W. F. NICHOLAS.

ETCHING MACHINE.

APPLICATION FILED JAN. 7, 1919.

1,345,219.

Patented June 29, 1920.

2 SHEETS—SHEET 1.

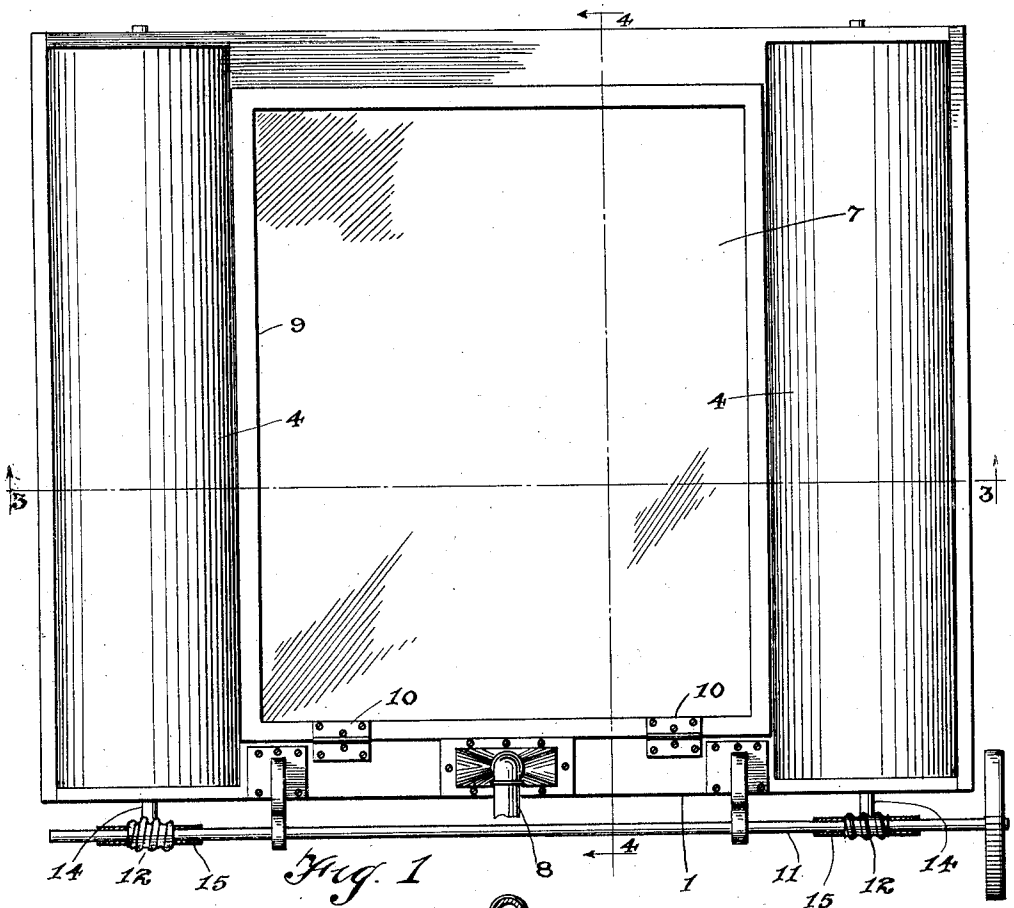


Fig. 1

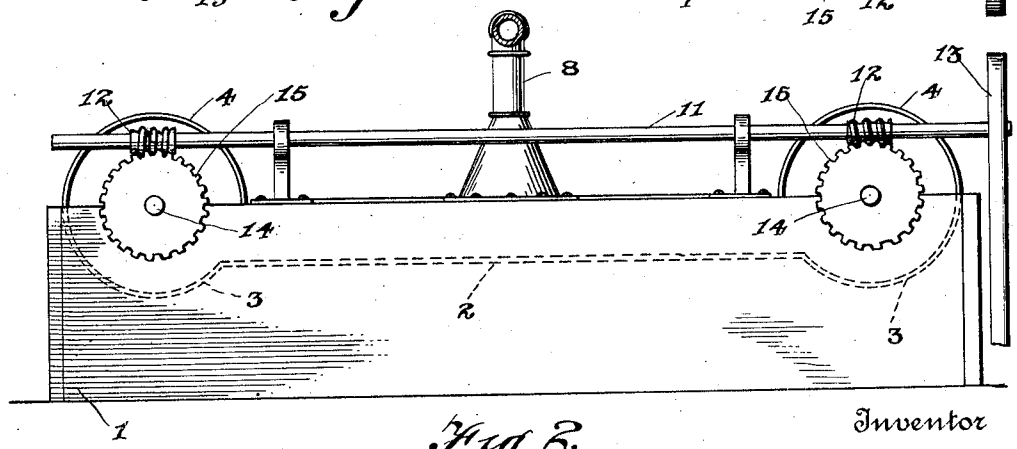


Fig. 2

Witnesses

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2 SHEETS—SHEET 2.

Fig. 3

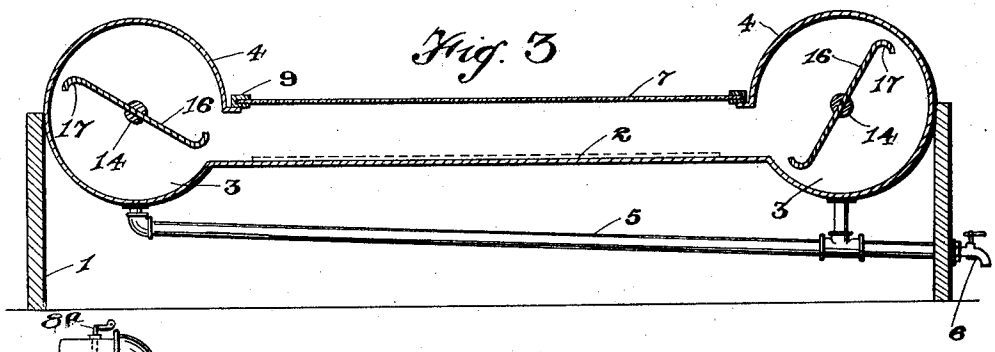
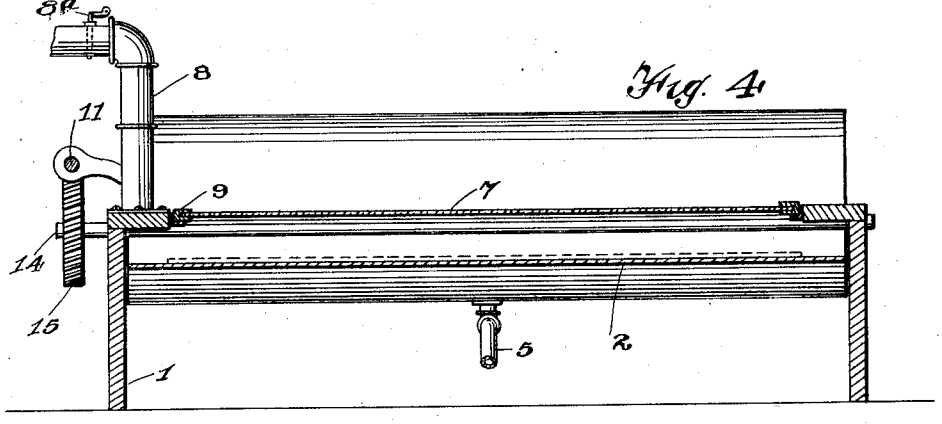


Fig. 4



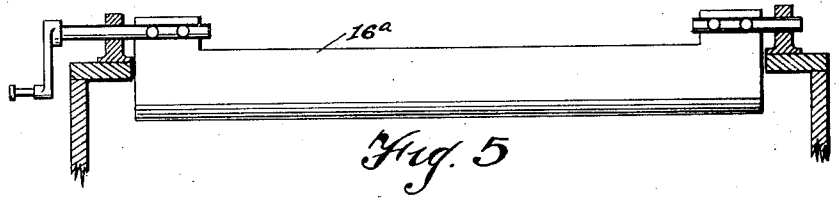


Fig. 5

Fig. 7

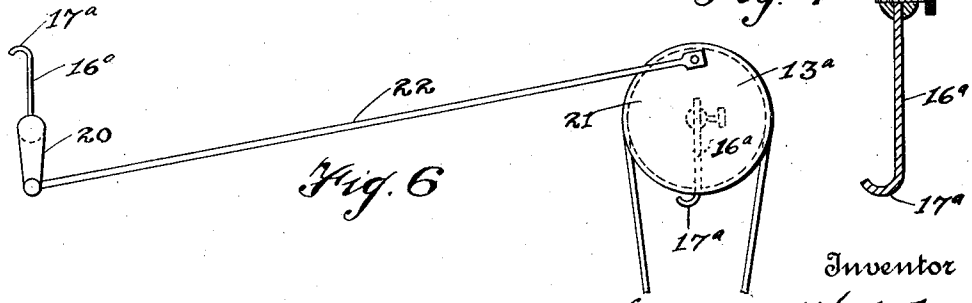


Fig. 6

Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM F. NICHOLAS, OF CHICAGO, ILLINOIS.

ETCHING-MACHINE.

1,345,219. Specification of Letters Patent. Patented June 29, 1920.

Application filed January 7, 1919. Serial No. 269,975.

To all whom it may concern:

Be it known that I, WILLIAM F. NICHOLAS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Etching-Machines, of which the following is a specification.

My present invention pertains to etching apparatus, and has for its object to provide an etching apparatus susceptible of operation at a high rate of speed and in such manner that by the agitation incidental to operation the plate is at all times immersed in a constantly agitated etching fluid, the fluid being caused to steadily flow over the plate and being prevented from breaking in the center with the result that clean and rapid etching is brought about.

The invention in all of its details will be fully understood from the following description and claims when the same are read in connection with the accompanying drawings, hereby made a part thereof, in which:

Figure 1 is a plan view of the apparatus constituting the best practical embodiment of my invention that I have as yet devised.

Fig. 2 is a side elevation of the apparatus.

Fig. 3 is a longitudinal vertical section taken in the plane indicated by the line 3—3 of Fig. 1.

Fig. 4 is a section taken at right angles to Fig. 3 in the plane indicated by the line 4—4 of Fig. 1.

Fig. 5 is a detail view partly in elevation and partly in section, showing one manner of mounting the paddles and also showing the paddle as equipped with a crank.

Fig. 6 is a view of the same taken in a plane at right angles to Fig. 5 and showing one manner of connecting the paddles.

Fig. 7 is an enlarged detail section showing a preferred paddle connection.

Referring by numeral to said drawings, and more particularly to Figs. 1 to 4 thereof, 1 is the frame of my novel apparatus and 2 is a plate, preferably of aluminum, supported in the frame. At its opposite ends the plate 2 merges into transverse wells 3, equipped with covers 4, the said wells and covers being also by preference of aluminum. Connected with the lowermost points of the wells 3 is a drain pipe 5 which is valved at 6. Supported between the covers 4 and spaced above the plate 2 is a glass cover 7 at one side of which is disposed an exhaust conduit or uptake 8, as best shown in Figs. 1, 2 and 4. The said glass cover 7 is carried in a frame 9 which is hinged at 10, Fig. 1. A damper 8^a, Fig. 4, is preferably employed in the conduit 8.

Mounted in suitable bearings on the frame 1 is a shaft 11 bearing worms 12 and equipped with a pulley 13 for connection with a suitable motor. Also journaled in suitable bearings on the frame 1 are transverse shafts 14, equipped at their ends with worm gears 15 that are in mesh with the worms 12.

Carried by the said shafts 14 are duplex paddles 16 which are provided at their longitudinal edges with reversely arranged cups 17. The said paddles 16 are preferably made of aluminum as is also the frame 9 of the glass cover 7.

In the practical operation of my novel apparatus, it will be apparent that agitation of the etching fluid will be maintained by the paddles 16 on the ends of the apparatus, and when the paddles are set to rotate in opposite directions, which is the preferred arrangement, the paddles will cause the fluid to flow over the plate, shown in dotted lines in Figs. 3 and 4, in continuing streams which will produce a clean and rapid etching.

In Figs. 5, 6 and 7 I show single or half paddles 16^a, reversely arranged and having cups 17^a on their outer longitudinal edges. These single or half paddles are calculated to prevent the fluid from breaking in the center of the apparatus, and I would therefore have it understood that without involving departure from the scope of my invention the shafts of the paddles may be equipped with cranks 20 and 21, the said cranks being connected by a pitman 22 and the crank 21 being adapted to serve the additional purpose of a pulley 13^a for connection with a motor.

It will be manifest from the foregoing that my novel apparatus is susceptible of being operated at a high rate of speed because of the immersion of the plate in etching fluid that is constantly agitated. Also, the apparatus is simple and compact and as a whole is well adapted to withstand the usage to which etching machines are ordinarily subjected.

Having described my invention, what I claim and desire to protect by Letters Patent is:

1. An etching apparatus having a plate, wells joined to opposite ends of the said plate

and in communication with the upper surface thereof, and paddles movable in the wells.

2. An etching apparatus comprising a plate, wells joined to opposite ends of the plate and in communication with the upper surface thereof, reversely arranged paddles in the wells, and means for synchronously rotating the paddles.

3. An etching apparatus comprising a plate, wells joined to and extending below opposite ends of the plate and in communication with the upper surface thereof, and paddles rotatable in the wells and having cups.

4. An etching apparatus comprising a plate, wells joined to opposite ends of the plate and in communication with the upper surface thereof, covers complementary to the wells, a transparent cover disposed between the well covers and adapted to be opened, an exhaust conduit, and paddles rotatable in the wells.

5. An etching apparatus comprising a plate, wells joined to and extending below opposite ends of the plate and in communication with the upper surface thereof, and rotatable paddles in the wells and connected together to move in concert and having cups.

6. An etching apparatus comprising a plate, wells joined to opposite ends of the plate and in communication with the upper surface thereof, duplex paddles rotatable in the wells and having reversely arranged cups at their outer edges, said paddles being set opposite to each other, and a connection intermediate the paddles.

7. An etching apparatus comprising a plate adapted to support a plate to be etched superimposed thereon, wells in communication with the upper surface of the first-named plate at opposite ends thereof, and means movable in said wells to move streams of etching liquid over the superimposed plate.

In testimony whereof I affix my signature.

WILLIAM F. NICHOLAS.