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METHOD AND MEANS FOR ETCHING ROLLERS

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Fig. 1

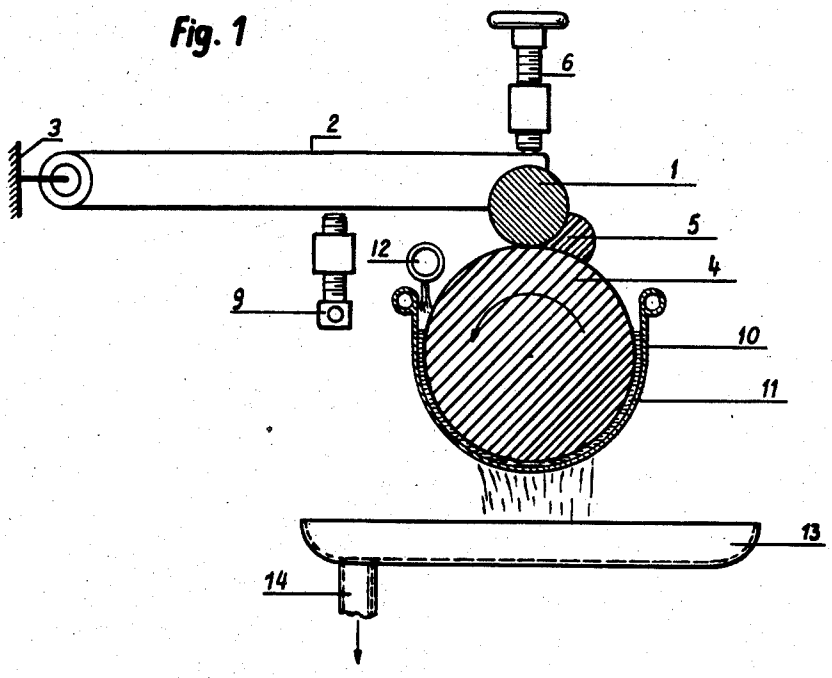
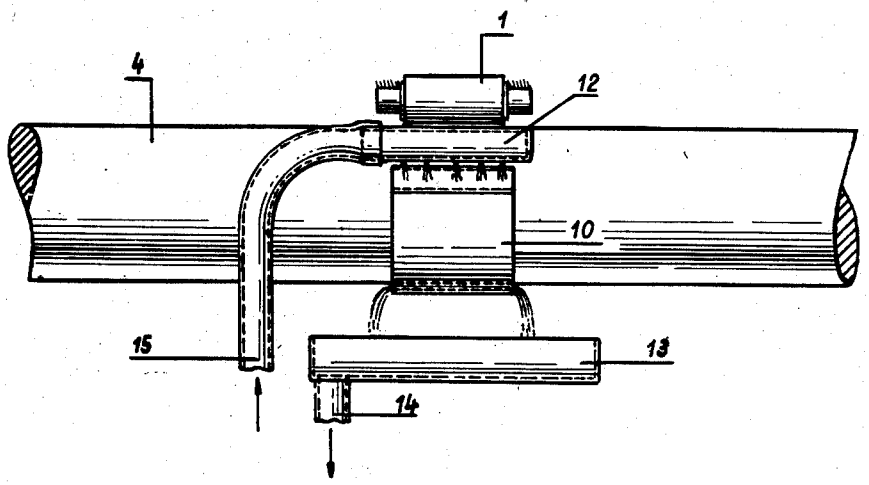


Fig. 2



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METHOD AND MEANS FOR ETCHING ROLLERS

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Application January 22, 1957, Serial No. 635,226

9 Claims. (Cl. 41—9)

This invention relates to methods and means for etching figures on rollers and is an improvement upon the invention disclosed in my copending United States patent application, Serial No. 562,858, filed Feb. 1, 1956, Method and Means for Etching Figures on Rollers, now U.S. Patent No. 2,870,560. That application discloses a method and means in which the roller to be etched has a portion only of the lower half of its circumference immersed for the full length of the roller in etching fluid in a container. In such an arrangement the surface of the etching fluid in the container is confined below the level of the roller trunnions and the bearings for the same, so as to avoid contact with and injury of the same, and the etching fluid is applied to the roller to be engraved throughout its length.

It has now been found that such method and means become the more effective the longer the circumferential arc of the roller exposed to the action of the etching fluid. One object of the invention, therefore, is to provide an improved method and means for subjecting a substantially longer circumferential arc of the roller to be engraved to the etching action while rolling in contact with the pattern roller.

It is desirable at times to employ a short pattern roller for engraving a longer roller, band by band, in succession and, therefore, to carry on the etching operation one band at a time. Another object, therefore, is the provision of such a method and means by which the roller to be engraved can be subjected to such action of the etching fluid over one circumferential band at a time without application of the etching fluid to the remainder of the length of the roller.

To these and other ends the invention resides in certain improvements and combinations of parts and method steps, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Fig. 1 is an end elevation, partly in section, of a device embodying and for carrying out the present invention, and

Fig. 2 is a side elevation of the same as viewed from the left in Fig. 1.

The invention is embodied in the present instance in a device comprising a pattern roller 1 which is formed with raised or recessed figure portions, as well understood in the art, the raised portions engaging the surface of the roller 4 to be engraved as the rollers are rotated in opposite directions under slight pressure against each other. The rollers are connected by means of cog wheels (not shown), whose gear ratio corresponds to the numbers of the figures on the circumferences of the rollers. If rollers of different sizes are to be engraved with negative rollers of different sizes, the simple gear connection between them is replaced by change speed gearing, as well understood in the art.

Both rollers have their trunnions journalled in suitable bearings (not shown), and the bearings for the upper pattern roller are carried by arm means 2 pivoted to a support 3, as shown. Adjustable stop means, such as a screw 9, is provided for limiting the descent of the arm means and pattern roller and the depth to which it sinks into the roller to be engraved and to prevent it from drawing wrongly when its surface is interrupted. Adjustable screw means 6 is provided above and bearing downwardly against the bearing arms for pressing roller 1 against roller 4, as disclosed in said copending application.

A body 5 of moldable plastic material is applied in the angle of engagement between the rollers at the entering side thereof, said material being resistant to the action of the etching fluid. From this material the rollers 1 and 4 carry along a film at those places only, such as the elevations of the rollers at which they have not come into contact with each other, so that the points of contact thus remain free from a coating of said material. When the roller 4 is subjected to the etching medium hereafter referred to, it acts on those places which have no coating. While roller 1 is shown in vertical alignment with roller 4, it may be located slightly to the left as viewed in Fig. 1 so as to more closely retain the resist body 5 in the angle between the rollers.

The roller 4 to be engraved is partially encircled by a correspondingly curved metallic channel 10 of corrosion-resisting material and slightly spaced from the surface of the roller, leaving a gap 11 therebetween which may be readily determined and adjusted experimentally. A pipe 12 is longitudinally formed with spaced perforations for supplying a flow or spray of etching fluid into the gap 11 adjacent the top of one side thereof, as shown, so that as the etching fluid descends, it flows over the circumferential portion of the roller within the channel 10, flowing to the bottom thereof and discharging from the open ends of the channel, as shown, into a collecting pan 13 having an outlet 14 leading to a sump (not shown). A pump has its intake suitably connected to the sump from which it recirculates the etching fluid back to pipe 12 through pipe 15. The rotation of the roller tends to carry the fluid partly up its opposite side and the depth of the fluid in the channel is regulated by regulating the flow through the discharge pipe 15 leading from the pump to pipe 12. By means of the present method and device, it is thus possible to bathe a much larger angular arc of the circumference of the roller with the etching medium and materially increase the effect of the etching fluid.

In the engraving of a longer roll 4 by means of a shorter roll 1, as heretofore practiced, roller 1 has been moved longitudinally of roller 4, step by step, so as to engrave one band at a time on the roller 4. Where the roller 4 is immersed for its whole length in a stationary body of fluid in a container, only the particular band being etched could be exposed to the etching fluid, the remainder of the roller being carefully covered with a caustic resistant layer since the least damage to such layer could spoil the roller. This was a laborious and time-consuming step, with some risk to the safety of the roller. By the present invention, the channel 10 may have a length equal to the width of the band to be etched or a slightly greater length, with a corresponding length of pipe 12, so as to limit the etching action to the area of the band to be etched, as indicated in Fig. 2. These parts are adjusted longitudinally of the roller 4 along with the adjustment of pattern roller 1, by any suitable means, to effect the etching of the bands, one by one, in succession. By this improved method and arrangement, only the band portion to be etched at any one time is brought into contact with the etching fluid while the

remaining lenth of roller 4 remains dry and runs no risk of damage.

By this improved method and means, considerably more than half of the circumference of the roller 4 is subjected to effective action by the etching fluid so as to materially increase the length of the arc acted upon and roller 4 may be conveniently etched, band by band, if so desired, with minimum danger of injury to other portions of the roller.

It will thus be seen that the invention accomplishes its objects and while it has been herein disclosed by reference to the details of a preferred embodiment, it is to be understood that such disclosure is intended in an illustrative, rather than a limiting sense, as it is contemplated that various modifications in the construction and arrangement of the parts will readily occur to those skilled in the art, within the spirit of the invention and the scope of the appended claims.

I claim:

1. The method of etching patterns on rollers comprising the steps of rotating a pattern carrying roller and a roller to be etched in pressing contact with each other at the same speed, supplying in the entrant angle between said rollers a moldable plastic material inert to the etching fluid for coating therewith the non-contacting surface portions of the roller to be etched, circulating a current of said etching fluid in contact with the lower portion of a circumferential zone of said roller to be etched simultaneously with said rotation thereof and discharging and collecting said fluid current for recirculation in contact with said roller zone, the portions of said roller zone in non-contacting relation to said pattern roller being continuously coated with said inert material and protected thereby, while the contacting portions of said roller zone are left free from said material and subjected to said fluid for progressive etching thereby.

2. The method of etching patterns on rollers comprising the steps of rotating a pattern carrying roller and a roller to be etched in pressing contact with each other at the same speed, supplying in the entrant angle between said rollers a moldable plastic material inert to the etching fluid for coating therewith the non-contacting surface portions of the roller to be etched, and simultaneously rotating said roller to be etched and circulating said etching fluid in contact with the lower portion of a circumferential zone thereof having a width longitudinally of said roller less than the roller length, the portions of said roller zone in non-contacting relation to said pattern roller being continuously coated with said inert material and protected thereby, while the contacting portions of said roller zone are left free from said material and subjected to said fluid for progressive etching thereby.

3. The method of etching patterns on rollers comprising the steps of rotating a pattern carrying roller and a roller to be etched in pressing contact with each other at the same speed, supplying in the entrant angle between said rollers a moldable plastic material inert to the etching fluid for coating therewith the non-contacting surface portions of the roller to be etched, simultaneously rotating said roller to be etched and circulating said etching fluid in contact successively with the lower portions of a plurality of circumferential zones thereof each having a width longitudinally of said roller less than the roller length, the portions of said roller zones in non-contacting relation to said pattern roller being continuously coated with said inert material and protected thereby, while the contacting portions of said roller are left free from said material and progressively etched away as they are subjected to said fluid.

4. The method of etching patterns on rollers comprising the steps of rotating a pattern carrying roller and a roller to be etched in pressing contact with each other at the same speed, supplying in the entrant angle between said rollers a moldable plastic material inert to the etching fluid for coating therewith the non-contacting surface portions of the roller to be etched, circulating a current of said etching fluid in contact with the lower half portion of a circumferential zone of said roller to be etched simultaneously with said rotation thereof, collecting said fluid current in a body of substantially semi-cylindrical shape and shallow depth about said lower half portion of said roller zone to be etched to continuously bathe the same with said fluid, and continuously discharging said fluid body for recirculation in contact with said zone of said roller.

5. The method of etching patterns on rollers comprising the steps of rotating a pattern carrying roller and a roller to be etched in pressing contact with each other at the same speed, supplying in the entrant angle between said rollers a moldable plastic material inert to the etching fluid for coating therewith the non-contacting surface portions of the roller to be etched, spraying a current of said etching fluid into proximity with the surface of said roller to be etched adjacent the level of the longitudinal axis thereof simultaneously with said rotation thereof, collecting said fluid current in a body of substantially semi-cylindrical shape and shallow depth about the lower half portion of said roller to continuously bathe the same with said fluid, and continuously discharging said fluid body for recirculation in contact with said roller, the portions of said roller in non contacting relation to said pattern roller being continuously coated with said inert material and protected thereby, while the contacting portions of said roller are left free from said material and subjected to said fluid for progressive etching thereby.

6. An apparatus for etching patterns on rollers comprising a pattern roller having raised portions forming the negative of a pattern to be formed on a roller to be etched, means supporting said pattern roller for movement toward and from said roller to be etched and urging said pattern roller into rolling contact with an upper portion thereof, an etching fluid container of generally channel shape for enclosing the lower portion of a circumferential zone of the roller to be etched in spaced relation therewith, means for circulating a current of etching fluid to the space between said container and the said roller to be etched to bathe therewith said lower portion of said roller, means for discharging said fluid from said container and means for collecting the discharged fluid for recirculation through said fluid supplying means, the arrangement being such that the portions of said roller in non-contacting relation to said pattern roller are continuously contacted with said inert material and protected thereby while the contacting portions of said roller are left free from said material and progressively etched away as they are subjected to said fluid.

7. An apparatus for etching patterns on rollers comprising a pattern roller having raised portions forming the negative of a pattern to be formed on a roller to be etched, means supporting said pattern roller for movement toward and from said roller to be etched and urging said pattern roller into rolling contact with an upper portion thereof, an etching fluid container shaped to conform to and enclose the lower half portion of a circumferential zone of the roller to be etched in spaced relation therewith, means for spraying said etching fluid into the space between said container and the roller to be etched to continuously bathe therewith said lower portion of said roller, means for discharging said fluid from said container and means collecting the same for recirculation through said fluid supplying means, the arrangement being such that the portions of said roller zone in non-contacting relation to said pattern roller are continuously coated with said inert material and protected thereby, while the contacting portions of said roller zone are left free from said material and subjected to said fluid for progressive etching thereby.

8. An apparatus for etching patterns on rollers comprising a pattern roller having raised portions forming the negative of a pattern to be formed on a roller to be etched, means supporting said pattern roller for movement toward and from said roller to be etched and urging said pattern roller into rolling contact with an upper portion thereof, an etching fluid container enclosing in spaced relation the lower portion of a circumferential zone of the roller to be etched having a width longitudinally of said roller less than the roller length, means for supplying a current of etching fluid to the space between said container and said roller to be etched to bathe therewith said lower portion of said roller zone, means for discharging said fluid from said container for recirculation through said fluid supply means, the arrangement being such that the portions of said roller zone in non-contacting relation to said pattern roller are continuously coated with said inert material and protected thereby, while the contacting portions of said roller zone are left free from said material and subjected to said fluid for progressive etching thereby.

9. An apparatus for etching patterns on rollers comprising a pattern roller having raised portions forming the negative of a pattern to be formed on a roller to be etched, means supporting said pattern roller for movement toward and from said roller to be etched and urging said pattern roller into rolling contact with an upper portion thereof, an etching fluid container of generally channel shape enclosing in spaced relation the lower portion of a circumferential zone of the roller to be etched having a width longitudinally of said roller less than the roller length, means for spraying a current of etching fluid into the space between said container and said roller to be etched to bathe therewith said lower portion of said roller zone and means for discharging said fluid from said container for recirculation through said supply means, the arrangement being such that the portions of said roller zone in non-contacting relation to said pattern roller are continuously coated with said inert material and protected thereby, while the contacting portions of said roller zone are left free from said material and subjected to said fluid for progressive etching thereby.

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