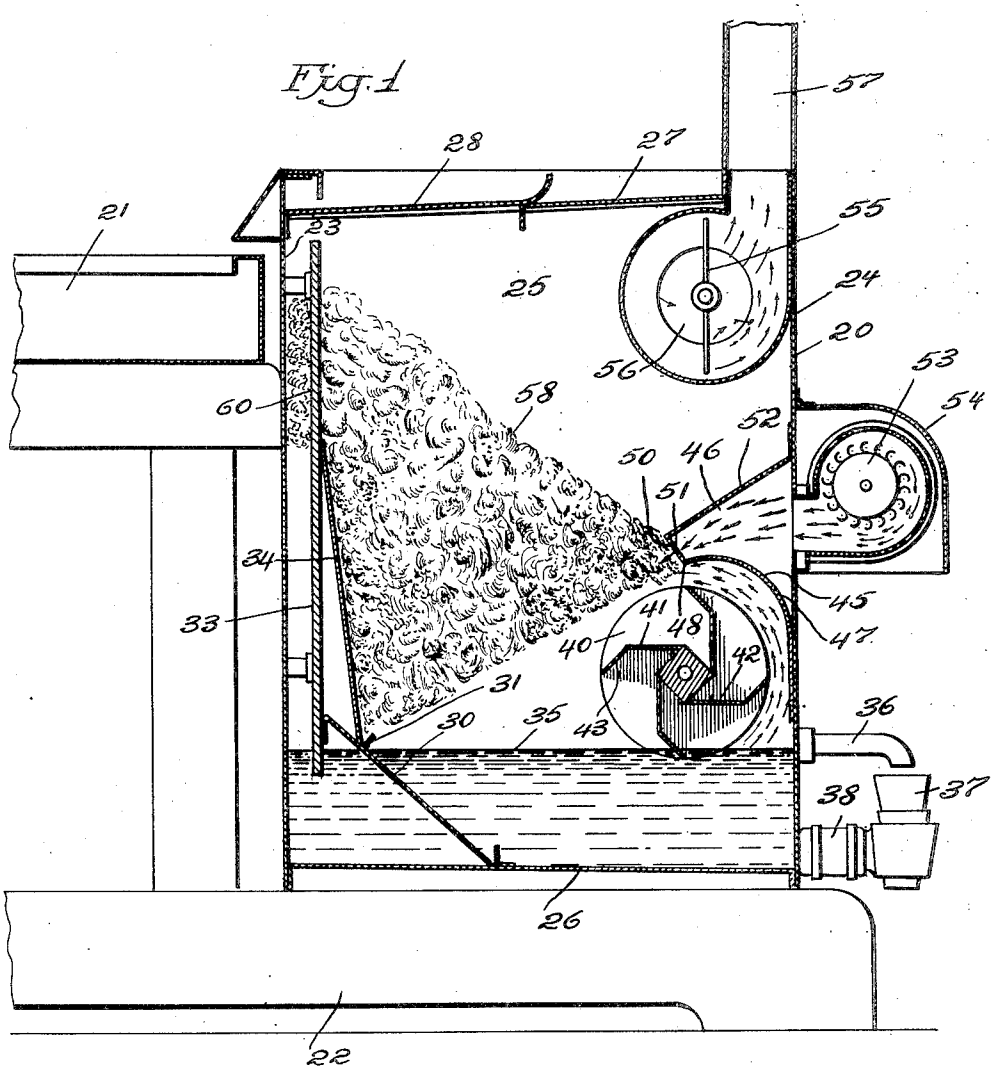
Sept. 15, 1953 W. GUENST 2,651,869

ETCHING MACHINE

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Fig. 1



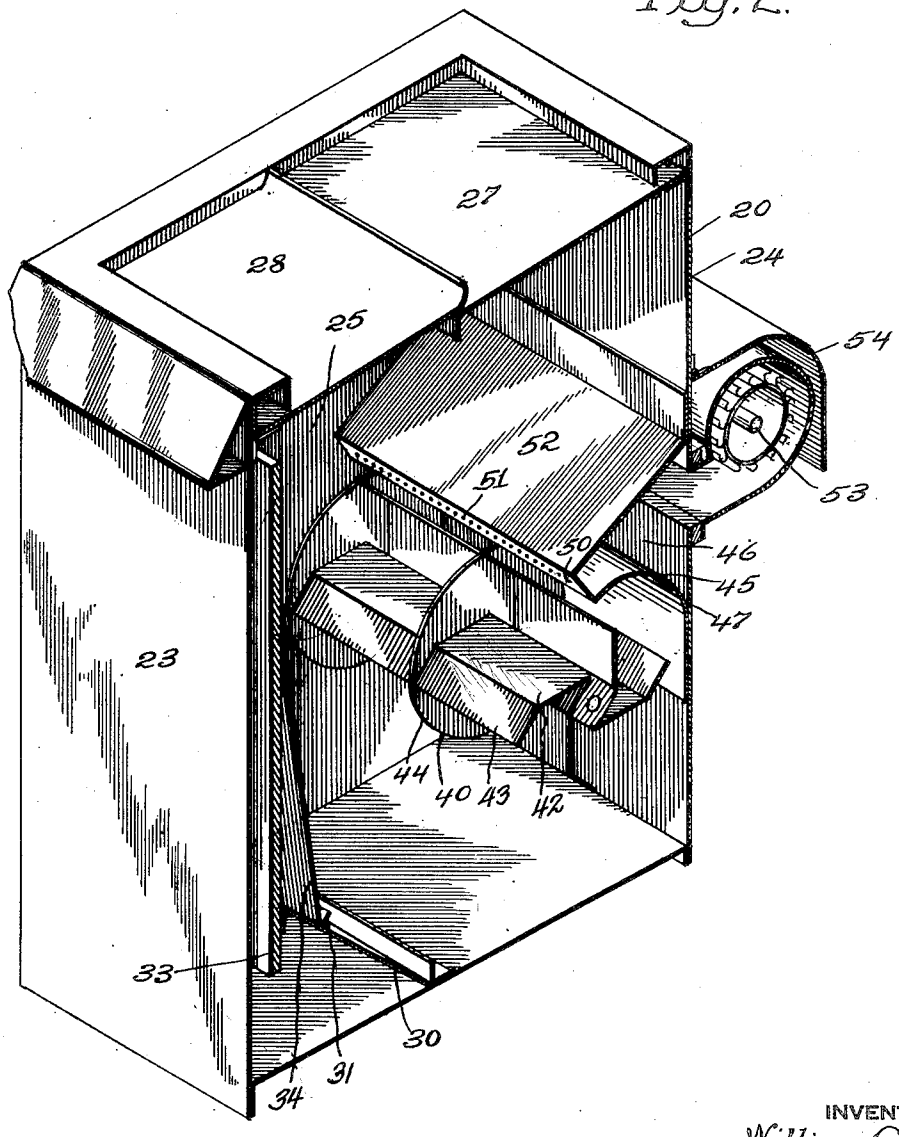
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Fig. 2.



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ETCHING MACHINE

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Application April 19, 1950, Serial No. 156,887

3 Claims. (Cl. 41—9)

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The present invention relates to etching machines, particularly of the type employing acid such as nitric acid for zinc etching.

A purpose of the invention is to increase the efficiency of utilization of acid, especially nitric acid in zinc etching.

A further purpose is to obtain more uniform and effective variation of the acid spray.

A further purpose is to make more effective use of oxidation in connection with acid etching, particularly of zinc plates, to obtain more rapid etching and reduce undercutting.

A further purpose is to aerate the acid at the time it leaves the spreader of the etching machine by air sprays applied through the nose of the spreader baffle.

Further purposes appear in the specification and in the claims.

In the drawings I have chosen to illustrate one only of the numerous embodiments in which my invention may appear, selecting the forms shown from the standpoints of convenience in illustration, satisfactory operation and clear demonstration of the principles involved.

Figure 1 is a vertical, longitudinal section of the etching machine of the invention illustrating diagrammatically the distribution of the etchant and of the air.

Figure 2 is a sectional perspective of the machine of the invention, the section being parallel to that shown in Figure 1.

Describing in illustration but not in limitation and referring to the drawings:

Acid etching, commonly with nitric acid, is used for etching of zinc photoengraving plates, commonly employed in newspaper work. The efficiency of etching by nitric acid is increased by oxidation, and efforts have been made in the past to introduce air into the etching machine, for example by bringing air in the end of the machine under the action of the exhaust fan or by introducing air at the end of the machine and churning it up with the acid under action of the speader. None of these prior attempts have been very successful, and my experiments indicate that in the prior art the inclusion of air in the acid spray has been very non-uniform, being much more effective at certain positions along the length of the spreader than at other positions.

I have discovered that air can be introduced very effectively through the wall of the baffle which is normally employed to direct the acid spray from the spreader, desirably applying spray openings through the nose of the baffle preferably directed toward the bottom of the plate. I find that the air from the jets distributed along the baffle effectively aerates or homogeneously mixes with the acid spray and gives very much improved etching.

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I find, for example, that the inclusion of air in the manner described in the present invention speeds up the etching process and at the same time avoids undercutting which is often objectionable. I also find that the air introduced by the present invention cools the acid spray and thus permits more continuous use of the machine without excessive heating.

By more effective inclusion of air, it is possible to etch with acid which would otherwise seem to be spent. I find that the invention makes it possible to accomplish a saving in acid utilization of about 20 percent since acid which would otherwise have to be discarded can be effectively used for etching.

I also find that the improvement of the present invention makes it possible to etch more uniformly, minimizing difficulty through differences in etching on different parts of the plate.

In the drawings I illustrate an etching machine having an etching receptacle 20 and a washtray 21 mounted on a common base 22. The receptacle comprises a front wall 23 and a back wall 24, side walls 25 and a bottom wall 26 formed into a tank-like structure. The walls along with all other permanent metallic components exposed to the interior of the etching machine preferably are made of stainless steel or other suitable acid resisting material. The receptacle can, of course, also be made of stoneware. The receptacle has a top 27 equipped with a removable cover 28.

A plate rest 30 is mounted diagonally in the bottom of the receptacle and is provided with a plate supporting flange 31. The plate rest is mounted at the upper end on a series of ribs 33 which extend across the forward wall of the machine, with adequate spaces between the ribs, and support the top of a plate 34 being etched.

The acid level 35 is located below the bottom of the plate and an overflow 36 is provided for the acid level which connects into a drain funnel 37 which discharges into a suitable drain, not shown. The drain funnel 37 acts as a handle on a drain cock 38 which, when open, drains the bottom of the receptacle.

Extending from side to side of the machine adjoining the back wall 24 is a rotary spreader 40 turning on a suitable shaft at the ends (not shown) under the action of any convenient motor drive (not shown) to rotate the spreader in the

direction of the arrows. The spreader has a series of blades 41 which as illustrated dip beneath the level of the acid and comprise portions 42 extending out generally parallel to the radius and portions 43 extending in the forwardly direction at angles of approximately 45° to the portions 42. Suitably separating hubs 44 are provided along the spreader. These tend to break up any spray which may travel longitudinally of the axis of the spreader.

Immediately above the spreader is located a baffle 45 which is unusual in that it has a hollow plenum chamber 46 inside the baffle. The baffle has a curved lower portion 47 which converges toward the circumference of the spreader as it moves upwardly and forwardly, terminating at a point 48 desirably located above the axis of the spreader. This is the point of maximum proximity between the baffle and the spreader. The baffle then diverges forwardly and upwardly in a nose 50 which is provided with a plurality of spray openings 51 extending longitudinally from end to end of the baffle. The direction of the forward edge of the nose is toward a position adjacent the bottom of the plate being etched so that air going through the openings meets the upwardly directed acid spray at a converging angle.

The upper surface 52 of the baffle is not critical but is preferably extended diagonally upwardly so that it will drain. The plenum chamber 46 inside the baffle is supplied with air under pressure from a rotary blower 53 having suitable air inlet at the end and covered by a cover 54 to protect against acid in the atmosphere. The blower is driven by a suitable motor not shown.

At the upper end of the receptacle a suitable exhaust fan 55 is provided, driven by a suitable motor, not shown, and drawing air from an opening 56 in the end of the fan and discharging it through a stack 57.

In operation it will be evident that the plate is placed on the support and the spreader and blower are started simultaneously. Acid is carried by the spreader up into the space between the spreader and the baffle and projected toward the plate. Air passing through the air jet openings 51 mixes with the acid and thoroughly aerates it through the entire length of the spreader. The mixture of acid and air is then projected against the plate and combines normal acid attack with oxidation to etch the plate rapidly with a minimum of undercutting. A very uniform etching is obtained which is uniformly effective in the normal etching and in oxidation. By this means a very efficient use of acid is obtained, resulting in a saving in acid consumption.

The effect of the air passing through the acid is also to cool the acid and avoid build-up of excessive temperature.

Insofar as the acid cloud 58 projected by the spreader and the blower pass above the plate, the excess passes between the space between ribs 33 and drops down behind the plate at 60, thus avoiding the downward flow of excess acid over the surface of the plate which might cause undercutting.

I find that it is best to employ enough air to aerate the acid and obtain effective oxidation, but not to blow grossly excessive quantities of air through the jets 51, as such excessive quantities of air are likely to cause a pressure in the tank of the etching machine, and fumes which normally escape through the stack would find their way into the etching room, and thus reduce the benefit otherwise obtained by the invention. The exhaust fan takes off the fumes from the interior of the receptacle.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I, therefore, claim all such insofar as they fall within the reasonable spirit and scope of my claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In an etching machine for etching a plate, a receptacle for etchant, a rotary spreader for distributing etchant over a plate, a support for a plate to be etched at a position opposite the spreader, a hollow baffle above the spreader having spray openings through the baffle directed generally toward the plate, means for turning the spreader to make it move toward the plate at the top and a blower communicating with the interior of the hollow baffle and adapted to supply air to the spray openings.

2. In an etching machine, a reservoir for etchant, a support for a plate to be etched, a rotary spreader in the receptacle, a hollow baffle having a curved surface on the side of the spreader remote from the plate extending above the spreader and having a nose directed generally toward the plate and having spray openings through the nose located along the length of the baffle above the spreader, means for turning the spreader to make it move toward the plate at the top and a blower communicating with the interior of the baffle and adapted to distribute air through the spray openings in the nose.

3. In an etching machine, a receptacle for etchant, a rack for supporting a plate to be etched inside the receptacle in a generally vertical position, a rotary spreader inside the receptacle and adapted to spray etchant on the plate, a baffle curving above the spreader on the side remote from the plate converging toward the spreader and upwardly deflecting to form a nose at approximately the center of the spreader, the nose extending diagonally upwardly and directed toward the bottom of the plate, walls forming spray openings through the nose, means for turning the spreader to make it move toward the plate at the top, a blower communicating with the spray openings to supply air through the spray openings along the length of the spreader, and an exhaust fan connected to the inside of the receptacle.

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