This invention relates to an electrical etching device, and has for an object the provision of a new and improved device particularly adapted for marking various kinds of metal tools and parts.

Another object of the invention is to provide a marking device of this class which is small enough to fit into one hand of the user in the manner of a fountain pen, or rubber stamp, and which is capable of comparable manipulation to effect rapid and permanent markings on metal tools or parts.

Another object of the invention is to provide a device wherein the etching operation consumes little time, of the order of seconds or a fraction of a second, to complete a marking operation.

Another object of the invention is to provide an etching device which can be filled with a sufficient amount of electrolyte to enable thousands of parts to be etched at one filling and wherein small quantities for the immediate etching operations can be fed as desired to the contacting portions of the device.

Other and further objects of the invention will appear hereinafter when the following specifications are read in conjunction with the accompanying drawings, in which:

Fig. 1 is a side elevational view of one embodiment of the invention, disclosing the actual size thereof, the electrical conductors being broken;

Fig. 2 is a vertical sectional view of the invention:

Fig. 3 is a horizontal sectional view corresponding substantially to the line 3—3 of Fig. 1;

Fig. 4 is a greatly enlarged vertical sectional view through the stencil means employed in connection with the invention;

Fig. 5 is a reduced bottom plan view of the stencil proper;

Fig. 6 is a broken side elevational view, disclosing a different embodiment of the invention;

Fig. 7 is a broken top plan view of the construction illustrated in Fig. 6; and

Fig. 8 is a broken vertical sectional view disclosing still another embodiment of the invention.

As shown in the drawings, the device includes a hollow body portion or casing 10, preferably of plastic material, having at one end a threaded socket 11, which communicates with a central bore 12, and with a counter-bore 13, leading into a socket forming a valve seat 14, this socket communicating with an enlarged socketed portion 15 formed adjacent the opposite end of the casing 10.

Threaded into the socket 11 is a plug 16 having a bore 17 extending therethrough, which communicates with an enlarged socket 18, the wall of which is relieved at one side to provide a channel 19, for a purpose presently to appear. Reciprocably mounted centrally of the casing 10 is a plunger 20, one end having a knob 21, fixedly secured thereon, and between the lower surface of the knob 21 and the bottom of the socketed portion 18 there is interposed a coiled spring 22, normally urging the plunger 20 in an outward direction. The opposite end of the plunger 20 is provided with a valve head 23 fixed in position thereon, and having a washer 24 along its inner face adapted to engage the valve seat 14 and close communication through the bore 13 leading from the central bore 12. Disposed within the central bore 12 is a plurality of annular felt pads 25 providing absorbent means adapted to contain a considerable quantity of electrolyte. The plunger 20 extends centrally through the pads 25 and is provided with a fixed collar 26 adapted, when the plunger 20 is depressed inwardly, to squeeze the absorbent pads 25 so as to feed electrolyte through the duct 13, the valve 23 opening upon this movement of the plunger 20, to permit passage of the electrolyte toward the point of use. The collar 26 carries a valve member 27 on its outer face, adapted to engage the inner face 28 of the plug 16, normally to close the bore 17, the latter being opened when the plunger 20 is depressed, then permitting additional electrolyte to be supplied to the pads 25 through the channel 19 and bore 17.

The enlarged socketed portion 15 communicates with stencil means, indicated generally by the reference character 29. The stencil means 29 include a cup-shaped member 30 preferably of thin thermo plastic material, having a contacting face 31 in which openings 32 are formed to define the characters desired, the face portion 31 merging into a wall portion 33, which terminates in an outwardly turned flange 34. Disposed in the bottom of the cup-shaped member 30, so as to overlie the entire inner surface of the contacting face 31, is a disk-shaped stainless steel, metallic screen 35 and overlaying the screen 35 is a cup-shaped fabric member 36, preferably of muslin, and disposed inside of the cup-shaped member 30, is a cup-shaped metallic screen 37, of stainless steel, the fabric cup 36 and the screen cup 37 being provided with flanges which overlie each other and are cemented together as indicated at 38, all of the component parts of the stencil means being formed and assembled to fit snugly and operate as a unit.
Beneath the flange 34 of the cup-shaped member 30 there is provided a sealing gasket 39, preferably of butyl rubber adapted to rest upon the annular shoulder 40, of a retaining cap 41 secured, as by a bayonet slot connection, indicated at 42, to the reduced lower end of the body portion or casing 30, an absorbent pad disposed in the cup-shaped formation of the stencil means, and another in the lower part of the socketed portion 35, providing absorbent means or an auxiliary reservoir for containing the electrolyte feed from the main reservoir.

The reduced portion of the casing 10 is formed for the reception of a plastic ring 42a which fits snugly about the reduced portion, and the inner surface of the ring is grooved for the passage of an electrode 43, the inner end of which is bent around the edge of the reduced portion of the casing, as indicated at 44, in such a way that when the stencil means 30 are secured in position by the retainer cap 41, the bent portion 44 of the electrode makes electrical contact with the adjacent flanges of the metallic screen 37, a conductor, indicated at 45, supplying electrical energy through the electrode 43. Another conductor, indicated at 46, extends into a groove in the ring 42a and laterally through the ring, and is secured to an exterior metallic electrode 47, fastened to the ring 42a by suitable screws, the electrode being provided with several, preferably three, resilient prongs 48, each of which extends slightly beyond the face of the stencil means 28, when the latter are in position, and terminates in a curved contacting portion 49.

In Figs. 6 and 7 the electrode 47 takes a slightly different form, having only two legs 50 projecting a considerable distance beyond the contact face of the stencil means 29 so as to engage the side wall of an object to be marked.

In Fig. 8 there is shown a construction wherein the lower end of the body portion of the device is provided with an enlarged section 51, to which the stencil means 29 are secured by the cap 52, the electrodes 53 being shaped to contact the rim 54 of an adapter 55, secured to one end of a shaft 56, whose end is to be marked, the other electrode 57 being secured to a metallic part 58 in electrical contact with the stencil means 29.

The device described is adapted to be operated in connection with alternating current at a low voltage, of the order of 6 to 9 volts, supplied through the conductors 45 and 46, and when the prongs 48, as shown in Figs. 1 through 5, are in electrical contact with a metallic article to be etched, a current is established between the object, the screen 27 and the electrolyte present in the cup-shaped stencil means, through the openings formed by the characters in the cup-shaped member 31, resulting in the etching of the metal of the object to be marked.

In the construction shown in Fig. 6, the circuit is established through contact of the legs 50 with the side of the object to be marked. In Fig. 8, the circuit is established through the electrodes 53, the adapter 55 and the end of the shaft 56, the stencil means 28 and the electrode 57.

By reason of the slim elongated shape of the device, it is possible to manipulate the same in the manner of a pen, pencil, or rubber stamp, and when the device is placed upon an object to be marked, the etching operation takes only a second, or a fraction of a second, to produce a clear and permanent mark thereon.

The manner in which the electrolyte is supplied makes it possible to mark many thousands of parts at one filling, electrolyte being fed to the cup-shaped stencil means in limited quantities as needed, while the valve arrangement prevents any leakage regardless of atmospheric conditions, and refilling is a simple matter as will be understood.

During the etching operation the screen disk 35, in immediate juxtaposition to the inner face of the plastic member and the screen disk 31, serve to concentrate and intensify the electrolyte energy supplied, and at the same time afford relief and escape for bubbling and diffusion of gases occurring during the electrolytic action.

It will be apparent to those skilled in the art that the embodiments herein disclosed accomplish at least the principal objects of the invention, and include advantages other than those herein disclosed, and that various changes and modifications may be made without departing from the spirit of the invention; and accordingly the embodiments herein disclosed are illustrative only and the invention is not limited thereto.

I claim:
1. A small hand-manipulated electroetching tool comprising a body member having an axial bore defining a reservoir for electrolyte, a plug secured within the upper end of said bore, a valve stem extending through said plug, a plurality of absorbent pads surrounding said valve stem and disposed within said bore, a valve carried by the lower end of said valve stem and serving to open and close said bore, a member carried by said valve stem and disposed within said bore and adapted to compress said pads, said body member having an enlarged delivery reservoir therein, stencil means located over the end of said delivery reservoir including a cup-shaped member containing a pair of metallic screens with a layer of absorbent fabric disposed therebetween, a dielectric stencil having openings formed therein defining the characters to be etched, means for actuating said valve stem to displace a limited quantity of electrolyte through the stencil and screens and onto the surface to be etched, means providing an electric circuit through the openings in said stencil and the electrolyte and the surface to be etched.

2. A small hand-manipulated electro-etching tool comprising a body member having an axial bore defining a reservoir for electrolyte, a plug secured within the upper end of said bore, a valve stem extending through said plug, absorbent material surrounding said valve stem and disposed within said bore, a valve carried by the lower end of said valve stem to serve to open and close said bore, a member carried by said valve stem and disposed within said bore and adapted to compress said absorbent material, said body member having an enlarged delivery reservoir therein, stencil means located over the end of said delivery reservoir including a cup-shaped member containing a pair of metallic screens with a layer of absorbent material disposed therebetween, a dielectric stencil having openings formed therein defining the characters to be etched, means for actuating said valve stem to displace a limited quantity of electrolyte through the stencil and screens and onto the surface to be etched, and means providing an electric circuit through the openings in said stencil and the electrolyte and the surface to be etched.

3. In an electrical etching device, the combination of an elongated body member, a reservoir for an electrolyte formed in the upper end of said body member, absorbent material disposed
within said reservoir, an open-ended chamber formed in the lower end of said body member, a dielectric stencil removably secured to the lower end of said body member in position to close the open end of said chamber, a bore providing communication between said reservoir and said chamber through which electrolyte may flow from said reservoir to said chamber, a closure for the upper end of said reservoir, an aperture through said closure operative to vent said reservoir to the atmosphere, a valve stem extending axially of said body member with one end thereof disposed within said chamber and the other end thereof disposed exteriorly of said body member, a valve secured to the end of said valve stem within said chamber, a second valve secured to said valve stem within said reservoir, and spring means urging said valve stem outwardly and operative to hold said valve and said second valve in position to normally close said bore and said aperture respectively, said valve stem being operative when depressed to move said valve and said second valve to open said bore and said aperture and to compress said absorbent material, and means providing an electric circuit through openings in said stencil and the electrolyte to the surface to be etched.

In an electrical etching device, the combination of an elongated body member, a reservoir for an electrolyte formed in the upper end of said body member absorbent material disposed within said reservoir, an open-ended chamber formed in the lower end of said body member, a dielectric stencil removably secured to the lower end of said body member in position to close the open end of said chamber, a bore providing communication between said reservoir and said chamber through which electrolyte may flow from said reservoir to said chamber, a closure for the upper end of said reservoir, an aperture through said closure operative to vent said reservoir to the atmosphere, a valve stem extending axially of said body member with one end thereof disposed within said chamber and the other end thereof disposed exteriorly of said body member, a valve secured to the end of said valve stem within said chamber, a second valve secured to said valve stem within said reservoir, and spring means urging said valve stem outwardly and operative to hold said valve and said second valve in position to normally close said bore and said aperture respectively, said valve stem being operative when depressed to move said valve and said second valve to open said bore and said aperture and to compress said absorbent material, and means providing an electric circuit through openings in said stencil and the electrolyte to the surface to be etched.

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The following references are of record in the file of this patent:

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