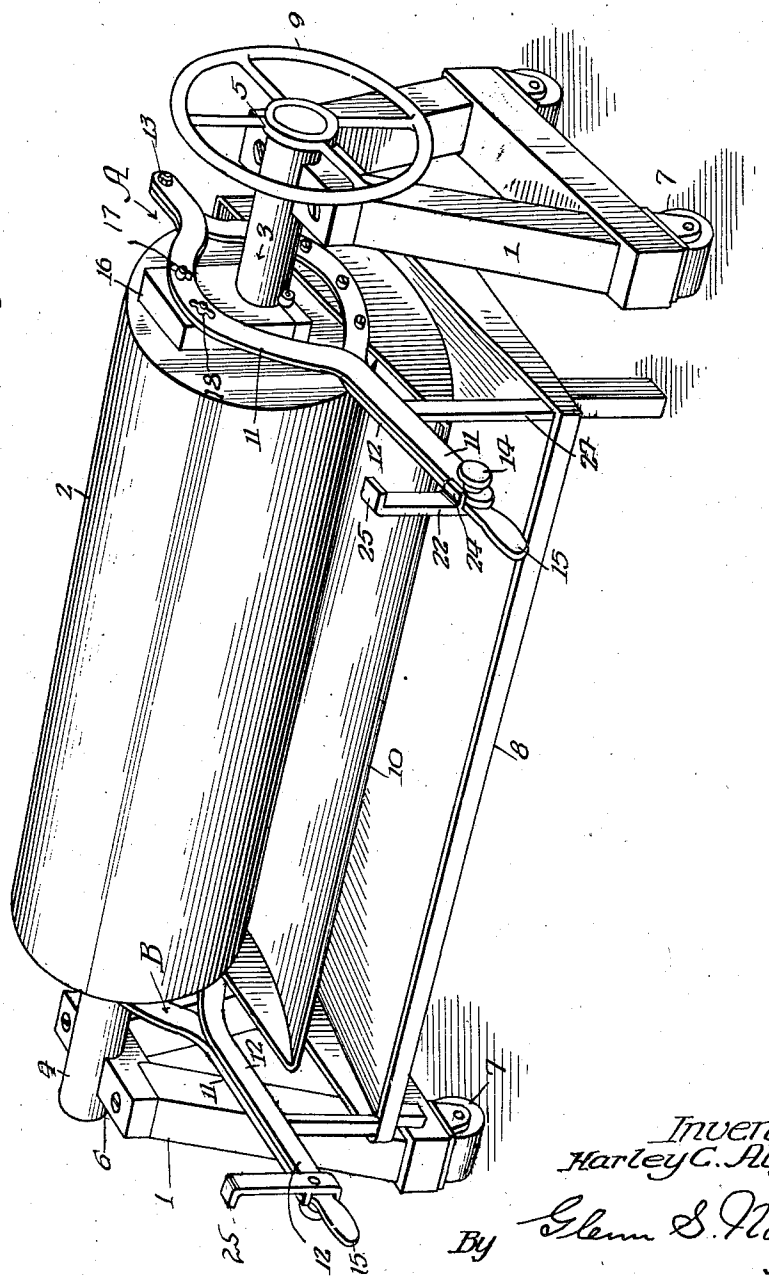
April 30, 1946. H. C. ALGER 2,399,534

ETCHING DEVICE FOR ROTOGRAVURE CYLINDERS

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Fig. 1



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Fig. 2

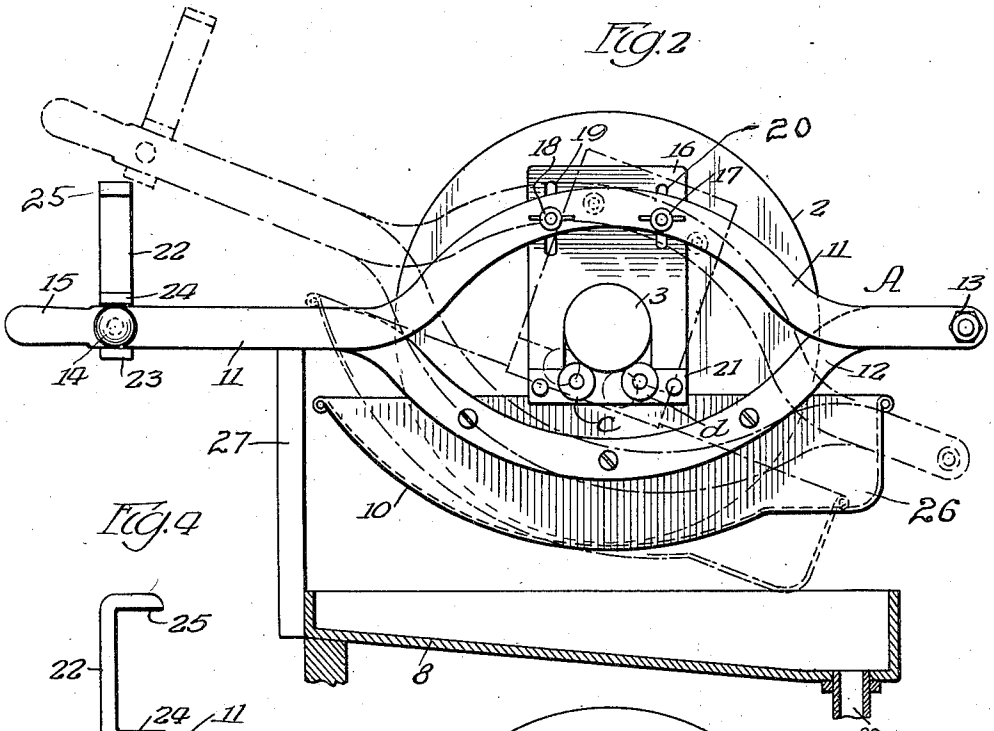
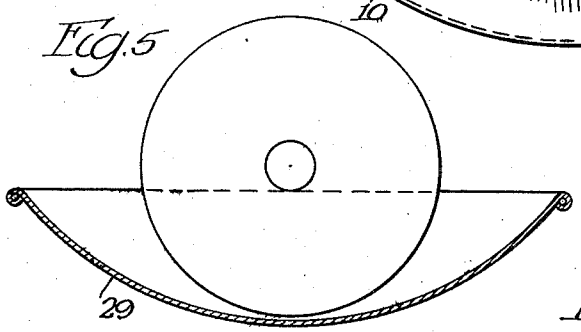


Fig. 4

Fig. 3

Fig. 5



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ETCHING DEVICE FOR ROTOGRAVURE CYLINDERS

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9 Claims. (Cl. 41—9)

This invention relates to the art of etching rotogravure printing cylinders and more particularly to the so-called tank or trough method of etching wherein the cylinder to be etched is revolved in a trough partly filled with a suitable mordant, in contrast with other methods of etching wherein the mordant is poured over the cylinder or where it is manually swabbed over the surface of the cylinder.

One object of this invention is to provide an etching device or apparatus and a method of procedure which will enable the etcher to standardize and produce uniform results so that it will be unnecessary to etch cylinders over again as is now often the case; another object is to simplify the procedure of etching; another object is to produce a device which will enable the etcher to etch all parts of a cylinder equally which will reduce the necessity for reetching parts of the cylinder now often the case; while still another object is to provide a method of etching which will conserve the mordant.

Other objects will be evident from the following description:

Rotogravure printing cylinders are commonly prepared for etching by providing a cylinder having a polished copper surface, mounted on a shaft having journals or trunnions extending axially from each end of the cylinder and mounting this cylinder on a suitable truck, stand or other support with the journals held in bearings and with at least one end of the shaft extending and carrying a wheel or a suitable connection for a motor by means of which one may easily revolve the cylinder about its axis during the preparatory and etching operations.

Next a sheet of sensitized gelatin coated paper commonly called "carbon tissue" is screened and printed by light through a positive transparency carrying the desired image, the carbon tissue is laid down on the surface of the cylinder, the paper is soaked with warm water until it is readily removed and the gelatin remaining on the cylinder is developed by further washing with warm water leaving the image carrying gelatin on the cylinder in the form of a resist of variable thickness, that is, the gelatin carrying the image is thin in the tones corresponding with the dark tones of the positive and relatively thick in the tones corresponding with the light tones of the positive, with intermediate tones in proportion. The gelatin is then dried and the margins between image bearing portions of the cylinder and other non-image portions of the cylinder are painted over with asphaltum commonly called "staging" so that these portions will not be affected by the mordant and the cylinder is thus made ready for etching.

At present, the common method of etching is to mount the cylinder, prepared as previously described, in a horizontal position, over a sink adapted to collect the mordant as it drips from the cylinder and with the ends of the shafts which extend from the cylinder resting in bearings on a suitable truck or stand. The cylinder is then revolved either by means of a hand wheel attached to one end of the shaft or by a motor which may be connected to the shaft by a suitable gear arrangement so as to revolve the cylinder slowly, in the bearings. The mordant which is iron perchloride is then either poured over the cylinder or is applied by dipping cotton into a pitcher of the mordant and swabbing it on by hand and rubbing the cylinder lightly as it revolved so as to apply the mordant more or less evenly over the cylinder.

I have found that when pouring the mordant over the cylinder, it tends to run in uneven streaks around the cylinder, thus tending to produce uneven etching, and while swabbing or rubbing the cylinder with the mordant tends to smooth out this unevenness to some extent, the rubbing itself injects another variable into the etching process. First, such swabbing or rubbing may produce streaks in the etching in the direction in which the cylinder is rubbed because of uneven application of the mordant over various parts of the cylinder, and second, since there is no good way to always swab or rub in an exact manner so that all parts will receive exact and equal treatment, there is apt to be, not only variation in the etching of one part of the cylinder as compared with some other part, but also a variation between cylinders as there is no way to standardize the etching of different cylinders. More rubbing tends to hasten the action of etching while less rubbing tends to reduce such action.

It is not possible to produce the best results in etching by the use of a single strength of the mordant which is iron perchloride, commonly called "iron." It is quite common to have five or six different dilutions of the iron perchloride from one reading about 44° Beaumé down to 39° or 38° Beaumé already prepared and then to change to each of the lower reading dilutions as the etching progresses. Moreover it is common to start with 44° "iron" and change to say 42° "iron" to get the etching started; then change back to 44° or 43° "iron" to slow down the etching so as to get tone separation, subsequently

proceeding to use each of the lower dilutions in turn until the etching is completed, it being necessary to complete the etching about two minutes after the lightest tone starts to etch, while at the same time, the darkest tones must be completed without etching so far as to etch away the walls or the screen lines in these tones.

It will be evident that when making these changes, it will be of great help to make them quickly without delay whenever such a change is decided upon.

Methods of etching wherein the cylinder to be etched is revolved in the mordant held in a trough or tank have been largely abandoned because heretofore no way has been devised to empty the tank quickly and make the change quickly, and no way has heretofore been devised to insure uniformity in the etching action.

In my invention, it will be seen that I have produced an etching device and a method of using it whereby these difficulties are almost entirely removed, where the trough may be drained very quickly without the use of cumbersome valves, and new mordant applied quickly and where the action of rubbing is replaced by a surging action of the mordant itself which may be accomplished in a uniform standardized manner over the surface of each cylinder and also over each and every cylinder.

In the accompanying drawings:

Fig. 1 shows a perspective view of my improved etching device mounted on the shafts of a cylinder which cylinder is supported with its shafts in bearings on an etching stand or truck ready to be wheeled over to a sink for the purpose of etching;

Fig. 2 shows an end view of the device in position over a sink, a pair of rollers of the truck bearing being shown supporting the cylinder shaft but with truck removed;

Fig. 3 shows an end view of the device as it may be lowered away from the cylinder during the operation of washing;

Fig. 4 shows a detail of the latch which holds the trough in either its etching or washing position;

Fig. 5 shows a modification of my invention in which a very simply constructed etching trough is used.

In Fig. 1 a conventional cylinder truck or stand 1 is shown supporting the cylinder 2, with its shafts or trunnions 3 and 4 resting in bearings 5 and 6 forming parts of the truck. The truck is carried by swivel castors 7 which facilitate movement of the cylinder through its various operations. The truck may be moved to hold the cylinder over a sink 8, in Fig. 2 where shaft 3 is shown supported by two rollers C and D, parts of bearing 5. A drain pipe 28 is adapted to drain from the sink any liquid collected therein. A hand wheel 9 attached to one of the shafts may be used to revolve the cylinder in either direction. The etching trough 10 is normally held with its concave bottom in close proximity to the lower portion of the cylinder as shown in Fig. 2, this clearance dimension being approximately $\frac{3}{16}$'' to $\frac{3}{8}$''. It is carried by two clamping devices A and B in Fig. 1, at either end of the cylinder, the clamping device A being shown more in detail in Fig. 2.

Each clamping device comprises a pair of arms 11 and 12 hinged at 13. Arm 11 is curved to pass above the cylinder shaft 3 to the opposite side of the cylinder where it terminates in a knob 14. Arm 12 is curved to pass under the cylinder shaft 3, also to the opposite side of the cylinder where it terminates in a handle 15. A bearing block 16 is fastened to arm 11 by adjusting screws 17 and 18 which permit adjusting the block to its desired position by virtue of slots 19 and 20. The block 16 is made in an inverted U-shape to fit the shaft and is held from up and down motion by a bar 21 secured across the open end of the block in any preferred manner. The arm 12 is riveted or secured to the end of the trough 10 as shown. A double latch 22 is secured to arm 12 near its handle end 15. By taking hold of knob 14 of arm 11 and springing the arm, it may be snapped into position shown in Fig. 2 with arm 11 between two prongs 23 and 24 of the latch as shown in Fig. 2, or it may be placed in contact with prong 25 with the arm 12 swung down to support the trough in a lowered position as shown in Fig. 3. It is to be understood that the second clamping device B of Fig. 1 is of similar construction and carries the other end of the trough.

In my preferred form of trough, the main body portion is concave with a pouch portion or protuberance at one side as shown at 26. This pouch or belly is adapted to hold the mordant out of contact with the cylinder during the operation of diluting the mordant when the trough is turned with the pouch at its low point as will be more fully described, while at the same time permitting swinging of the trough with its handle and knob to a vertical position when the mordant will quickly drain from the trough into the sink. A stop 27 which engages with one of the arms 11 may be used to hold the trough in its level position and prevent it from turning in one direction, the weight of the arms of the clamping device being sufficient to prevent turning in the opposite direction.

In the simplified form shown diagrammatically in Fig. 5, the trough 29 is shown as being concave in cross section without a pouch, but it still has the feature of quick draining and holding the bottom close to the lower portion of the cylinder to produce the surging action of the mordant which eliminates the necessity for rubbing the cylinder during etching and standardizes this operation. This form is of particular use where it is desired to hold each mixture of mordant in condition as originally mixed in one method of etching as will be more fully described.

In actual use of the preferred form of my invention as shown, there are three methods that may be employed: In the first method, a supply of iron perchloride is prepared in about six different dilutions of five to six litres each, reading approximately 44° down to 39° Beaumé inclusive, which may be referred to as Nos. 1 to 6 inclusive, for convenience. The cylinder is then supported on the stand or truck and the etching trough is secured in position as shown in Fig. 2 and the stand is moved into position to support the cylinder with the trough over the sink. The cylinder is then revolved usually by hand at a peripheral speed of about 150 to 200 lineal feet per minute and the No. 1 "iron" is poured over the cylinder and is caught in the trough and keeps the cylinder covered all over its surface with the "iron." During this first application of "iron" to the cylinder, it is advisable to wipe the "iron" lightly over the surface of the cylinder with cotton to free any air from its surface and to insure that the surface is wetted evenly all over. This operation is not to be confused with rubbing during etching because the cylinder will not start to etch for some little time. The cylinder should preferably be revolved in one direction for about one minute and then reversed to revolve in the

opposite direction for an equal time, reversing each minute to keep the action uniform.

After the etcher decides that the No. 1 "iron" has performed its purpose, he swings the trough about the cylinder axis by lifting on the handles so as to spill all the "iron" from the trough into the sink, then he swings the trough back to its first position and pours the next "iron" wanted, perhaps No. 2, over the cylinder or into the trough, thus continuing the etching with this "iron" within an elapsed time of eight or ten seconds. In the meantime, the No. 1 iron is collected in the sink and passes through the drain to a suitable receptacle, not shown, which may take a minute or so.

In like manner, the etcher continues using the different solutions of "iron" as desired until the etching is completed, when he swings the trough and spills the last "iron" into the sink, he then swings the trough back and moves the knob arm 11 from the lower latch and swings the arm 12 down until the arm 11 engages with the upper latch so that the trough drops to position as shown in Fig. 3. He can then apply wash water quickly to the cylinder to stop the etching action and the water will be caught in the trough out of contact with cylinder and be held there until the last "iron" is drained from the sink, when the trough may be swung to drain the wash water to the sink. The trough is then unlatched and removed from the cylinder and the truck may be moved away with the etched cylinder.

One of the primary features of this method is that lower portion of the cylinder is very close to the bottom of the trough and the ends of the trough should be quite close to the ends of the cylinder so that revolving the cylinder rather rapidly produces a sort of pumping action with the "iron," causing it to rise on the side of the cylinder in the direction which the cylinder is passing through the "iron" and thus producing a pressure or "head" of iron on this side, causing surging of the "iron" against the cylinder and a rushing back in the confined space underneath the cylinder. This action gives even agitation throughout the length of the cylinder and eliminates necessity of rubbing the cylinder manually while etching. It will be evident that this agitation action is quite constant for any given speed so that it may be standardized to produce uniform results.

The second method of using the device enables the etcher to produce many changes of "iron" thus smoothing out the etching action by the simple method of providing two pitchers of "iron," applying the first pitcher, then adding a slight amount of water to the second pitcher, say enough to bring it to a Beaumé reading of 43¾°, allowing the first "iron" to etch say 1½ minutes, then quickly spilling the "iron" into the sink and changing to the second "iron," allowing this to etch about 1½ minutes, in the meantime adding enough water to the first "iron" to bring it to a Beaumé reading of say 43½°, changing to etch with this "iron" and by keeping diluting alternate pitchers of iron and changing at one or one-and-one-half minute intervals, to apply fifteen or twenty different strengths of "iron" during a twenty-five minute etch. The simple form of my invention as shown in Fig. 5 may be used in the two methods just described equally well with this form shown in Fig. 2.

In the third method, the form shown in Fig. 2 only is used which may be used equally well with the first two methods also.

In the third method, a result similar to that of method two may be obtained by the use of one pitcher of "iron" only, the amount being about 5 or 6 litres in etching a newspaper size cylinder. In this method, the "iron" say 44° Beaumé is poured over the cylinder and the etching is started as before. After about one minute, the trough is swung so as to throw the pouch to its lowest position. The "iron" runs into the pouch out of contact with the cylinder, a previously planned amount of water is added by pouring along the length of the cylinder and stirred well into the "iron," the trough is then swung back to its original position, this operation taking only 12 to 15 seconds and the cylinder is allowed to etch one minute to 1½ minutes when a change is made again in the same manner just described. In this way, the etching can be smoothed out with many changes of "iron" using only the small amount measured out to start with, thus saving "iron."

Having thus described my invention, what I claim is:

1. A device for etching a rotogravure printing cylinder, comprising a stand for supporting the cylinder in a horizontal position so that it may be revolved about its axis, and an etching trough adapted to hold a mordant in contact with a portion of the cylinder during the operation of etching, means for supporting said trough so that it may be swung about the axis of the cylinder whereby the mordant is quickly drained from the trough.

2. A device for etching a rotogravure printing cylinder, comprising a stand upon which the cylinder to be etched may be revolubly mounted with its axis horizontal and a trough adapted to hold a mordant in contact with a portion of the cylinder during the operation of etching, swingingly supported under the cylinder so that it may be swung about an axis substantially coaxial with the axis of the cylinder whereby the mordant may be quickly drained from the trough.

3. In a device for etching a rotogravure printing cylinder, a stand upon which a cylinder may be revolvably mounted, and a trough shaped to hold an etching mordant in contact with a portion of the cylinder and adapted to swing about an axis substantially coaxial with the axis of the cylinder whereby the mordant may be quickly drained from the trough.

4. In a device for etching a rotogravure printing cylinder a sink, means for supporting a cylinder over the sink and a trough adapted to hold a mordant in contact with a portion of the cylinder during the operation of etching, means for supporting said trough so that it may be swung about an axis substantially on the center line of the axis of the cylinder whereby the mordant is quickly drained from the trough into the sink.

5. In a device for etching a rotogravure printing cylinder a sink, means for supporting a cylinder over the sink, a trough adapted to hold a mordant in contact with a portion of the cylinder during the operation of etching, means for supporting said trough so that it may be swung about an axis substantially on the center line of the axis of the cylinder whereby the mordant is quickly drained from the trough into the sink, and means for lowering the trough whereby wash water applied to the cylinder may drip into the trough and be held in the trough without touching the cylinder.

6. In a device for etching a rotogravure printing cylinder, a sink, a stand for supporting a cylinder over the sink in a horizontal position so

that it may be revolved about its axis, a trough adapted to hold a mordant in contact with the cylinder during the operation of etching, mounted between the cylinder and the sink in a swinging position whereby the trough may be swung about an axis substantially in line with the axis of the cylinder thereby causing the mordant to be quickly drained from the trough into the sink and means for lowering the trough away from the cylinder whereby the trough may receive any wash water which may be applied to the cylinder and retain the wash water out of contact with the cylinder.

7. A device for etching a rotogravure printing cylinder, comprising a stand for supporting the cylinder in a horizontal position so that it may be revolved about its axis and an etching trough adapted to hold a mordant in contact with the lower portion of the cylinder during the operation of etching, said trough being positioned with its bottom in close proximity to the lower portion of the cylinder, whereby the mordant is forced to assume a higher level on the side of the cylinder toward which the cylinder is being revolved through the mordant, with a consequent surging of the mordant against the cylinder, said trough being mounted so that it may be swung about an axis substantially in line with the axis of the cylinder whereby the mordant may be quickly drained from the trough.

8. In an apparatus for use in etching cylinders, the combination of a receptacle adapted to receive the lower portion of the cylinder and to fit closely against the ends thereof, the receptacle having a generally concave transversely arcuate bottom of larger diameter than the diameter of the cylinder, means for rotatively supporting the receptacle on the cylinder, and means for adjusting the receptacle toward and away from the cylinder, the arrangement being such that the receptacle may be swung to quickly empty the same for the purposes described.

9. In an apparatus of the character set forth for etching a printing cylinder, a pan having a transversely curved bottom and adapted to receive the lower portion of the cylinder to be etched, said pan having a protuberance extending longitudinally at one side of the same, adapted to hold substantially the full amount of mordant to be used at one time, means for swingingly and detachably supporting the pan on the cylinder, and means for swinging the pan to discharge the contents into a sink, or the like.

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