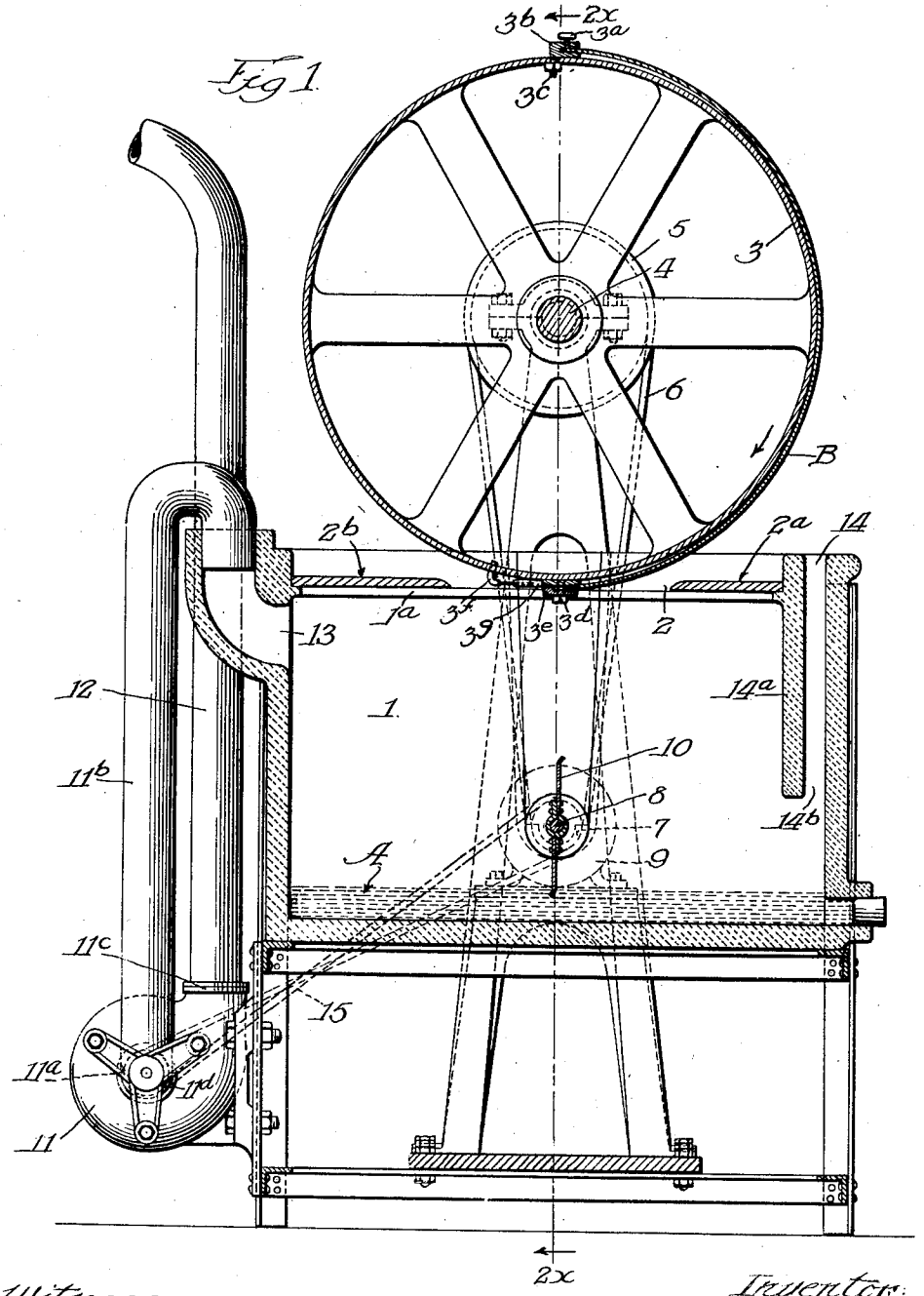
Dec. 2, 1930. R. R. ROBERTSON 1,783,390

ETCHING MACHINE

Filed Oct. 8, 1929 3 Sheets-Sheet 1

Fig 1.



Witness

A B Davison.

Inventor:

Robert Roy Robertson,

By Wilkinson, Huxley, Byron & Knight

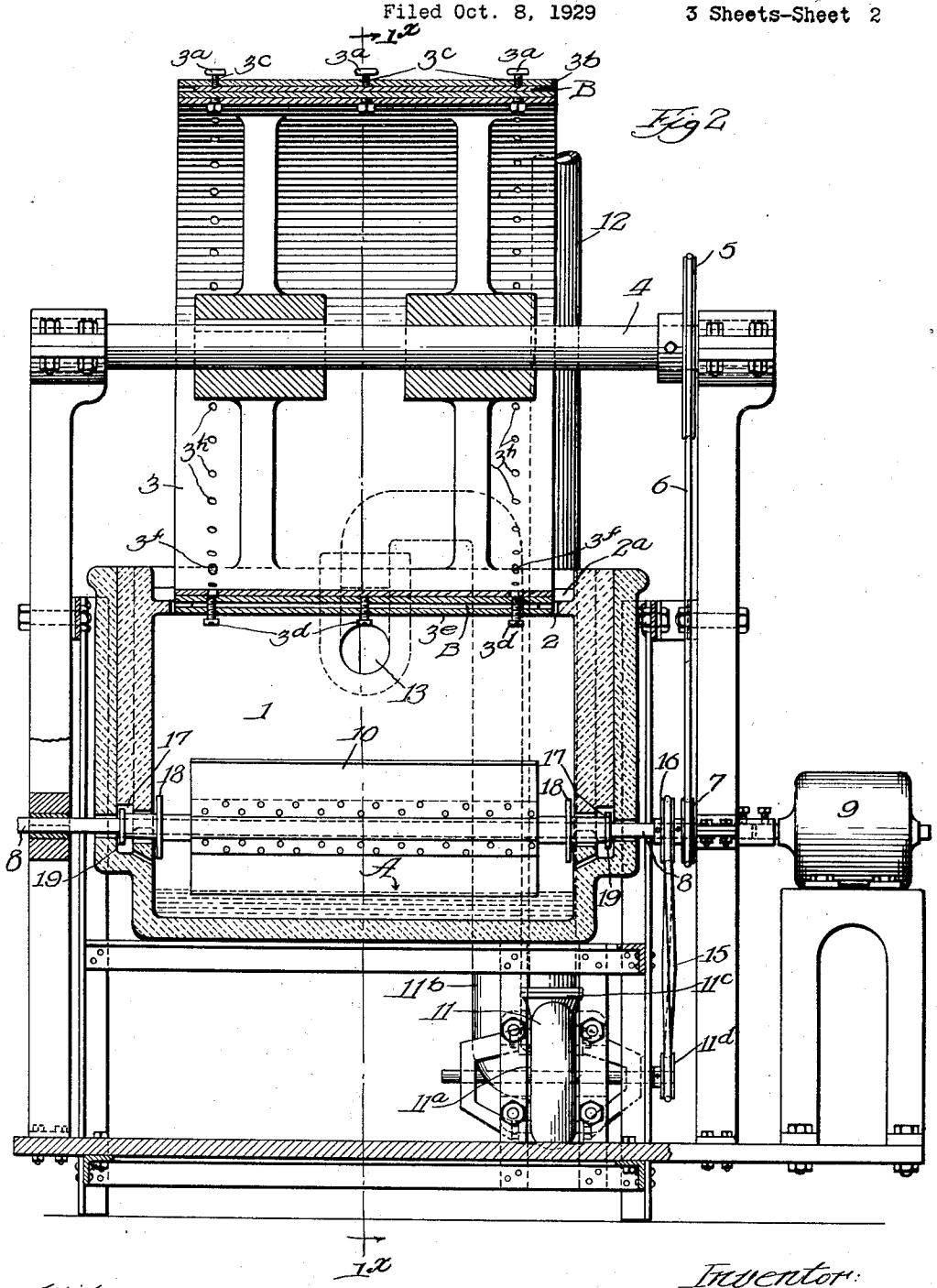
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Dec. 2, 1930. R. R. ROBERTSON 1,783,390

ETCHING MACHINE

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Fig 2



Witness

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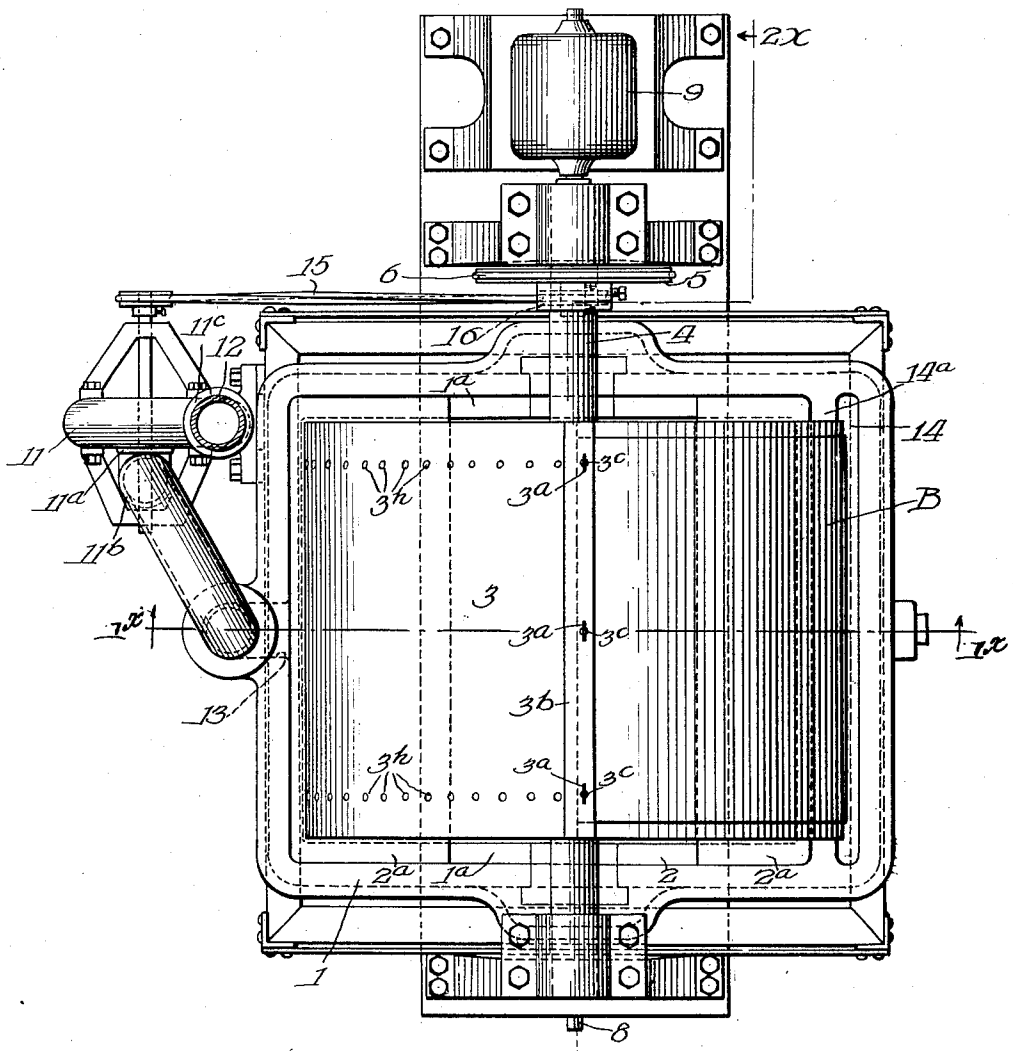


Fig 3.

Witness:
A B Davison.

Inventor:
Robert Roy Robertson:
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Attys.

Patented Dec. 2, 1930 1,783,390

UNITED STATES PATENT OFFICE

ROBERT R. ROBERTSON, OF EVANSTON, ILLINOIS

ETCHING MACHINE

Application filed October, 8, 1929. Serial No. 398,117.

This invention relates to a means through which the surface of a printing plate required to be etched, in the course of its production, is subjected to the reagent employed for etching it; and has for its object to provide a means whereby the surface to be etched can be subjected with greater uniformity and with greater certainty with respect to the duration of the treatment than with apparatus as heretofore constructed.

Accordingly, the invention proceeds upon the principle of mounting the metal to be etched for movement across an exposure opening where it will encounter the reagent; the exposure opening being of less area than the entire surface to be treated, so that the surface is treated progressively and the severity of the treatment being regulated by the rapidity of motion of the surface past the exposure opening the number of times the surface is made to traverse the exposure opening, the volume of reagent delivered to the surface per unit of time of travel, or some or all of these factors together; an important feature of the invention residing in the circumstance that whatever the condition encountered by the surface at the exposure opening and whether the entire area of the exposure opening be subjected to identical supply of the reagent, all portions of the surface to be etched will be made to traverse, alike, one dimension of the exposure opening and therefore receive identical treatment, particularly if the manner and volume of delivery of the reagent be uniform throughout that dimension of the exposure opening which is perpendicular to the direction of travel of the surface.

The preferred embodiment of the invention includes as a means for bringing the reagent to the surface that is to be etched, a rotary dasher dipping into a bath of the reagent and throwing it by centrifugal force against the surface, and contemplates also the use of means for evacuating gases from within the vat to avoid contaminating the working atmosphere around the machine, and also with the effect of maintaining the required supply of free oxygen in the presence of the etching operation; and the ventilating apparatus employed to this end is such that flow of air through the exposure opening and past the surface that is being treated will be inward rather than outward. But it is to be understood that the invention in its broadest aspect is not limited to any particular means for bringing the reagent to the surface that is to be etched, or the use of ventilating means.

In the accompanying drawings, in which the preferred embodiment of the invention is shown by way of illustration—

Figure 1 is a vertical section of an etching machine, the plane of section being indicated approximately by the line $1x$—$1x$ of Figures 2 and 3.

Figure 2 is a section on the line $2x$—$2x$ of Figures 1 and 3; and

Figure 3 is a top plan view of the machine with the ventilator stack in section.

1 represents a vat which is preferably constructed of vitreous material or earthenware, in form suitable to contain a relatively shallow bath A of etching reagent. Vat 1 is constructed with an exposure opening 2 conveniently defined by supporting removable plates $2a$, $2b$ upon the ledge $1a$ around the perimeter of the upper open end of the vat. The invention contemplates having the surface that is to be etched travel in a manner to bring all parts of such surface successively but uniformly into the range of the reagent which is delivered at said opening.

As a preferred means for mounting a plate, for instance, a printing plate B, in position to traverse the exposure opening 2, I employ a rotary cylinder 3 mounted upon a shaft 4 and receiving motion through some suitable means, such, for instance, as a pulley 5 receiving a belt 6 that also passes around a pulley 7 mounted on shaft 8 that is driven by electric motor 9. Plate B may be replaceably mounted upon cylinder 3 through suitable anchoring means, such, for instance, as screws $3a$ gripping one margin of the plate and a cleat $3b$ that is attached to the cylinder through means of screws $3c$, and securing the opposite margin of said plate B through means of screws $3d$ confining it to the cleat $3e$ which is secured to the cylinder 3, with adjustment in the direction to place the plate

B under tension, by means of anchoring hooks 3*f* and threaded sleeves 3*g*. As suggested in Figure 2, cylinder 3 will be provided with appropriately arranged holes 3*h* adapting it to receive bolts, such as shown at 3*e*, and hooks 3*f* at positions appropriate to the length of the plate that is to be treated.

In order to cast or project etching reagent A against the surface of a plate traversing the exposure opening 2, I prefer to employ a rotary dasher 10 conveniently mounted on the shaft 8 so that it is rotated by the driving motor 9, and this dasher is caused to dip into the bath A sufficiently to pick up and discharge the reagent by centrifugal force upwardly through the exposure opening where it will impinge against the surface of the plate B as the latter traverses said opening. Preferably, the exposure opening 2 is vertically above the dasher 10, for the reason that the discharge from the dasher that reaches the surface of the plate in this relative position is in much better condition, consistent with the needed volume of the reagent, than if the exposure opening were located at any other point in the sector of travel of the dasher.

In order to ventilate the interior of the vat 1, fan 11 has its eye 11*a* in communication through suction pipe 11*b* with the interior of the vat, the tangential discharge port 11*c* of the fan being equipped with a stack 12 through which the fan can deliver to a point in the outer atmosphere that will be unobjectionable. Suction pipe 11*b* communicates with the vat 1 through a port 13 which is preferably located at the middle upper point in one side of the vat 1, and in order to properly aerate the interior of the vat, the latter is provided with an air supply flue 14 at the opposite side of the vat and preferably having a horizontal dimension approximately equal to that of said side, and having its inner defining wall 14*a* extending downwardly within the vat so as to locate the delivery end 14*b* of said flue well down within the vat to avoid interference between the incoming air and the spray of reagent, besides more thoroughly aerating the interior of the vat. While the sectional area of the flue 14 will be sufficient to supply approximately all of the air evacuated by the fan 11, some air will flow inwardly through the exposure opening 2 so as to displace inwardly fumes arising from the operation and maintain supply of free oxygen that may be needed at the surface where etching is taking place. Fan 11 may be conveniently driven by connecting its pulley 11*d* through belt 15 with pulley 16 on the shaft 8.

17 represents trapping recesses in the walls of the vat 1 surrounding the shaft 8 and preventing escape of the reagent through the openings made to receive said shaft; said trapping recesses being constructed to drain back into the vat; and the openings on the inner and outer sides of said recesses being guarded by centrifugal disks 18 and 19 which throw off any liquid precipitating upon and tending to move outward along the shaft.

In the operation of the device, the rotation of the cylindrical plate carrier 3 and that of the spray dasher 10 are definitely related by proper selection of dimensions of driving connections. As will best be seen from Figure 2, the dasher approximates the dimension of the exposure opening 2 in a direction transverse to the travel of the carrier, with the result that it develops a characteristic and substantially uniform discharge of reagent in any given line parallel with the dasher; and as all parts of the surface to be etched cross said line, or, indeed, all of all lines running in that direction, all parts of the surface receive like treatment. The depth of etching can readily be controlled by the number of times the plate is caused to traverse the exposure opening; that is, in the particular form illustrated, the number of times the rotary carriage is caused to revolve.

I claim:

1. In apparatus of substantially the character described, means defining an exposure opening, means for delivering a fluid at said opening, and a plate carriage mounted for movement and adapted to present portions of a plate successively to said exposure opening.

2. In apparatus of the character described, means defining an exposure opening, means for delivering a fluid at said exposure opening, and a carriage adapted to receive and hold a plate and movable in a manner to cause the plate to traverse the exposure opening with a continued uniform movement.

3. In apparatus of the character described, means for delivering a fluid over a predetermined area, and a carriage adapted to receive and hold a plate; said carriage having a movement which causes the surface of the plate mounted thereon to traverse said area of delivery.

4. In apparatus of the character described, a rotary plate carrier adapted to receive and hold a plate, and means delivering a fluid over an area corresponding to a portion of the surface of said carrier; said carrier having means for moving it to cause successive portions of the area of the plate mounted upon it to traverse said area.

5. In apparatus of the character described, a vat having an exposure opening, means within said vat for delivering fluid contained by the vat at said exposure opening, and a rotary carriage adapted to receive and hold a plate and by its rotation present successive areas of said plate at said exposure opening.

6. In apparatus of the character described, a vat, a rotary spray dasher in said vat, and means for mounting a plate and causing its

surface to progressively intersect a zone of delivery from said dasher.

7. In apparatus for etching plates, a rotary carriage, a cleat mounted on said carriage and adapted to receive one margin of a plate to be etched, and an adjustable anchoring means on said carriage adapted to receive the opposite margin of such plate; said anchoring means comprising a movable cleat, a hook adapted to engage said carriage, and means for adjusting the hook relatively to said movable cleat.

8. In apparatus of the character described, a vat having an exposure opening, a carriage adapted to mount a plate and cause said plate to traverse the area of said exposure opening, and means for drawing air from the interior of said vat.

9. In apparatus of the character described, a vat having fluid delivery means, an exposure opening at which fluid is delivered, a movable carriage adapted to mount a plate and cause it to traverse said opening, means for withdrawing air from the interior of said vat, and means for admitting replacement air constructed to release inflowing air at a point remote from said exposure opening.

10. In apparatus of the character described, a vat constructed with an exposure opening in the upper portion thereof, means within the vat for delivering fluid at said opening, a movable carriage adapted to mount a plate and cause the surface of the plate to traverse said exposure opening, means for exhausting air from within the vat, and an intake flue leading downward along one wall of said vat and releasing replacement air at a level below the exposure opening.

Signed at Chicago, Illinois, this 4th day of October, 1929.

ROBERT R. ROBERTSON.