J. H. ANDRESEN.

METHOD AND APPARATUS FOR PHOTOGRAVURE ETCHING.

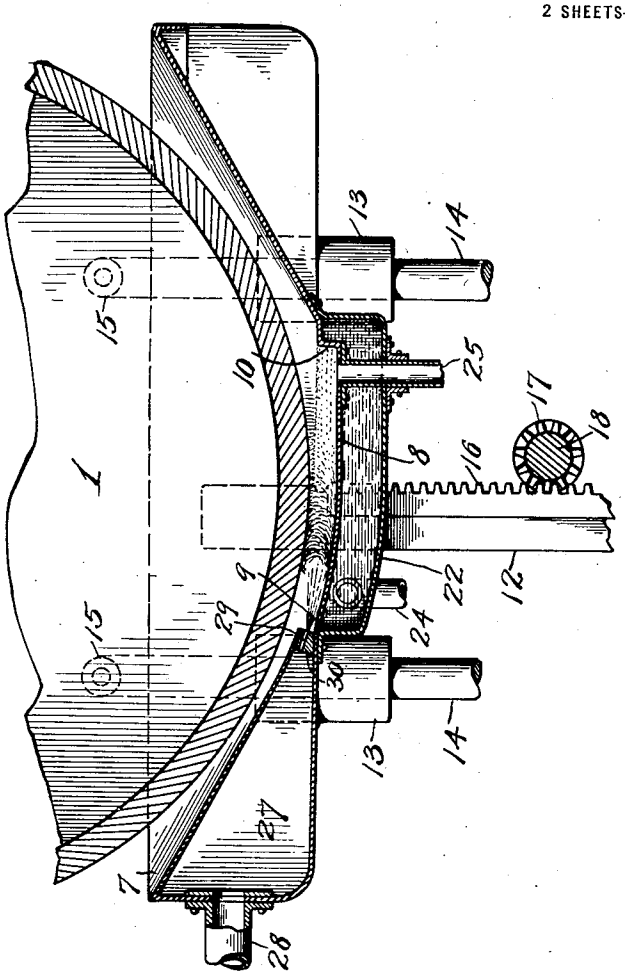
APPLICATION FILED NOV. 5, 1918.

1,371,338.

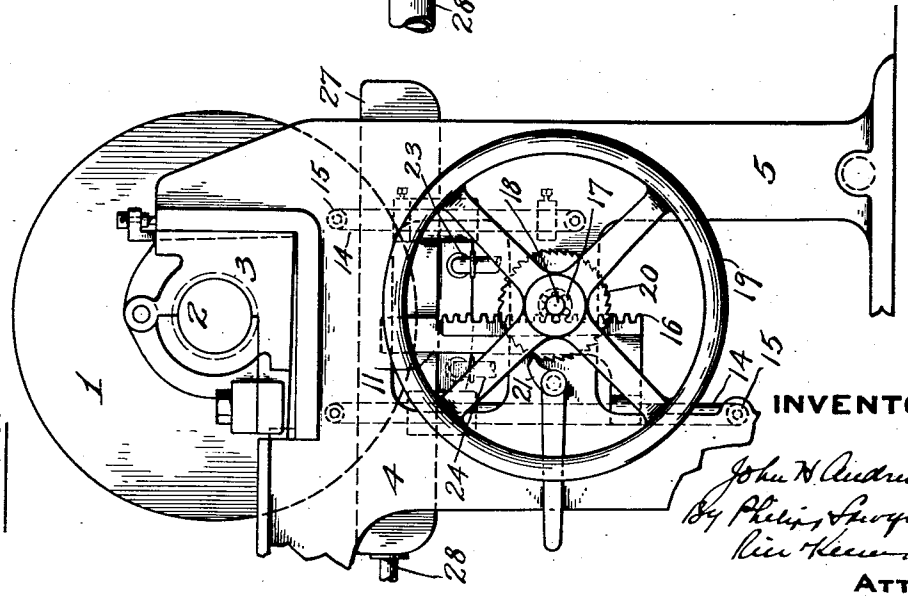
Patented Mar. 15, 1921.

2 SHEETS—SHEET 1.

—FIG. 3.—



—FIG. 1.—



INVENTOR

John H. Andresen

By Philip Stenger

Rice Kenny

ATT'YS

J. H. ANDRESEN.

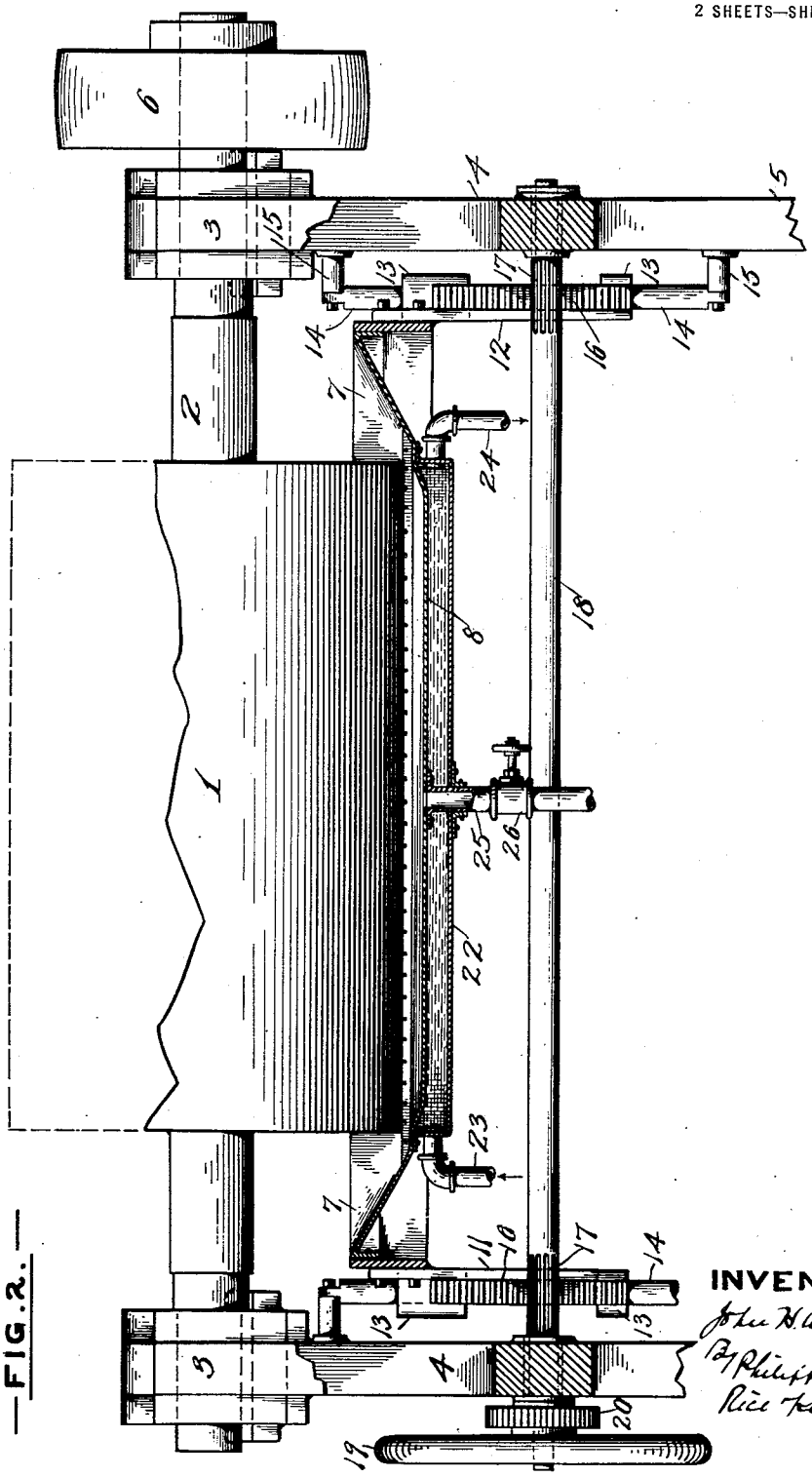
METHOD AND APPARATUS FOR PHOTOGRAVURE ETCHING.

APPLICATION FILED NOV. 5, 1918.

1,371,338.

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2 SHEETS—SHEET 2.



—FIG. 2.—

INVENTOR.

John H. Andresen

By Philipp Sawyer

Rice Kenney

ATT'YS.

UNITED STATES PATENT OFFICE.

JOHN H. ANDRESEN, OF GLEN ROCK, NEW JERSEY, ASSIGNOR TO R. HOE AND CO., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

METHOD AND APPARATUS FOR PHOTOGRAVURE ETCHING.

1,371,338. Specification of Letters Patent. Patented Mar. 15, 1921.

Application filed November 5, 1918. Serial No. 261,193.

To all whom it may concern:

Be it known that I, JOHN H. ANDRESEN, a citizen of the United States, residing at Glen Rock, county of Bergen, and State of New Jersey, have invented certain new and useful Improvements in Methods and Apparatus for Photogravure Etching, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to certain improvements in methods of and apparatus for etching designs on photogravure plates, and has been designed particularly for etching photogravure plates of that class in which an endless cylindrical etched plate is produced such as now used in rotary photogravure printing.

In photogravure etching, particularly in etching continuous cylindrical plates, it has been the custom to take a copper cylinder and prepare on it with some gelatin tissue the design which is to be etched, this compound resisting the etching acid to a greater or less extent, depending on the design to be etched. This design heretofore has been etched by pouring on the cylinder by hand the etching acid from receptacles of comparatively small size. This method has certain disadvantages, in that the cylinder is not covered evenly and quickly, and by this method of handling also the temperature during the etching operation is not regulated, these all tending to produce an inferior etching.

It is the especial object of the invention to provide a method and apparatus by which the surface of the cylindrical or other plate which is to be etched may be evenly and quickly covered with acid.

It is a further object of the invention to apply the acid to the plate under continuous agitation and thoroughly aerated and to keep the acid at a constant desired temperature to effect a thorough and even etching.

It is a further object of the invention to provide a construction in which the relation between the acid and the plate may be varied while the machine is in operation and by which the strength of the acid may be conveniently changed.

It is a further object of the invention to provide a construction in which the various parts of the apparatus, except the acid container, is kept free from and clear of the acid so as to avoid corrosion and injury to the parts.

It is a further object of the invention to produce a method and apparatus whereby the amount of acid necessary for the etching is reduced to a minimum, thus effecting a saving in acid.

With these and other objects in view, the invention consists in a certain novel method and apparatus which will be described in connection with the accompanying drawings, in which—

Figure 1 is an end elevation, partly broken away, of an improved apparatus for carrying out the invention;

Fig. 2 is a side view, partly in section and partly broken away, illustrating the invention as applied to etching a cylindrical plate, and

Fig. 3 is a cross sectional view on a larger scale illustrating the manner in which the etching acid is applied to a cylindrical plate.

Referring now to the drawings, the invention has been illustrated as used for etching a cylindrical cylinder on which the design has been prepared, though it will be understood that if desired the invention may be employed for etching plates other than cylindrical. In the particular construction illustrated, however, the design is etched on a design cylinder 1 carried on a shaft 2 suitably mounted in bearings 3 supported on side frames 4 rising from standards 5 of any suitable or desired construction. This design carrying cylinder is mounted to rotate in the bearings and is driven in any suitable manner, as from a pulley 6.

This design-carrying cylinder is rotated and during its rotation the etching acid is applied to etch the design on the surface thereof in such manner as to be evenly and quickly distributed over the cylinder surface as it rotates. I have found that the acid may be quickly and evenly distributed and a very effective etching result produced by rotating the cylinder over a supply of acid and, during the etching operation, directing a current of air against the acid supply so as to thoroughly agitate and aerate the acid and bring it in contact with the surface of the cylinder. I have found, furthermore, that the best results may be obtained by directing the air current against the acid sup-

ply so as to in effect bank up or produce a wave in the acid, which raises it into etching contact with the cylinder, the cylinder and acid being adjusted relatively to each other so that with the air current turned off, the surface of the cylinder will just clear the surface of the acid, and by turning off the air, the cylinder will be clear of acid and the etching operation stopped. In apparatus embodying the invention in its best form, furthermore, the air current will be delivered from a point which is clear of the acid supply, so as to prevent corrosion of the air supplying parts.

While various apparatus may be designed for carrying out the method, that shown has been effective in operation. In this construction, the etching acid is carried in a pan 7 having a shallow acid-containing bottom portion 8, the one wall 9 of which slopes gently toward the bottom and the other opposite wall is formed with a jog forming a dam or abutment 10 against which the acid may back up when the air is applied, as hereinafter referred to. In the best constructions, this pan will be supported so that the distance between the surface of the design-carrying cylinder or other plate to be etched and the surface of the acid may be varied and preferably so that this variance may be effected while the machine is in operation. This can be effected in various ways, but in the preferred construction the acid pan is carried on a pair of plates 11, 12 provided with upper and lower guiding projections 13 mounted to slide on rods 14, these rods being detachably connected to studs 15 secured to the side frames 4 before referred to. These side plates have secured thereto racks 16 which mesh with teeth 17 formed on the ends of a cross shaft 18 suitably supported in the side frames of the machine. This shaft 18 may be operated by a hand wheel 19, by the rotation of which the racks and the supporting plates 11 may be raised or lowered to adjust the relation of the surface of the cylinder to the surface of the acid as may be desired. A ratchet 20 and pawl 21 (shown in Fig. 1) may be employed for holding the parts in adjusted relation.

In the best constructions, means will be provided for maintaining the temperature of the etching acid constant. While these means may be varied, as best shown the pan is provided beneath its bottom and below the acid with a jacket 22 through which water at any desired temperature may be circulated through pipes 23, 24, this construction insuring an even etching temperature of the acid. If desired, a drain pipe 25, extending from the bottom of the pan through the jacket and provided with a controlling valve 26, may be provided for draining the acid from the pan.

In accordance with the invention means will be provided for agitating and aerating the acid, as it has been found in practice that such agitation and aeration produce the best results. This is effected by providing a current of air under suitable pressure and, in the best constructions, this air is delivered against the acid so as to cause it to bank up in the pan and raise the acid into etching contact with the surface of the cylinder. As shown in Figs. 2 and 3, the air under pressure is supplied from chamber 27 to which air is supplied from any suitable source through a pipe 28, this chamber acting as an expansion chamber in which the air may expand to the desired pressure. The air is delivered from this chamber through a plurality of small nozzles 29 extending along the length of the cylinder, a suitable number of these nozzles for effecting the purpose being supplied, these nozzles being preferably formed in a removable block 30 which can be readily taken out for inspection and repair. As illustrated in Fig. 3, the air is delivered down the gentle forward incline or slope 9 of the pan, before referred to. This action forces the acid body sidewise and causes it to back up against the shoulder 10 on the other side of the pan and to raise or elevate it, as shown in this figure, in the form of a wave, which brings the acid into etching contact with the surface of the cylinder to be etched. The air at the same time keeps the acid agitated and thoroughly aerated, and the air nozzle and adjacent parts are out of contact with the acid, thus preventing corrosion of these parts.

With this construction, the acid is thoroughly agitated and aerated and is applied quickly and evenly along the surface of the cylinder. To stop the etching action, it is simply necessary to turn off the air, whereupon the acid will subside below the surface of the cylinder and the etching action be arrested.

While the construction shown and described is found to be an effective one for the purpose, it will be understood that the invention is not to be restricted to the specific construction shown and described, but that the method may be used with a wide variety of apparatus, and in apparatus in which plates other than cylinders are to be etched. It will also be understood that, while the apparatus illustrated is a simple and effective one for carrying out the method, the invention is not restricted to the precise form and arrangement of apparatus, but that such form and arrangement as to details may be varied.

What is claimed is:

1. The method of etching a photogravure plate with etching acid, which consists in supporting a plate so as to be normally out

of contact with the acid and effecting a continuous contact during the etching operation of a mass of acid with the plate by delivering an air current sidewise against the acid from above the surface thereof.

2. The method of etching a cylindrical plate with etching acid, which consists in supporting a plate so as to be normally out of contact with the acid and effecting a continuous contact during the etching operation of a mass of acid with the plate by directing a current of air sidewise against the acid above the surface thereof while the plate is rotating over the acid.

3. The method of etching a photogravure plate with etching acid, which consists in supporting a plate so as to be normally out of contact with the acid and effecting a contact during the etching operation of a mass of acid with the plate by directing a current of air sidewise against the acid from a point above the surface thereof.

4. The method of etching a cylindrical photogravure plate with etching acid, which consists in supporting the plate so as to be normally out of contact with the acid and effecting a contact during the etching operation of a mass of acid with the plate by directing a current of air sidewise against the acid from a point above the surface thereof while the plate is rotating over the acid.

5. The method of etching a photogravure plate with etching acid which consists in supporting a plate so as to be normally out of contact with the acid and effecting a continuous contact of a mass of acid with the plate by directing a current of air against the acid at a point above the surface thereof while maintaining the acid at a constant temperature.

6. In a machine for etching photogravure plates with etching acid, the combination of a plate carrier, an acid supply normally out of contact with a plate on the carrier, and means for directing a current of air under pressure against the acid for bringing it into etching contact with a plate, and maintaining it in contact with the plate during the etching operation.

7. In a machine for etching photogravure plates with etching acid, the combination of a plate carrier, an acid supply normally out of contact with a plate on the carrier, means for directing a current of air under pressure against the acid for bringing it into etching contact with a plate, and maintaining it in contact during the etching operation, and means for controlling the temperature of the acid while in etching relation with the plate.

8. In a machine for etching photogravure plates with etching acid, the combination of a plate carrier, means for supporting an acid supply normally out of contact with a plate on the carrier, means for directing a current of air under pressure against the acid for bringing it into etching contact with the plate, and means for effecting a relative movement of the acid supply and the carrier.

9. In a machine for etching photogravure plates with etching acid, the combination of a plate carrier, means for supporting an acid supply normally out of contact with a plate on the carrier, means for directing a current of air under pressure against the acid for bringing it into etching contact with the plate, means for effecting a relative movement of the acid supply and the carrier, and means for controlling the temperature of the acid.

10. In a machine for etching photogravure plates with etching acid, the combination with a plate carrier, an acid supply normally out of contact with the plate on the carrier, means for directing a current of air sidewise under pressure against the acid from a point above the surface of the acid for causing it to bank up and bring it into etching contact with a plate.

11. In a machine for etching photogravure plates with etching acid, the combination of a rotary plate carrier, an acid container over which the carrier rotates normally out of contact with the acid in the container, and a series of nozzles located out of contact with the acid extending along the carrier for directing a current of air under pressure against the acid and causing it to bank up in the container into etching contact with a plate.

12. In a machine for etching photogravure plates, with etching acid, the combination of a rotary plate carrier, an acid container over which the carrier rotates normally out of contact with the acid in the container, a series of nozzles located out of contact with the acid extending along the carrier for directing a current of air under pressure against the acid and causing it to bank up into etching contact with a plate, and means for regulating the temperature of the acid in the container.

13. In a machine for etching a photogravure plate with etching acid, the combination of a plate carrier, an acid bath normally out of contact with the plate, a series of nozzles located out of contact with the acid extending along the carrier for directing a current of air under pressure against the acid to bring it into etching relation with the plate.

14. In a machine for etching photogravure plates with etching acid, the combination of a rotary plate carrier, an acid container mounted below the carrier over which the carrier rotates normally out of contact

with the acid therein, means for directing a current of air under pressure against the acid for bringing it into etching contact with a plate, and means for effecting a relative movement between the acid container and the carrier while the machine is in motion.

15. In a machine for etching photogravure plates with etching acid, the combination of a rotary plate carrier, a shallow tank over which the carrier rotates for holding acid normally out of contact with a plate, a wall or abutment at one side of the tank, a gently sloping wall at the other side of the tank, and connections out of contact with the acid for forcing a current of air down the sloping wall sidewise against the acid to cause it to bank up into etching relation with the plate.

16. In a machine for etching printing plates with etching acid, the combination of a plate carrier, an acid container, and a series of nozzles located out of contact with the acid and extending along the carrier through which a current of air under pressure may be directed against the acid to bring it into etching relation with the plate.

17. In a machine for etching photogravure plates with etching acid, the combination of a plate carrier, an acid supply, and means located out of contact with the acid for directing air sidewise against the acid to lift it into etching relation with a plate.

18. In a machine for etching photogravure plates with etching acid, the combination of a plate carrier, a trough for containing acid, a jacket adjacent the trough, and means for supplying a temperature regulating medium to the jacket.

19. In a machine for etching printing plates with etching acid, the combination of a plate carrier, an acid container, and a series of nozzles located out of contact with the acid extending along the carrier for directing a current of air under pressure against the acid to bank up the acid in the container and bring it into etching contact with the plate and hold it in such contact during the etching operation.

20. In a machine for etching photogravure plates with etching acid, the combination of a plate carrier, an acid container and a row of nozzles extending along the container but above the surface of the acid, and means for supplying compressed air to the nozzles for raising the acid into etching relation with the plate.

In testimony whereof, I have hereunto set my hand.

JOHN H. ANDRESEN.