will appear with perfect clearness, and thousands of
80 copies can be printed from it.

This superior mode of engraving offers advantages for the production of fine pictorial effects, surpassing those of any other mode of artistic engraving. It combines in its nature
85 the facility and freedom of execution of the crayon drawing with the delicate softness of the mezzotint and the well-defined distinctness of the stippled steel-plate engraving.

Although this rectangular system of cross-
90 lining gives the best results for nearly all kinds of work suitable for this style of engraving, there may be other effects produced by crossing the lines at different angles. Even parallel lines, without being crossed at all, can in some
95 instances be usefully employed in imitating line engraving. I therefore do not limit myself to the use of any one of these styles for producing the described roughened surface of
100 the stone, but claim as new and useful the employment of these etched lines for that purpose.

I am aware that machine-ruling and etched lines have frequently been used heretofore in lithographic engraving; but in these cases
105 they have always been employed with a view to receive the printing-ink and form a plate in which the design was executed in intaglio.

In my improved method the reverse effect is aimed at, as the etched lines do not in the engraving appear as such in black, but as the
110 white spaces, between the dots of which the picture is composed. In this method of engraving, the white, being represented by lines, is sunk considerably below the level of the general surface of the stone; hence the design
115 itself, being produced by the proportionate cutting down of the projections included between the lines, may not inappropriately be described as an engraving in relief.

I do not claim, broadly, the application of a solution of gum-arabic in water to a litho-
120 graphic stone, it having long been used for incapacitating the clean places of such stone for receiving ink or grease of any kind, this being the preliminary step in the ordinary process of engraving on a polished lithographic
125 stone; and I am also aware such gum solution has been applied to zinc relief-plates to keep the ink from the body of the plate where not needed.

What I claim is—

1. The improved process of lithocaustic engraving, consisting in drawing parallel crossed
130

lines on the etching-ground covering the litho-
graphic stone, for the purpose of giving a
roughened surface of even texture to the stone,
then applying an acid for the purpose of deep-
5 ening and broadening the lines and producing
pyramidal points, then covering the lines
with a solution of gum-arabic in water, then
rubbing down or otherwise reducing the points
to produce the uneven surface required for the
10 lights and shades of the engraving, substan-
tially as hereinbefore set forth.

2. The process of lithocaustic engraving, con-

sisting in roughening the surface of the stone,
then filling the depressions thereof with a gum
solution, so that they shall persistently repel 15
printers' ink, and subsequently working in
the design by abrasion, or otherwise reducing
the projections of such surface, substantially
as described.

AUGUST HOEN.

Witnesses:

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