E. ALBERT.

ETCHING MACHINE.

APPLICATION FILED MAY 25, 1912.

1,081,289.

Patented Dec. 16, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

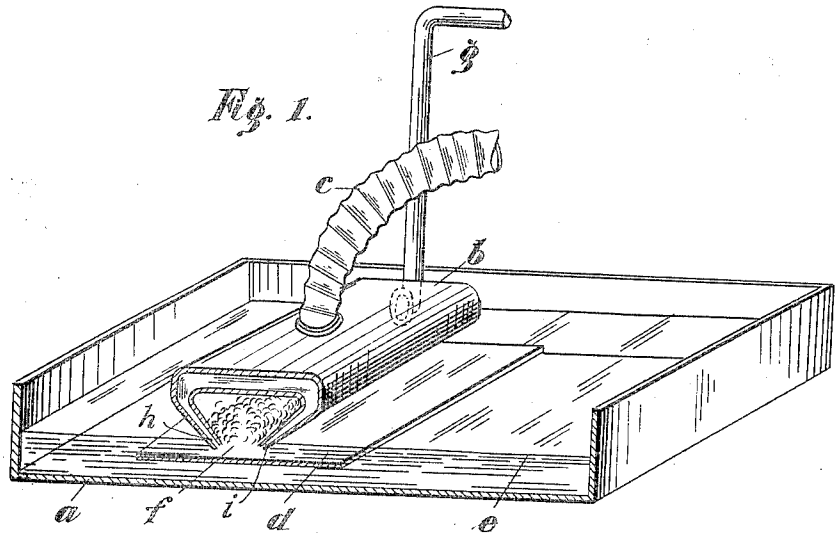
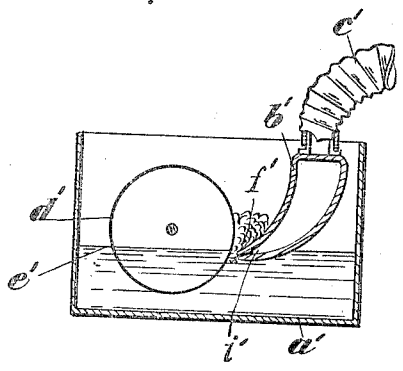


Fig. 2.



Witnesses.

D. P. Winston.

E. L. Williams

Inventor

Eugen Albert

by Delbert H. Decker

Attorney

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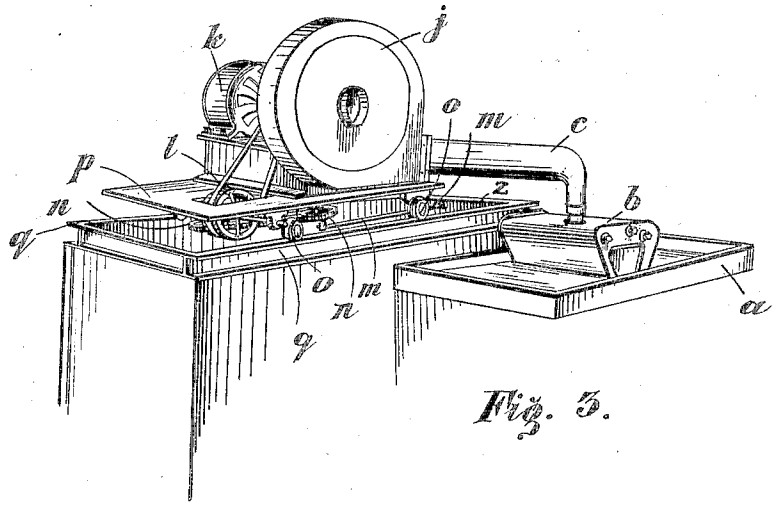


Fig. 3.

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UNITED STATES PATENT OFFICE.

EUGEN ALBERT, OF MUNICH, GERMANY.

ETCHING-MACHINE.

1,081,289. Specification of Letters Patent. Patented Dec. 16, 1913.

Application filed May 25, 1912. Serial No. 699,689.

To all whom it may concern:

Be it known that I, EUGEN ALBERT, a subject of the Emperor of Germany, residing at Kaufingerstrasse 11, Munich, Germany, have invented certain new and useful Improvements in Etching-Machines, of which the following is a specification.

This invention relates to improvements in etching machines for etching metallic goods with acid; it has reference especially to the means for carrying into practice my process for etching with a concentrated air blast either with, or without, a resistance directly opposed to the air blast for the purpose of creating a violently ebullient layer of acid contiguous to the metallic surface.

The accompanying drawings illustrate the apparatus employed.

Figure 1 is a perspective view showing in section the device for bringing an air blast near the surface of the plate to be etched; Fig. 2 shows the application of the air blast to the etching of a roller; and Fig. 3 is a perspective view showing the general construction of a complete machine for etching plates, in an etching bath.

Referring first to Fig. 1, *a* is a tray, or bath, which is filled up to *e* with acid; *c* is a tube for supplying compressed air to the saddle shaped casing or double nozzle *b*, provided with the two converging outlet branches *h* and *i* opening above the surface of the plate *d* to be etched, but below the level of the surface *e* of the acid. The release of the compressed air from *h* and *i* produces a violent whirling, or ebullient, zone *f* between the branches *h* and *i* and there the etching of the plate takes place with increased effect owing to the continued movement of the acid.

g is an exhaust tube through which it may be arranged that the injurious acid vapors exhaust into the open air without the use of any fan, or like device, but merely owing to the pressure of the air blast within the saddle-shaped nozzle *b*.

It should be observed that an increased etching effect can be obtained by the blast from a single branch of the nozzle, such as *i*, but that by introducing an active resistance to the blast therefrom a still greater effect is produced; owing to the greater concentration of the action. Such resistance is provided in the case of Fig. 1 by a second air blast namely from *h* which, meeting the first blast beneath the surface of the acid, gives rise to a much increased rapidity of displacement of the particles of acid against the surface of the metallic plate, causing increased rapidity of etching owing to the quick removal of oxids from the surface being etched. In order to act directly upon the entire surface of the plate being etched, either the bath *a* is given a reciprocating movement in relation to the double nozzle *b*, or said nozzle is moved and the bath held stationary as in Fig. 3. When only one nozzle is employed a furrow is produced which forces the particles of liquid under increased pressure against the surface of the plate; the resistance in this case being simply the deformation of the surface of the liquid to produce the furrow.

Fig. 2 shows the device applied to etching a roller, the bath being indicated by *a'*, the surface of the acid by *e'* and the air tube by *c'*. The surface *d'* to be etched in this case forms the resistance to the air blast from the blast nozzle *b'* and causes the formation of a concentrated whirling zone *f'* between the outlet *i'* and the roller *d'* along the whole length of the latter. The roller is rotated in order to present new surfaces to the whirling zone, and it will readily be seen that a similar zone may be formed with a second nozzle on the opposite side of the roller if desired.

Referring to Fig. 3, the trough or bath *a*, and the blast nozzle *b* are as previously described with reference to Fig. 1; the blast of air is produced by the fan *j* operated by the motor *k*, and both of these together with the air pipe *c*, and the double nozzle *b*, are supported by a platform *p* which is movable on the flanged wheels *o*, *o*, so as to enable the said nozzle to be moved from end to end of the trough *a*. The wheels *o*, *o* are arranged to run on the rails *q*, *q* and the movement backward and forward is effected by pivotally anchoring a rod *m* to the end rail *z* located between adjacent ends of the rails *q q* and connecting said rod to an endless chain running on a pair of sprocket wheels *n*, *n*. By means of a pulley and belt *l* from the motor the sprocket wheels *n* are rotated (through worm wheel gearing, or the like) and cause the platform *p* to reciprocate by their movement relative to the end of the rod *m* as the link of said chain to which the free end of said rod is connected travels around the wheels *n*. The whole surface of any plate in the trough *a* is thus successively covered by the whirling zone within the double nozzle *b*, and equally

etched, but if on examination some further etching is required for certain parts of the surface, it can readily be applied there. An advantage of this arrangement is that only the ends of the nozzles need be of acid proof material, and as they are not subject to mechanical strain, their construction is easily accomplished. It should be noted that a somewhat stronger resistance to the air blast may be obtained by making its passage from the single outlet *i* intermittent the acid flowing back toward the nozzle at each cessation of the blast.

What I claim as my invention and desire to secure by Letters Patent is:—

1. The combination in an etching machine, of a blast nozzle having an outlet just beneath the surface of a considerable bulk of acid in a tray or tub, means for holding the particular part of the object which is to be etched adjacent to but below the level of the blast nozzle, and means for causing longitudinal movement of the said surface and the blast nozzle in regard to each other.

2. The combination in an etching machine, of a blast nozzle having an outlet just beneath the surface of a considerable bulk of etching fluid in a tray or tub, means for holding the particular part of the object which is being etched in such a position below the surface of the fluid that it interposes a resistance to the current of fluid driven by the blast, and means for causing longitudinal movement of the surface being etched and the blast nozzle in regard to each other, substantially as and for the purpose set forth.

3. The combination in an etching machine, of a blast nozzle having an outlet just beneath the surface of a considerable bulk of etching fluid in a tray or tub, means for holding the particular part of the object being etched adjacent to, but below the surface of the fluid, a second blast nozzle in similar but relatively opposite location to the first blast nozzle in relation to the object to be etched, which projects a second air blast in opposition to the first, for the purpose of creating a resistance thereto in the fluid, and means for causing longitudinal movement of the surface being etched and the blast nozzles in regard to each other, substantially as described herein.

4. The combination in an etching machine, of a blast nozzle having an outlet just beneath the surface of a considerable bulk of etching fluid in a tray or tub, means for holding the particular part of the object being etched adjacent to, but below the surface of the fluid, means for supplying a blast of air to said nozzle, and means for causing longitudinal movement of the surface being etched and the blast nozzle in regard to each other, substantially as described.

5. In an etching machine, the combination of a two passage blast nozzle having downwardly directed converging outlets just beneath the surface of a considerable bulk of etching fluid, means for bringing compressed air to the said nozzle, an exhaust pipe connected to the space between the outlet branches of the blast device, and means for causing longitudinal movement of the surface being etched and the blast nozzles in regard to each other, substantially as and for the purpose set forth.

6. In an etching machine, the combination of a blast nozzle having downwardly directed converging outlet branches the whole width of the nozzle, with a fan and air pipe connected thereto, an etching trough arranged at a level to hold the object to be etched adjacent to the blast nozzle outlets, and means for causing reciprocation of the said blast outlets in relation to the said trough, substantially as described herein.

7. In an etching machine, the combination, of a blast nozzle having downwardly directed converging outlet branches the whole width of the nozzle, with a fan and air pipe connected thereto, an etching trough arranged at a level to hold the object to be etched adjacent to the blast nozzle outlets, a platform carrying the fan, a motor operating same and the blast nozzle, wheels to the said platform and rails for carrying same, and means for causing reciprocation of the said platform, substantially as described.

8. In an etching machine, the combination, of a blast nozzle having downwardly directed converging outlet branches the whole width of the casing, with a fan and air pipe connected thereto, an etching trough arranged at a level to hold the object to be etched adjacent to the blast nozzle outlets, a platform carrying the fan, a motor operating the fan and the blast nozzle, wheels to the said platform and rails for carrying same, a rod anchored to the rail frame at one end, an endless chain and sprocket wheels mounted on the said platform and operated by gearing from the fan motor spindle, and an attachment connecting the free end of the anchored rod to a point on the endless chain, all substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

EUGEN ALBERT.

Witnesses:
MATHILDE R. HELD,
A. V. W. COTTER.