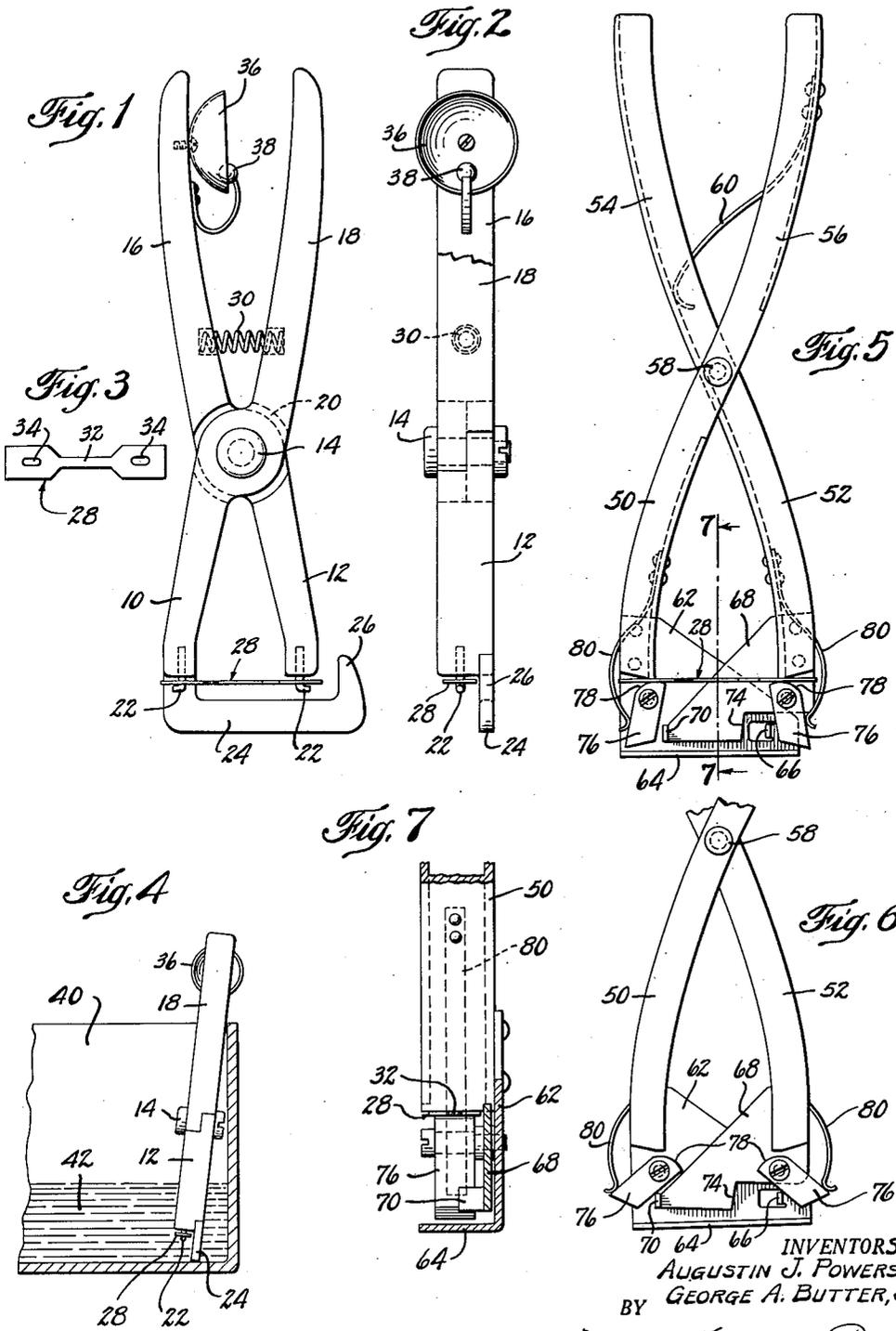


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PHOTOENGRAVERS ETCHING BATH

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## PHOTOENGRAVER'S ETCHING BATH

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3 Claims. (Cl. 23—253)

The invention relates to the art of photoengraving and more particularly to the etching process in preparing the photoengraved plate for use.

It further relates to a device by which the strength of an etching bath acid solution may be accurately determined so that a plate subjected to the action of the tested etching solution during the time period indicated by the device will be etched to a predetermined desired depth.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate two embodiments of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:

Figure 1 is a front elevation of an etching bath testing device showing a metal test strip in place therein;

Figure 2 is a side elevation of the device shown in Figure 1;

Figure 3 is a plan view of a metal test strip as used in the testing device;

Figure 4 is a fragmentary vertical section through an etching bath tray showing the device partially immersed in the acid;

Figure 5 is a front elevation of an alternate form of testing device with a test strip clamped therein;

Figure 6 is a fragmentary front elevation of the lower portion of the device shown in Figure 5 but illustrates the jaws in the position assumed when the test strip is to be inserted or released; and

Figure 7 is a vertical section taken along the line 7—7 of Figure 5.

As presently practiced, the strength or concentration of an acid solution to be used for etching halftone or line photoengravings is roughly determined by a guess by a skilled operator that the processing of a certain number of plates has exhausted the usefulness of the solution, or alternatively by noting the depth to which a plate is etched during a normal time of etching. Such rough determination or guesswork results in inefficient use of the etching solution as well as possible adverse variations in the desired depth of etch in successive plates.

The use of the invention as described herein enables an etcher to perform a simple test which will indicate the exact time that the acid being tested will take to produce an etch of desired depth. Thus, only when the time to produce a desired depth of etch becomes longer than deemed efficient is it necessary to renew the etching solution.

The invention consists of a scissors or pincher-like device formed, partially or wholly, of material which is non-etchable by the solution to be tested. The jaws of the device are spring-urged away from each other and provided with hooks or clamps for attaching a specially formed etchable metal test strip. The strip is of such a length that when attached to the jaws the strip is under spring tension. The central portion of the test strip is so shaped and proportioned that when immersed in the

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etching acid the strip will break at this portion when it is etched through. The breaking of the strip permits the jaws to spring apart and thus indicate by visible, auditory or other means the exact moment of the break.

5 The time interval between the time the test strip was immersed in the acid to its time of breaking gives a measurement which may be used to determine the length of time a photoengraving must be subjected to the etching solution to produce a desired depth of etch.

10 It will be understood that the foregoing general description and the following detailed description as well are exemplary and explanatory of the invention but are not restrictive thereof.

Referring now to the drawings and more particularly to Figures 1 to 4, the test strip holding device consists of a pair of jaw members 10 and 12 pivoted to each other by a pin 14. Each jaw is extended beyond the pivot to form a handle 16 or 18.

Recesses 20 in each jaw and handle member at the pivot portion permit nesting of the two members and alignment of the jaws and handles in the same plane.

20 Either the lower portion or the entire test strip holding device should be constructed of an acid resisting metal, plastic or similar material, and for use with nitric acid, stainless steel is a suitable material, while for a ferric chloride bath, the device should be constructed of polystyrene, rigid phenolic resin, cellulose acetate or other appropriate relatively non-corrodible material.

Each of the jaws 10 and 12 is provided with a projecting hook 22 with the open end of each hook facing away from the other. Jaw 10 is further provided with an offset extension plate 24 which projects downwardly and then laterally to a point beneath and beyond the other jaw 12 where an upwardly projecting lug 26 is formed in the plane of jaw 12 to act as a stop for limiting the spreading of the jaws. Extension 24 also acts as a support standard for the device to insure that a test strip 28 carried by hooks 22 is above any contaminating sediment which may be in the bottom of the etching bath tray.

Means for urging the jaws 10 and 12 away from each other to the limit of stop lug 26 is provided by a coiled compression spring 30 seated in recesses in the facing sides of the handles 16 and 18.

45 The means for testing the etching strength of the acid bath consists of a test strip 28 of metal capable of being etched by the acid in use such as copper, zinc or magnesium. A narrow neck 32 of the strip 28 is so proportioned in width and thickness that the time necessary for the acid to etch through the neck 32 is in direct proportion to the time necessary for that same acid to etch a photoengraving plate to a desired depth. Thus as an acid bath weakens through continued use a longer time is necessary to etch the strip 28 to its breaking point and a corresponding increase in time is thereby indicated for the processing of the plate to produce the same desired etched depth.

50 The enlarged ends of strip 28 are provided with slots 34 which are adapted to be slipped over hooks 22 when the jaws are squeezed together the necessary amount. The distance between the slots 34 is such that jaw 12 is held a small distance away from the stop lug 26 when the strip is mounted on the hooks 22 of the device. When the strip 28 breaks, the jaws 10 and 12 snap apart and the lug 26 sharply strikes jaw 12 with an appreciable ping if the jaws are made of metal or a visible jarring of the device if softer or non-sound producing material forms the jaws, thus notifying the operator that the end of the time period being measured has arrived.

70 Additional means may be employed to indicate the breaking of strip 28 and one such means may be a bell 36 attached to the handle 16 and adapted to be struck by a sensitive spring mounted clapper 38 secured on the handle 16 adjacent the bell 36. Thus as the jaw 10 suddenly strikes stop 26, when strip 28 breaks, the clapper 38 is caused to vibrate and ring the bell 36.

75 As illustrated in Figure 4 the device when in use is placed in the etching bath tray 40 with the strip immersed in the acid 42 and the support standard or extension 24 resting on the bottom of tray 40 while the handles 16 and

18 rest against a tray side. After the strip 28 has broken, the ends remaining on hooks 22 may be shaken off by the operator without touching them and a new strip easily hooked in place.

An alternate form of the testing device is illustrated in Figures 5, 6, and 7 wherein the hooks 22 of the form previously described are replaced by cam clamps. As shown the device comprises jaws 50 and 52 and handles 54 and 56 which may be channel shaped and pivoted to each other at 58 at which point the web of jaw 50 and handle 56 is cut away to permit the other jaw 52 and handle 54 to pass therethrough. The jaws are urged apart by a leaf spring 60 secured on the web of handle 56 and pressing against the web of handle 54. A plate 62 having a foot 64 is secured to the lower end of jaw 50 and extends downward below the jaw end and laterally towards a point below the other jaw 52. A combination clamp actuating and stop lug 66 is struck up from the plate 62. A plate 68, similar to plate 62, is secured on jaw 52 and provided with a turned up lug 70 to actuate a second clamp. The spread of the jaws 50 and 52, as urged by spring 60, is limited by an edge 74, provided on plate 68, striking the stop lug 66 on plate 62.

Means for clamping a test strip 28 on the ends of jaws 50, 52 are provided whereby the strip is held thereon and subjected to the tension produced by the jaw spreading spring 60. As embodied a pair of clamps 76 are provided, one of which is pivoted on plate 62 and the other on plate 68, at a point just beneath the web portion of the jaw associated with the respective plates. A cam surface 78 on the upper end of each clamp 76 is adapted to engage the adjacent jaw end as the clamp is partially rotated by the urging of a relatively strong leaf spring 80 which may be attached at one end to the jaw and have its free end press upon the free end of clamp 76.

As shown in Figure 6 the cam surfaces 78 on clamps 76 are caused to move away from their adjacent jaw ends as jaws 50, 52 are brought towards each other by squeezing the handles 54, 56. This is caused by stop lug 66 on plate 62 striking the free end of the right hand clamp 76 and the lug 70 on plate 68 striking the free end of the left hand clamp 76 thus rotating the clamps in opposite directions. A test strip 28, which may be in the form shown in Figure 3 or a simple ribbon of etchable metal, such as copper, zinc or magnesium, may then be placed in the device so that one end of the strip is between the end of jaw 50 and its clamp 76 and the opposite end between the end of jaw 52 and its clamp 76. The handles 54, 56 may then be released thus permitting clamps 76 to rotate, oppositely, as lugs 66 and 70 move away from them thereby causing the respective cam surfaces 78 to pinch the strip 28 against each jaw end. Further spreading of the jaws is then arrested. Figure 5 illustrates the device in the condition just described.

The device is now placed in the acid bath in a manner similar to that shown in Figure 4 and when the metal strip 28 is etched through and breaks, the spring 60 snaps the jaws 50, 52 apart. As edge 74 on plate 62 strikes stop lug 66 on plate 62 the jaws come to a sudden stop and give a visual or auditory signal indicating the end of the test time. The broken ends of strip 28 may be readily freed from the device merely by squeezing the handles of the device.

Various metals may be used for making the test strip 28 and in practice the selected metal may be the same as that from which the photoengraving plate is made, as, for instance, if a copper plate is to be etched in a ferric chloride bath the strip 28 could be copper of the same composition as the plate and the neck portion 32 of the strip would have a width and thickness of previously calculated and tested size so that its breaking

time is a direct indication of the depth to which the ferric chloride being tested will etch the copper photoengraving plate. Similarly if a zinc base plate and nitric acid are the materials in use a test strip 28 of appropriate size may be made of zinc having the same composition as the plate.

It is also contemplated that the metal of the test strip 28 may be of a different composition than that of the photoengraving plate as, for example, magnesium ribbon, in which case the time to etch the strip to a breaking point may be shorter than the time necessary for a desired depth of plate etch but which is, nevertheless, in direct proportion to that time. In actual practice, the size and material of the test strip 28 are so correlated to the normal strength of the etching bath that the strip is normally etched to its breaking point in a period of from fifteen to forty-five seconds. Shorter times than fifteen seconds are usually undesirable due to the possible errors in etching at such short time, and longer periods than forty-five seconds are unnecessarily long.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What is claimed is :

1. A photoengraver's etching bath testing device including in combination a pair of scissor-like levers pivoted together at an intermediate point, means engaging said levers for constantly urging the ends of the levers away from each other, said lever ends being formed with spring closing jaws for holding a metal test strip to be etched at portions spaced apart along said strip so that a portion of said strip between said held positions is freely available to be attacked by an etching solution, and means for opening the jaws as the levers are moved together, said strip being held in constant tension as the ends of said levers are resiliently urged apart.

2. A testing device as claimed in claim 1 in which means are provided on the levers for spacing the test strip from the bottom of the etching bath.

3. A photoengraver's etching bath testing device, including in combination a pair of elements for engaging and holding at spaced points a metal test strip to be etched, whereby a portion of said strip between said points is freely available to be attacked by an etching solution, means for constantly resiliently urging said elements away from each other whereby a test strip is held in constant tension when held by said elements, and means for spacing the test strip so held from the bottom of an etching bath container as the test strip is immersed in the etching bath, said last means comprising a plate connected to one of said elements and extending toward the other said element said plate having a substantially straight surface disposed below the test strip adapted to be seated on the bottom of the etching bath container.

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