

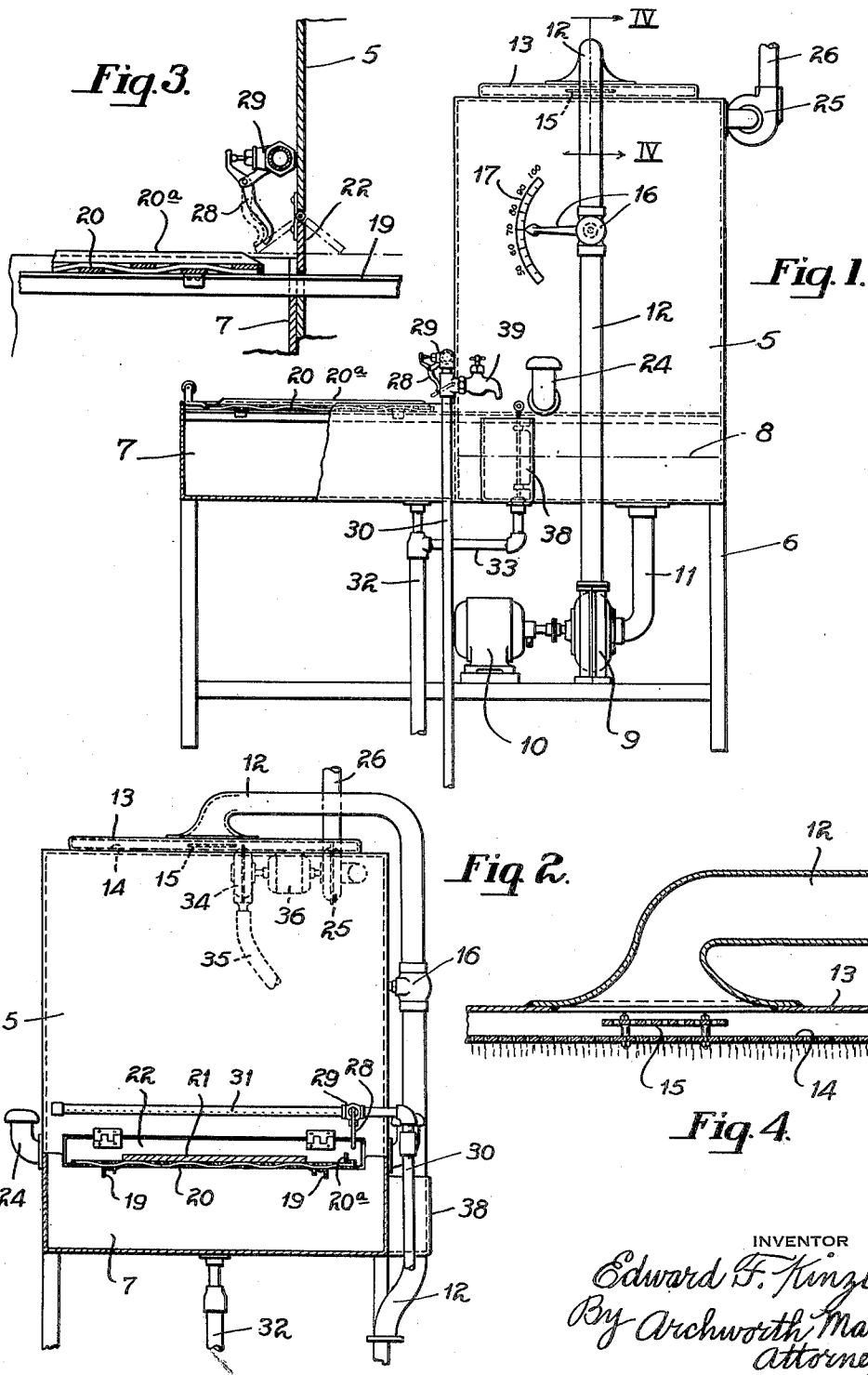
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E. F. KINZLER

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ETCHING APPARATUS

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INVENTOR
Edward F. Kinzler,
 By *Archworth Martin,*
 Attorney.

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ETCHING APPARATUS

Edward F. Kinzler, Pittsburgh, Pa.

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My invention relates more particularly to the etching of plates such as are employed in the photoengraving and analogous arts, and more particularly to the subjecting of said plates to the action of acid solutions which are employed for producing "relief" on the printing surface of the plate, but it will be understood that various features of the invention are capable of use in other ways.

One object of my invention is to provide apparatus of the character referred to wherein there is more uniform distribution of liquid spread over the surface of a plate and consequently more uniform etching thereof than in various forms of apparatus heretofore employed.

Another object of my invention is to provide an improved manner of circulating the acid solution and controlling the rate of supply thereof to the plates being treated to control the etching rate on the plates.

Still another object of my invention is to provide apparatus whereby the handling of the plates is facilitated, together with means for automatically subjecting the plates to a washing operation, upon withdrawal thereof from the acid-treating cabinet.

A further object of my invention is to provide an apparatus of the character referred to of generally simplified and improved form, whereby turning and acid-brushing of the plates is eliminated.

As shown in the accompanying drawing, Figure 1 is a side elevational view of the apparatus; Fig. 2 is a vertical sectional view thereof, looking from the left-hand end of Fig. 1; Fig. 3 is an enlarged sectional view of a portion of the apparatus of Fig. 1, and Fig. 4 is a view taken on the line IV—IV of Fig. 1, on an enlarged scale.

The apparatus includes a treating or acid chamber 5 which is mounted upon a suitable table or supporting frame 6, and which may suitably be formed of acid-resisting metal or enameled steel plates. A washing tank 7 is also mounted upon the framework 6.

The chamber 5 normally contains a body of acid solution or mordant of substantial volume and depth, as indicated at 8, and said solution is circulated by means of a pump 9 which is driven from a motor 10. The solution is drawn from the tank through a pipe 11, and forced by the pump 9 upwardly through a pipe 12, which discharges into a spray head 13. The spray head extends across and closes the major portion of the uppermost portion of the chamber 5, and a perforated wall or plate 14 extends across the lower side of the spray head and is provided with a large number of perforations distributed throughout its area.

The acid solution is preferably supplied to the

spray head rapidly enough to maintain substantial pressure within the spray head, so that the solution will be sent through the perforations of the plate 14 with considerable force.

A perforated baffle plate 15 is provided in the path of flow from the pipe 12, and this plate is provided with perforations which are preferably somewhat larger than perforations in the plates 14, so that while the plate 15 will assist in effecting distribution of the liquid somewhat uniformly through the spray head, nevertheless the spray openings or perforations directly beneath the plate 15 will receive an adequate supply of liquid. A control valve 16 serves to regulate flow through the pipe 12, and has a stem or handle that is located in proximity to a graduated scale 17 that is positioned on the side of the chamber 5. The motor 10 is usually driven at a constant speed, so that when the valve 16 is positioned at a certain point with respect to the scale 17, a given number of gallons of solution per minute will be supplied to the spray head. I have found that good results are secured by supplying liquid at from 50 gallons to 100 gallons per minute, the rate per minute, of course, depending upon the relative coarseness or fineness of the work.

Slide rails or track rails 19 extend across the wash tank 7 and into the chamber 5. A tray or plate rest 20 is slidably supported upon the rails 19, and has its bottom preferably of lattice or mesh-like form, so that the acid spray can pass through those portions thereof which are not covered by a photo engraving print or plates. Plates 21 which are to be subjected to the acid solution are placed upon the tray 20 which is then slid past a swinging door or gate 22, into the chamber 5, where the plates will be disposed directly beneath the spray head and be subjected to the action of the downwardly discharged solution.

The tray is preferably of such size as to receive four plates comprising a set of plates employed in color printing. The area of the perforated plate 14 is preferably equal to the area of the tray 20, so that a plurality of plates to be treated will be uniformly subjected to the action of the solution.

Circulation of air through the chamber 5, and removal of gases from the chamber is secured by means of hooded air inlets 24 at the sides of the chamber, through which atmospheric air may enter during exhaust of vapors and gases from the upper end of the chamber. Forced draft or exhaust from the chamber 5 is secured by a pump or blower 25 which draws the air and gases from the tank and discharges the same through a pipe 26 to a point where such fumes and gases will not affect the operator.

When the plate or plates contained on the tray 20 have been subjected to the acid solution

for a sufficient period of time, the tray is withdrawn through the door 22. A grid or bar 20* projecting upwardly from the tray 20, pushes the door 22 in either direction, when the tray is inserted into and withdrawn from the chamber 5. Upon the withdrawal movement of the tray, the bar pushes the door 22 against a lever 28 which opens a valve 29 so that flushing water may flow from a water supply pipe 30 to a water spray pipe 31, and be discharged upon the etched plate to wash the acid therefrom.

The wash water will flow into the tank 7, from which it may be drawn off through a waste pipe 32 to which a drain pipe 33 from the chamber 5 is also connected, for the withdrawal of waste acid and flushing water from the chamber 5 when it is desired to change the acid solution.

The plates may then be subjected to drying air that may be supplied from a blower 34 through a pipe 35 which will lead to a suitable position above the plate. The blower 34 may conveniently be driven by a motor 36 which also drives the draft fan or blower 25.

The acid solution in the chamber 5 may conveniently be replenished by the introduction of acid to a charging chamber 38, and by admitting water to said chamber through a tap 39 that has connection with the water supply pipe 30.

In the etching operation, it is, of course, necessary that the shadows, half-tones and highlights be fully and accurately developed on the plates, and it is particularly important that the etching for the various tones be uniform over the entire surface of each plate. There is present on the surface of the plates a scum which, heretofore, the operator has attempted to remove before inserting the plates into the acid chamber by brushing, but this brushing has not been satisfactory or effective to remove the scum entirely. I have found, however, that such brushing is unnecessary, since the scum is effectively removed by the action of the downwardly discharged solution, particularly when the liquid is supplied at a high rate per minute, for example, at a rate between 85 and 90 gallons per minute for a short period of time.

After the scum has been removed, the rate of flow is lowered and the plates subjected to the acid spray for a sufficient period of time to develop fully the shadows. During this period, it is unnecessary, as formerly practised, to remove the plates and turn them relative to their former position, usually four times, in order to render the etching uniform over the plates.

Apparently, uniformity of etching and the elimination of such plate turning is due to the proper distribution of the acid by the baffle plate 15 through the spray head, and its discharge therefrom under pressure and at a sufficient rate of flow that the plates are subjected to fresh acid which is effective to wash away the contaminated acid.

After the shadows or details are etched properly in the plates, the valve is actuated to increase the rate of flow, to develop the middle tones, and further actuated to increase the rate of flow to possibly 90 gallons per minute to bring out the highlights. However, the period of time that the plates are exposed or subjected to the high volume flow is much less than the period of time that the plates are subjected to the low volume flow, but, in practice, the entire time re-

quired for proper etching of fine work is approximately fifty percent lower than the time required by methods heretofore practised.

Not only are the plates uniformly etched over their entire surface, but the production of a set of plates utilized in color printing having exactness in characteristics is facilitated by the uniformity of etching under the downwardly discharged acid solution, so that the plates in effect are duplicates.

When etching coarser work, a high volume acid discharge is employed to decrease the time required for etching the plates.

I claim as my invention:—

1. Etching apparatus comprising a treating chamber adapted to contain a body of liquid in its lower portion, means for supporting a plate above said liquid, a downwardly-discharging spray head at the upper end of said chamber and extending across the major portion of the chamber, a pipe communicating with said spray head, a pump device for withdrawing liquid from a lower portion of the chamber, and discharging it through said pipe into the spray head, and a perforated baffle plate disposed in the path of flow of said liquid as it enters the spray head.

2. Etching apparatus comprising a treating chamber adapted to contain a body of liquid in its lower portion, means for supporting a plate above said liquid, a downwardly-discharging spray head at the upper end of said chamber and extending across the major portion of the chamber, a pipe for conveying liquid into said spray head, and a perforated baffle plate disposed in the path of the liquid which enters the spray head.

3. Etching apparatus comprising a treating chamber adapted to contain a body of liquid in its lower portion, means for supporting a plate above said liquid, a downwardly-discharging spray head at the upper end of said chamber and extending across the major portion of the chamber, a pipe for conveying liquid into said spray head, and a perforated baffle plate disposed in the path of the liquid which enters the spray head, the baffle plate being of small area relative to the area of the spray head, and provided with perforations of substantially larger area than the perforations in the spray head.

4. Etching apparatus comprising a treating chamber wherein photographic plates may be subjected to the action of a liquid, a tray for supporting photographic plates and movable into the said chamber, a swinging door in one wall of the said chamber, and means on the tray for pushing said door from its closed position to an open position, during movement of the tray into and out of said chamber.

5. Etching apparatus comprising a treating chamber wherein photographic plates may be subjected to the action of a liquid, a tray for supporting photographic plates and movable into the said chamber, a swinging door in one wall of the said chamber, means on the tray for pushing said door from its closed position to an open position, during movement of the tray into and out of said chamber, the door being swingable inwardly and outwardly, and a flushing valve device positioned to be operated by the door upon outward swinging movement thereof during withdrawal movement of the tray.

EDWARD F. KINZLER.