Oct. 31, 1939. H. G. PFAFFMANN 2,177,877

ETCHING MACHINE

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Fig. 1

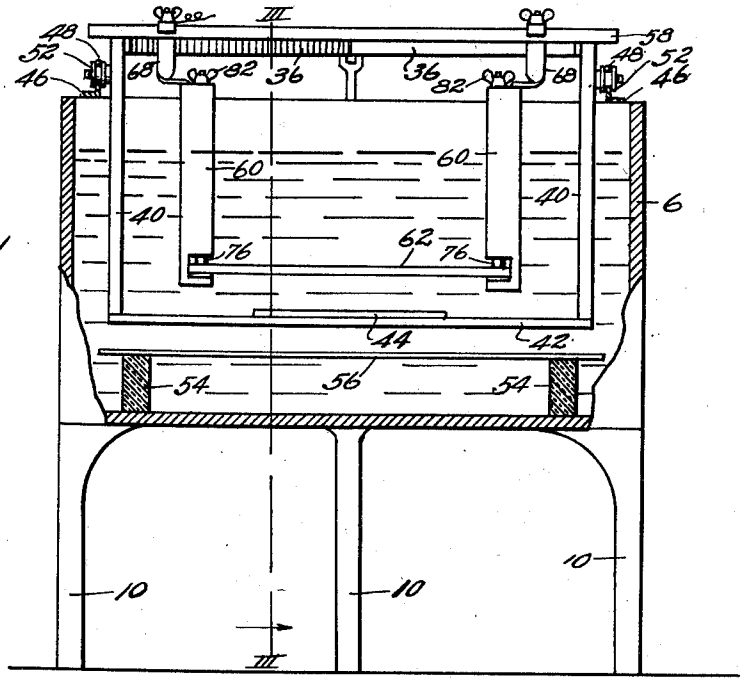
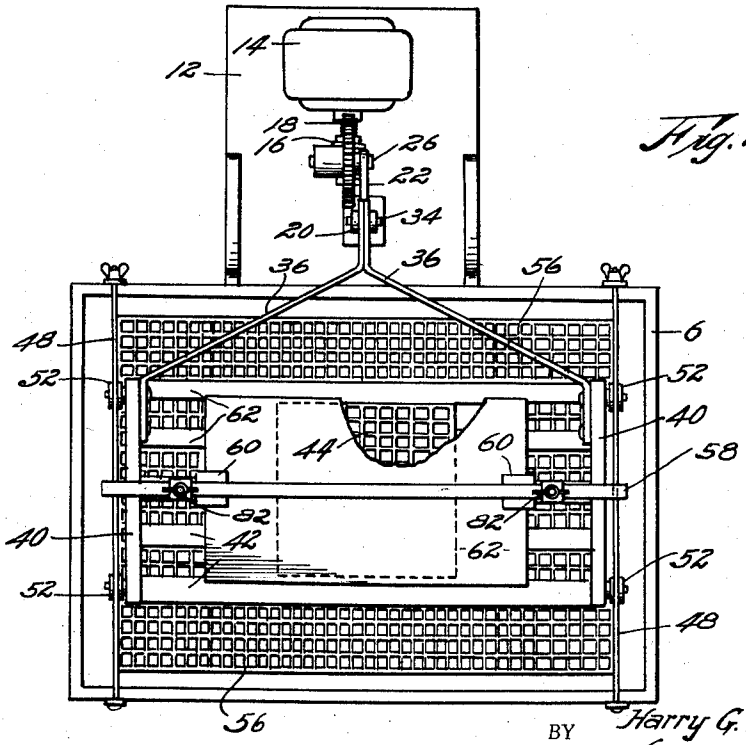


Fig. 2.



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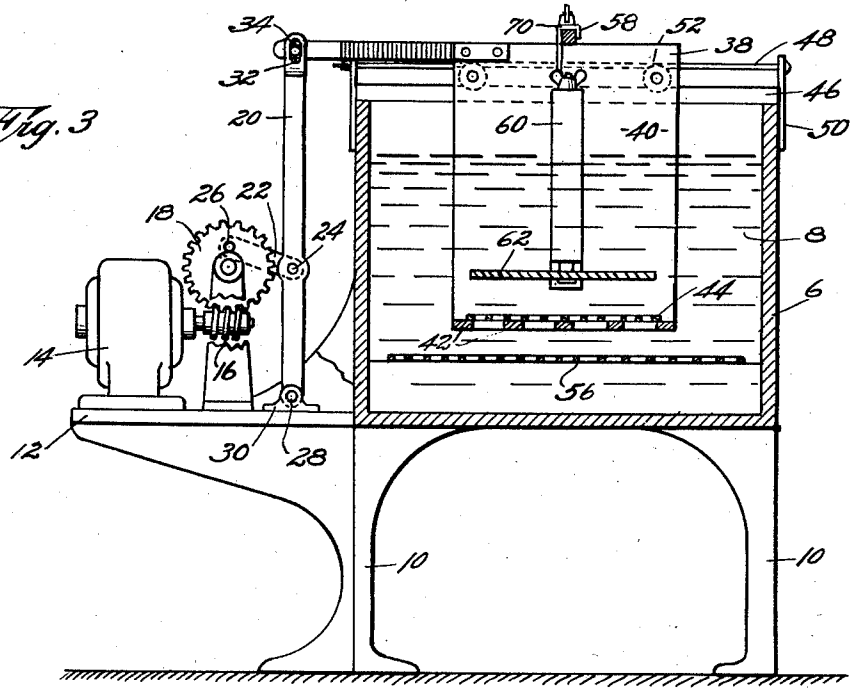
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Fig. 3



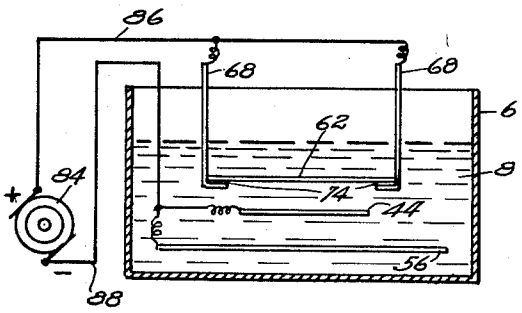


Fig. 5

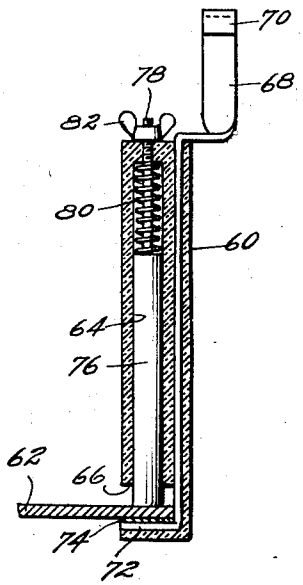


Fig. 4

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2,177,877

ETCHING MACHINE

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Application November 16, 1936, Serial No. 111,089

6 Claims. (Cl. 204—5)

This invention relates to electrical etching machines and has for one of its primary objects, the provision of means for more evenly and uniformly etching printing plates of relatively large areas through the use of a main and supplemental grid forming the cathode in the machine while the plate being etched constitutes the anode.

One of the important aims of this invention is the provision in an electrical etching machine of the aforementioned character, of a supplemental cathode which is supplied in addition to the main cathode of the apparatus, and in such relation thereto and to the plate being etched as to produce highly desirable and unexpected results without complicating the machine nor adding to the cost of operation.

A number of minor objects will appear during the course of the following specification, referring to the accompanying drawings, wherein:

Figure 1 is a front elevation of an electrical etching machine made in accordance with the present invention.

Fig. 2 is a top plan view of the same.

Fig. 3 is a vertical, sectional view through the machine, taken on line III—III of Fig. 1.

Fig. 4 is an enlarged, detailed, longitudinal section through one of the plate holders of the machine, and,

Fig. 5 is a diagrammatical view illustrating the electrical relation between the anode and cathodes of the machine.

Referring to the drawings illustrating the preferred embodiment of the invention, the numeral 6 designates a vat or like container for the bath 8. This bath 8 may be of the conventional, well known character, but in practicing the invention, it has been found that a saturated solution of ordinary salt (NaCl) is satisfactory.

This bath, sometimes called an electrolytic bath, is a conductor and serves to submerge the hereinafter described anode and cathodes. Vat 6, supported by legs or standards 10, is provided with an outwardly extending shelf 12, upon which is mounted a motor 14, having a worm 16 secured to its shaft. Pinion 18, in mesh with worm 16, is connected to rocker arm 20 through the medium of a link 22, one end of which is pivotally affixed as at 24 to rocker arm 20, while the other end thereof is pivotally secured as at 26 to pinion 18, eccentric to its axis of rotation.

One end of rocker arm 20 carries a pintle 28, that is journalled in bearings 30 mounted upon shelf 12. The other end of rocker arm 20 is bifurcated and the opposing jaws formed by the bifurcation are provided respectively with slots 32, wherein rides cross pin 34, traversing yoke 36. Yoke 36 is substantially Y-shaped and the leg thereof is in connection with the upper end of rocker arm 20 through the medium of the aforesaid cross pin 34. The two legs of yoke 36 are secured to the movable rack 38. This rack is substantially U-shaped and comprises legs 40, connected by a number of slats 42, upon which rests a supplemental grid 44. Rack 38 is mounted for movement through the employment of tracks 46, one of which is mounted along the top of vat 6, adjacent each end thereof, and guide bars 48, that are maintained in parallelism with each track respectively by brackets 50. Rollers 52, mounted upon legs 40, ride along tracks 46 so as to impart rectilinear reciprocating movement to rack 38 as motor 14 drives the aforementioned intermediate mechanism during the etching operation.

Main grid 56 is large enough to underlie grid 44 and plate 62 during the entire rectilinear reciprocating movement of grid and plate 44 and 62 respectively.

Spacer blocks 54 in the bottom of vat 6, support main grid 56 in spaced relation to the floor of vat 6 and below slats 42. A bus bar 58 rests upon the upper edges of legs 40 and carries two or more fixtures 60 that support plate 62 to be etched. These fixtures are specially formed and shown in detail in Fig. 4. The body thereof is preferably created of non-conducting material and has a longitudinal bore 64 extending inwardly from a notch 66 that is formed adjacent one end of the body. A strap 68, having a hook 70 formed at the outer end thereof, longitudinally traverses the body of fixture 60 and terminates at an inturned foot 72 within notch 66. This foot 72 is faced as at 74 with a silver coating so that plate 62 might contact the same.

To hold plate 62 against face 74, there is provided a plunger 76 of non-conducting material that is extended outwardly at one end in the form of a threaded shaft 78. A coil spring 80 urges plunger 76 against plate 62 and turning thumb nut 82 will overcome the force of spring 80 and withdraw plunger 76 from engagement with plate 62 when it is desired to remove the plate from the fixture. Usually two of fixtures 60 are provided and mounted upon bus bar 58, as shown in Figs. 1 and 2.

These fixtures 60 should be formed to hold plate 62 in spaced, parallel relation with supplemental grid 44, and this last mentioned grid has an area much smaller than the area of main grid 56. Since supplemental grid 44 is carried by rack 38,

it will be stationary with respect to plate 62 that is also carried by rack 38 and both 44 and 62 will be movable with respect to main grid 56 in relatively spaced paths and in paths spaced from and parallel to main grid 56.

In all instances, grid 44 and plate 62 have their centers on a common line or in alignment vertically and grid 56 is large enough to always extend beyond the edges of grid 44 and plate 62 during the etching operation so that the center of the plate being etched will be etched as deeply as the marginal portions thereof. Thus one of the most troublesome shortcomings of electrical etching machines is overcome.

Reference to Fig. 5 will teach the manner in which plate 62, forming the anode, and grids 44 and 56, forming the cathode, are joined to a conventional source of current 84. This source of current may be a generator of commercial type, and plate 62 is connected to the positive pole thereof by wire 86 and straps 68 of fixture 60. The cathodes in the form of grids 44 and 56, are joined to the negative pole of generator 84 by a wire 88, so that the circuit is completed to effectively electrically etch plate 62.

It is conceivable that machines having widely varying characteristics might be made to embody this invention, and while the preferred form has been illustrated and described, it is desired to be limited only by the spirit of the invention and scope of the appended claims.

Operation

When plate 62 is in operative position in fixtures 60 with its face side down and in a horizontal plane, motor 14 is started and current for generator 84 directed through the circuit above traced. Grid 44 and slats 42 of rack 38 will agitate the electrolytic bath between main grid 56 and plate 62 sufficiently to wash the face of plate 62 and keep the same clear of deposits and bubbles.

Main grid 56 is always large enough to underlie grid 44 and plate 62 and the throw of link 22 and arm 20 may be altered as desired.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. An electrical etching machine comprising an electrolytic bath; means for supporting a plate therein to be etched; mechanism for moving said supporting means through a path of travel; conductors connecting the plate, which forms an anode, with the positive pole of a source of current; a main grid having an area appreciably greater than the plate in spaced parallel relation with said plate; a supplemental grid, shorter in length than the anode plate, carried by the plate supporting means, between the said plate and said main grid for movement with the plate; and conductors connecting the main grid and the supplemental grid, forming cathodes, to a source of current said main grid being great enough in area to have a portion thereof in opposed relation to the plate and supplemental grid as the same are carried by the supporting means as it moves through said path of travel.

2. An electrical etching machine comprising an electrolytic bath; means for supporting a plate therein to be etched; mechanism for reciprocating said supporting means; conductors connecting the plate, which forms an anode, with the positive pole of a source of current; a stationary main grid in spaced parallel relation with said plate; a supplemental grid, shorter in length than the anode plate, carried by the plate supporting means, between the said plate and said main grid for movement with the plate; and conductors connecting the main grid and the supplemental grid, forming cathodes, with the positive pole of the source of current, said supplemental grid being in spaced parallel relation with both the main grid and said plate said plate and the grids being in horizontal planes, said main grid being lowermost and having an area great enough to have a portion thereof below the plate and supplemental grid as the same are reciprocated by the supporting means.

3. An electrical etching machine comprising an electrolytic bath; means for supporting a plate in a horizontal plane therein to be etched; mechanism for reciprocating said supporting means; conductors connecting the plate, which forms an anode, with the positive pole of a source of current; a stationary main grid in spaced parallel relation with said plate; a supplemental grid, shorter in length than the anode plate carried by the plate supporting means, between the said plate and said main grid, for movement with the plate; and conductors connecting the main grid and the supplemental grid, forming cathodes, with the positive pole of the source of current, said main grid, being below the said plate in a horizontal position, said supplemental grid being spaced from and parallel to both the main grid and said plate for the purpose specified the main grid being extensive enough in area to underlie the plate and supplemental grid as the same are reciprocated.

4. In an electrical etching machine having an electrolytic bath, a plate therein to be etched forming an anode, and a main grid forming a cathode, the combination of a supplemental grid, shorter in length than the anode plate, forming a part of the cathode disposed between the main grid and the plate having an area appreciably less than the area of the main grid and having its center in alignment with the center of the plate, said supplemental grid and the plate being mounted for movement through the bath in paths spaced from and substantially parallel to the main grid, said plate and the supplemental grid being in spaced parallel relation to each other the area of said main grid being great enough to have a portion thereof opposite the plate and supplemental grid throughout their paths of travel.

5. In an electrical etching machine having an electrolytic bath, a plate therein to be etched forming an anode, and a main grid forming a cathode, the combination of a supplemental grid, shorter in length than the anode plate, forming a part of the cathode disposed between the main grid and the plate, said main grid having an area appreciably greater than the area of the plate and extending beyond the edges thereof.

6. An electrical etching machine having an electrolytic bath, a plate therein to be etched forming an anode, and a main grid forming a cathode, the combination of a supplemental grid, shorter in length than the anode plate, forming a part of the cathode disposed between the main grid and the plate having an area appreciably less than the area of the main grid and having its center in alignment with the center of the plate, said supplemental grid and the plate being mounted for movement through the bath in paths spaced from, substantially parallel with and in opposed relation to the main grid.

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