PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION

Improvements in Shaped Flat Articles such as Punches or Dies

I, JOHN JONSON SNELLMAN, 36, North Road, London, N.7, British, do hereby declare the nature of this invention to be as follows:—

By the scaled reproduction of an unshaded line drawing or outline, a familiar photographic method prepares thin sheet-metal, foil or shimstock for incisions or excisions by an extension of the usually associated etching method. Identical opposed photographic line-impressions are registered on both surfaces of the stock. Below each surface the etching action extends for half a stock-thickness preferably limited to a few thousandths of an inch. Etched incisions approach, merge and meet to produce smooth-edged square-edged excisions and remainders, with no pronounced undercuts or edge-concavities.

Assuming the photographed outline on a pair of negatives or positives with the line-image truly dimensioned, and free from defects originating in emulsion-creep (also suitably handed if on glass and preferably secured, from a white-on-black large-scale drawing by the simultaneous exposure of two maximum-resolution plates, face to face)—the most elaborate stencils, profile-gauges and templates are securable as readily and precisely as are the least elaborate. Where both surrounded and surrounding parts figure in the one result (that is, where secondary excisions or island-shapes are retained as part of a pattern)—the necessary ties must appear as predetermined in the original drawing.

In the case of steel stock, any suitable quench-hardening method offers a distinct advantage. Such an operation may precede or succeed the main operations. Fine edges conduce to the effectiveness of brush and spray stencils; hardened fine edges especially conduce to the effectiveness of light scribing and cutting templates.

The staple stock need not be metallic; there may be specified any thin sheet material capable of double incision leading to excision as above-described. Metallic material is preferred where nickel or chromium plating of a single edge, or of a flush assembly of edges, would prove advantageous.

A main immediate purpose is the utilisation of hardened or unhardened, plated or unplated, steel stock—superimposed in multiple to form master-templates for the preparation of cutting die-tools. A compound blanking-piercing die-tool may be taken as a representative case.

Inner and outer master-templates may be used as boring jigs, in order to locate either piercing punches or guide pins, or for any related purpose. Where no such hole locations are required, excised holes may be provided in each lamination of either master-template. Whatever the case, close-fitting boring bushes or plugs in mathematically correct positions facilitate the assembly and solidification of any such master-template.

Dated this 17th day of November, 1942.

J. J. SNELLMAN.

COMPLETE SPECIFICATION

Improvements in Shaped Flat Articles such as Punches or Dies

I, JOHN JONSON SNELLMAN, British subject, of 25, Baron Street, London, N.1, formerly of 36, North Road, London, N.7, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The invention relates to shaped flat articles of the kind which includes dies, stencils and templates and is directed to a method of producing such articles. Fine work of this kind is frequently produced by etching after a protective coating has been removed locally by a photo-mechanical process. To obviate the undercutting of the material by the etching fluid, which is the greater, the thicker is the sheet material used for the article, it has been proposed to carry out the

etching from both sides.

According to the present invention shaped flat articles such as dies are produced by the steps of coating sheet metal or like material on both sides with a resist, removing the resist or rendering it ineffective over areas registering on both sides by a process depending on photography from an original, etching the material from both sides, and assembling together in register a plurality of sheets of material etched as aforesaid to the same shape. Preferably the etching is limited to a width of a few thousandths of an inch by using a line drawing for the original.

A suitable method of operation is to prepare a large-scale drawing of the shape required with white lines on a black background and to photograph it with the required reduction in size simultaneously on to two photographic plates placed with their emulsion sides together. One end and a side of each plate are placed against a three point contact device to ensure registration after the removal development and replacement of the plates. After development the plates are replaced in register with the sheet metal between them, the metal having been previously coated with a sensitised resist on both sides. The resist coatings are then exposed under the replaced plates and the usual procedure is followed to remove the resist along the lines which were white in the original drawing and to permit the etching fluid to act on the material only at those places.

It will be clear from what has been stated above that the only restriction imposed by the invention on the material for the article apart from the physical qualities necessary for maintaining shape, is that it should be susceptible to attack by the etching fluid. Thus such materials as hardened steel or plated metal could be used where the properties of such materials are advantageous in the finished object. It is desirable in some cases to plate the etched edges of the material.

The invention may be applied to hardened sheet steel to build up a punch for certain purposes. Correct registration in assembly may be effected by holes separate from the outline of the final article. The companion die would be made in the same manner but starting from an original in which the outlines are so displaced relatively to those in the original for the punch that the cutting edges cooperate properly in the finished tool. The same procedure could be used for an ejector or stripper plate if required. Where the etched edges are plated allowance should be made for the thickness of the plating.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. The method of producing shaped flat articles such as dies which comprises the steps of coating sheet metal or like material on both sides with a resist, removing the resist or rendering it ineffective over areas registering on both sides by a process depending on photography from an original, etching the material from both sides, and assembling together in register a plurality of sheets of material etched as aforesaid to the same shape.

2. The method as claimed in claim 1 in which the etching is limited to a width of a few thousandths of an inch by using a line drawing for the original.

3. The method as claimed in claim 1 in which the original is a large-scale drawing with white lines on a black background.

4. The method as claimed in claim 1, 2 or 3 in which two photographic plates are placed face to face with means for retaining register, the plates are exposed simultaneously to an image of the original drawing and are developed, they are then replaced in register but with the material coated with a sensitised resist between them, and the images on the plates are used for removing the resist from the parts of the material to be etched away.

5. The method as claimed in any of claims 1 to 4 in which the articles are made of hardened steel.

6. The method as claimed in any of claims 1 to 5 in which the articles are made of metal plated before etching.

7. The method as claimed in any of claims 1 to 6 in which the articles have their etched edges plated.

8. The method of producing a pair of co-operating elements such as a punch and die in which the elements are produced from two different originals by the method claimed in any of claims 1 to 7 and in which the outlines of the two originals are relatively displaced to permit proper cooperation of the companion edges of the finished elements.

9. A punch or die for thin sheet material produced by the method claimed in any of claims 1 to 8.

Dated the 17th day of November, 1943.
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