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F. T. POWERS SR

2,566,142

ETCHING MACHINE

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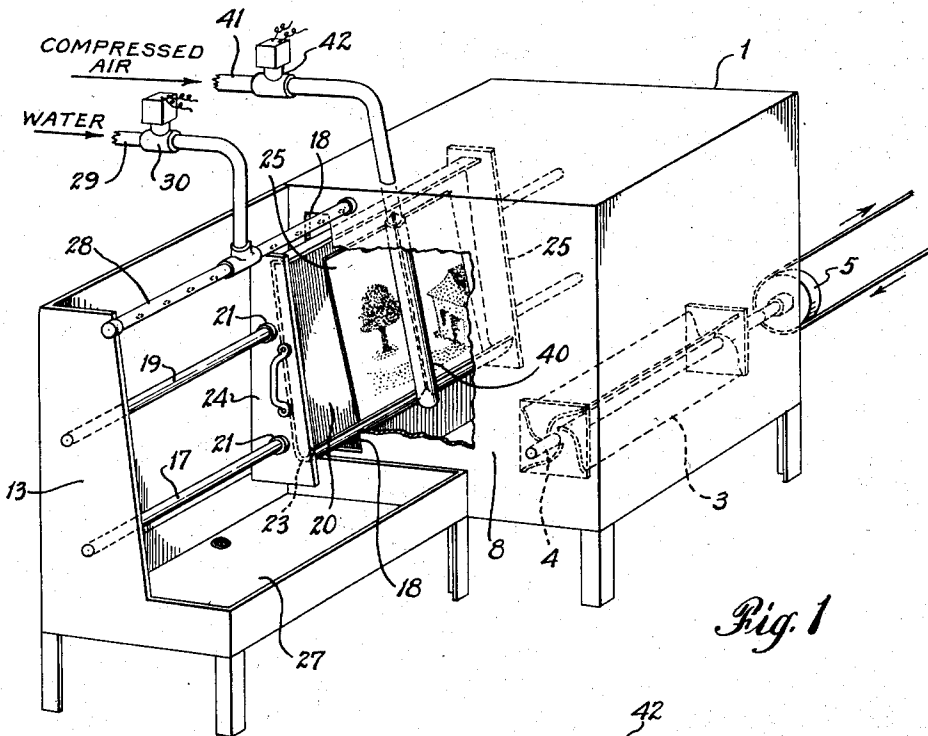


Fig. 1

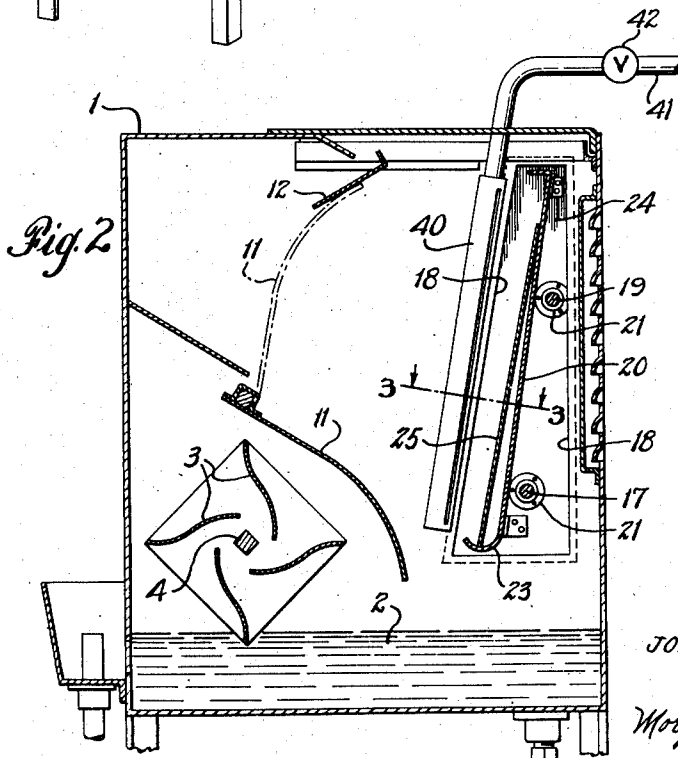


Fig. 2

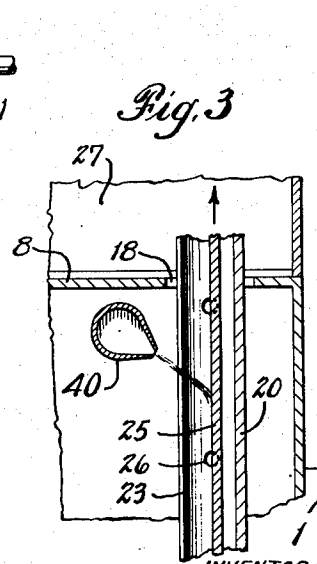


Fig. 3

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UNITED STATES PATENT OFFICE

2,566,142

ETCHING MACHINE

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Application September 30, 1948, Serial No. 51,964

1 Claim. (Cl. 41—9)

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The present invention relates to new and useful improvements in apparatus for etching plates in photoengraving, and particularly for use in connection with relatively viscous etching fluids.

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 claim.

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 one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:

Figure 1 is a perspective view with certain parts omitted and with other parts broken away, of an etching machine illustrative of the present invention;

Figure 2 is a cross-section of the etching machine shown in Figure 1; and

Figure 3 is a detailed fragmentary sectional view taken on the line 3—3 of Figure 2.

The present invention has for its object the provision of an improved etching machine particularly adapted for the economical use of relatively viscous mordants, such as ferric chloride solution. A further object of the invention is the provision of an etching machine for etching plates in the process of photoengraving and in which adherent mordant is removed from the plate and returned to the bulk of the mordant in a reservoir prior to flushing the surface of the plate with water to remove all traces of the mordant from the surface of the plate, thereby preserving the strength of the mordant solution as well as conserving the mordant.

In accordance with the present invention means are provided for subjecting the surface of the plate to be etched to a spray of the etching mordant, and in the case of copper halftone photoengraving, this mordant is usually a relatively concentrated and somewhat viscous solution of ferric chloride. When the etching has been completed, the mordant spray is interrupted, and in accordance with the present invention the plate is subjected to a strong blast of air which mechanically removes the excess mordant from the surface of the plate and returns it to the etching bath or the reservoir of

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mordant, after which the plate is flushed with water to remove any remaining traces of mordant and also to clean from the surface of the plate any particles of salts which may have dried on the surface of the plate.

In certain respects the present invention is an improvement upon the etching machine shown in Powers prior Patent 1,825,127 granted September 29, 1931, but the invention may be applied to many other types of etching machines although its greatest usefulness is primarily in connection with the etching of copper plates using mordants such as concentrated solutions of iron chloride.

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 in detail to the present preferred and illustrative embodiment of the invention as shown in the accompanying drawings, there is provided a chamber 1 of generally rectangular shape in the bottom of which is contained a quantity of the etching mordant at a sufficient level to allow the impeller blades 3 to dip into it as they rotate. Blades 3 are supported on a shaft 4 and are driven from any suitable source of power, for instance through pulley 5. As the blades rotate (counterclockwise in Figure 2), a vigorous, fine spray is thrown upwardly, and except during the actual etching operation the spray is interrupted by a pivoted baffle 11 and a stationary baffle 12 so that the spray is returned to the main body of mordant 2.

Means are provided for supporting the photoengraved plate in a substantially vertical position within the chamber 1, and for moving it into and out of the chamber so that it may be inserted in the chamber for etching, and removed from the chamber for inspection or when the operation has been completed.

Extending horizontally into the chamber 1 and supported by end walls 13 are horizontal rails 17 and 19 on which a plate carrier 20 is slidably mounted by means of guide flanges 21 secured to the end walls 24 and 25 of the plate carrier. The lower edge of the carrier 20 is preferably bent upwardly, as at 23 to provide a trough on which rests the lower edge of the photoengraved plate 25. Trough 23 is provided with suitable openings 26 at its lowermost point so that the etching mordant continually drains therefrom. Surrounding the guide rails 17 and 19, one wall 8 of the chamber 1 is provided with an opening 18

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of sufficient size to admit the plate carrier 20 and the supported plate 25, and this opening is normally closed during the etching operation by the end wall 24 of the plate carrier, this end wall 24 being slightly larger than the opening 18.

At one side of the etching chamber 1, and in a position below the plate carrier 20 when it is slid out of the etching chamber, is a watertight tray 27 adapted to receive any drip from the carrier 20 or the plate 25, and also to receive the flushing water after the plate has been flushed. For flushing the plate after the etching operation has been completed, a pipe 28 is provided with suitable holes through which water is supplied from pipe 29 under control of a valve 30, these holes directing the spray of water onto the face of the plate 25 when it has been slid from the etching chamber 1.

The various parts of the etching machine are made of suitable material resistant to the action of the etching fluid.

Adjacent to the wall 8 of the etching chamber 1 and within the etching chamber 1 and extending a distance equal to the vertical height of the plate to be etched is a long, narrow air nozzle 40 supplied with compressed air from pipe 41 under control of the valve 42. The air blast issuing from the nozzle 40 is obliquely directed against the etched surface of the plate 25 towards the etching chamber, and vigorously blows the retained mordant from the surface of the plate after the etching operation has been completed and as the plate is withdrawn from the etching chamber 1 preparatory to rinsing the plate.

Valves 30 and 42 may be in any desired location, but are preferably controlled by separate pedals so that they may be operated without requiring use of the operator's hands. The mordant removed from the surface of the plate drains into the bottom of the etching chamber 1 where it joins the main body 2 of the mordant and thus practically no mordant is lost as the plate is removed. Due to the relatively high cost of iron chloride solution, and its viscous nature, its use in many types of etching machines has been commercially unfeasible, but the present invention avoids this defect.

In the operation of the illustrative embodiment of the invention, the plate to be etched is positioned on the plate carrier 20 with its bottom edge in the trough 23. The paddle-wheel 3 is rapidly rotating and directing a spray upwardly which is normally interrupted by the pivoted baffle 11. After the plate carriage has been slid to the right so as to bring the plate completely into the etching chamber 1, the baffle 11 is lifted to the dot-dash position shown in Figure 2, thereby allowing the spray to be directed against

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the surface of the plate 25. The etching continues for the desired period of time after which the baffle 11 is lowered to stop the spray from reaching the plate 25. The operator then opens the compressed air valve 42 and slides the plate carriage 20 to its lefthand position, thereby moving the plate past the air blast issuing from the nozzle 40 and removing the surplus mordant from the face of the plate.

When the plate is positioned over the tray 27, the operator closes valve 42 and opens the valve 30 controlling the flow of flushing water to the spray pipe 28. This water sprays and flushes the surface of the plate cleaning any trace of the mordant solution or dried salts from the plate, while the flush water drains from the plate into the tray 27, and is thus completely separate from the bulk of the iron chloride solution.

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 claim without departing from the principles of the invention and without sacrificing its chief advantages.

What is claimed is:

In an etching machine for photoengraving use having an etching chamber, means for holding a plate to be etched and movable into and out of the chamber, and means for forcing a mordant spray against the face of the plate, the combination with those parts of an air nozzle positioned at the side of the chamber and past which the plate is moved, said air nozzle being supported in a substantially vertical position within the etching chamber and above the mordant in said chamber, said nozzle having a long narrow slot directed towards the interior of the chamber and transversely across and obliquely to the surface of the plate to remove mordant from the surface of the plate and direct the mordant into the etching chamber whereby substantially no mordant is removed from the chamber as the plate is moved out of the chamber.

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REFERENCES CITED

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

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Number	Name	Date
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