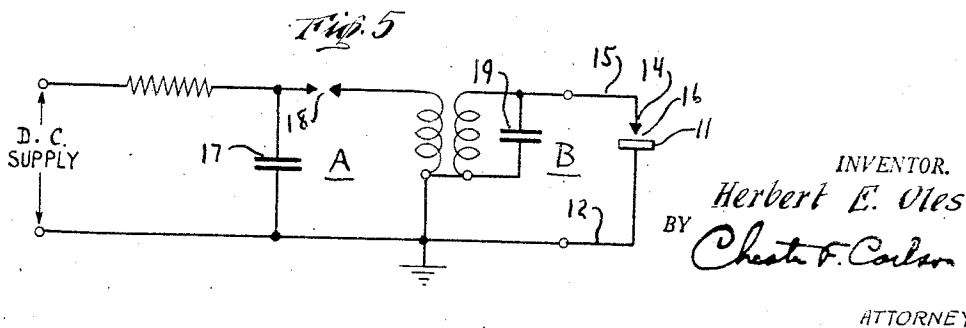
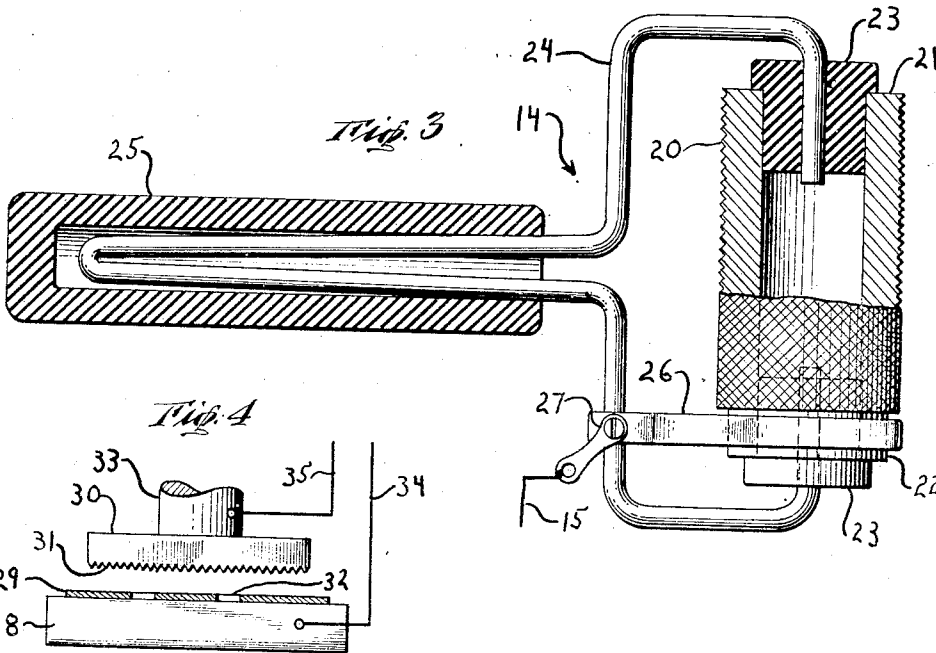
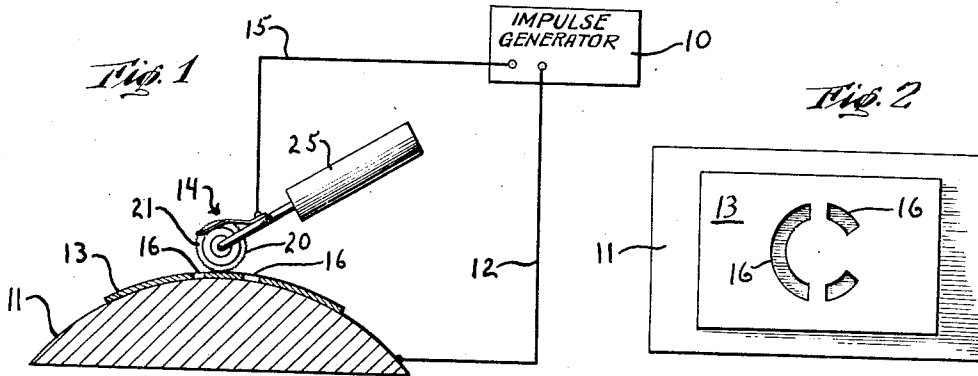


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MARKING DEVICE

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MARKING DEVICE

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This invention relates to marking devices and method and has particular reference to electrically forming characters or designs on metal.

An object of this invention is to provide improved means and method of forming characters or designs on metal.

Other objects will be apparent from the following description and claims, and the accompanying drawings, in which:

Figure 1 is a side elevation of an illustrative embodiment of this invention in operation;

Figure 2 is a plan view of the object to be marked and its stencil as in Figure 1;

Figure 3 is a plan view of the roller of Figure 1, in partial central section;

Figure 4 is an elevation of an alternate marking structure; and

Figure 5 is a schematic diagram of the electrical circuit utilized with the structure of Figure 1.

At present, there are several methods of providing marking, such as name plates, identification, serial numbers, etc., on metallic objects. These include hardened steel stamps which impose the characters in the metal and have the disadvantage of subjecting the piece to shock and possible distortion. Another method is to write on them with a so-called "electric pencil." This has the disadvantage that it is slow and does not give uniform work. Another method is on the market whereby a special stencil is made and then by means of a solution and electrolytic action the characters are etched into the surface. This has the disadvantage that the stencils are expensive, not readily made, and a solution must be employed, which is inconvenient.

The present invention utilizes a method which has none of the disadvantages of the foregoing. The invention comprises the application of the output of a high frequency electrical impulse generator to a group of metal projections, preferably fine or sharp metal points and so arranging these points that sparks will jump from them through the character or design openings of a stencil to a metal object to be marked. The burning caused by the sparks produces the desired marking. The stencils can be produced out of paper from any stenciling machine. No solutions are employed and the operation is rapid and simple, producing a permanent mark.

As in Figure 1, the device comprises mainly a high frequency electrical impulse generator 10; a metal object 11 to be marked, connected to the impulse generator by a lead 12; a stencil sheet 13, mounted on the object 11; and a marking device 14, connected to the impulse generator by a lead

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15. In operative position, the marking device 14 rests on the stencil sheet 13, and marking impulse gaps 16 are thus provided between the marking device 14 and the object 11, through the perforations of the stencil sheet 13.

The circuit of the impulse generator 10 is shown in Figure 5. While relatively low frequencies may be used, it is preferable to provide frequencies of the order of radio frequencies in the output of the impulse generator particularly since such high frequencies present no danger to an operator of the device of this invention. A relatively high voltage is preferable so that the sparking rate through the marking impulse gaps is high enough to provide a substantial and uniform density of dots or marks on the object 11.

The impulse generator circuit has a D. C. supply and comprises two oscillatory circuits A and B. The D. C. supply to circuit A builds up a charge in a condenser 17 which breaks down a spark gap 18. The oscillation of the circuit A, with a 2000 volt D. C. supply, provides a sparking frequency across the gap 18 of the order of 1000 sparks a second. This oscillation causes the circuit B to oscillate, and at a higher frequency, through the charging of a condenser 19 and the breaking down of the marking impulse gap 16, which is also a perforation in the stencil 13, see Figure 1, between the object 11 and the marking device 14. The gap 16, that is, the thickness of the stencil 13, is taken into consideration with respect to the voltage and the electrical characteristics of the impulse circuits, the object 11, and the marking device 14, so that the gap 16 is short enough to permit arcing in sufficient strength to efficiently burn the object 11.

Referring to Figures 1 and 2, the object 11 is formed of metal, for example, steel, and is provided with a convex upper surface to be marked, in a curvature to which a rolling cylinder may conform in continuous overall contact. It is within the scope of this invention that the surface to be marked may be flat, or may be of any desired curvature and configuration, as long as the marking device is so formed as to be able to conform to such curvature and configuration.

The stencil 13 may be formed of paper or other suitable non-conducting material, and with perforations defining whatever character is desired to be formed on the object 11.

The marking device 14, of Figures 1 and 3, comprises a roller unit with metal spark points 20. The marking is accomplished by running the roller, in this case manually, back and forth over the stencil sheet 13 as it lies on the object 11.

The contact of the roller with the unperforated portions of the stencil 13 keeps the spark points 20 uniformly spaced from the object 11 as they pass over the stencil perforations so the spark gap 16 is consistent in length as determined by the thickness of the stencil paper.

The marking device 14 includes a metal cylinder sleeve 21 on the outside surface of which the spark points 20 are formed by knurling. The sleeve 21 has a reduced end portion 22 with a smooth outer contact surface, and the ends of the sleeve are closed by centrally perforated plugs 23 of nonconducting material such as Bakelite. A support arm 24 is provided for the roller sleeve 21, in the form of a metal rod bent back on itself at its midpoint to form a handle portion with two portions of the rod extending along a substantial distance together, then outwardly, then parallel, and finally inwardly toward each other to terminate inside the sleeve 21 in the perforations of the end plugs 23. Thus, the sleeve 21 may be rotated on the ends of the support arm 24. A handle 25 of Bakelite or other insulation material is mounted on the handle portion of the support arm 24. Electrical connection from the impulse generator 10 to the spark points 20 is made through the lead 15, and a contact arm 26 which is secured to the support arm at 27 and is in contact engagement with the roller sleeve contact portion 22.

The alternate structure of Figure 4 is shown in out of operation position and comprises a substantially flat object 28 to be marked, a paper stencil sheet 29 lying on the body 28, and a marking plate 30, comparable to the roller 21 of Figure 1. The plate 30 is substantially in the form of a metal disc with its operating face knurled to provide metal points 31 from which sparks are jumped through the perforations 32 of the stencil sheet 29 to mark the body 28. The desired length of the marking spark gap is provided by the thickness of the stencil sheet 29 so that in its position of operation, the marking plate 30 rests on the stencil sheet 29.

The marking plate 30 is provided with a handle 33 for moving the plate into and out of operating position. With this structure, the marking plate 30 may be applied to the stencil 29 somewhat in the manner of a stamp instead of the rolling application of the structure of Figure 1. Thus, the structure of Figure 4 may be used in arrangements where no room is available for the lateral rolling action of the roller 21.

The surface to be marked of the body 28 may be of any desired curvature or configuration, as long as the marking plate 30 is formed to a conforming curvature and configuration. Leads 34 and 35 are provided for connection with the impulse generator 10 and correspond respectively to the leads 12 and 15 of Figure 1.

Many variations of material, form, and dimension come within the scope of this invention as disclosed in this specification and the following

claims, taken in conjunction with the accompanying drawings, since the particular details provided are simply for illustration.

Having described my invention, I claim:

1. In an electric marking device, a metal object, a stencil mounted upon a surface of said object having openings therein defining a pattern to be marked on said surface, a metal marking member having projections extending therefrom constituting a continuous regular array of spark electrodes, and an impulse generator connected to said member and said object whereby, when the member is moved into contact with the stencil, sparks pass between said object and said electrodes through the openings in said stencil thereby marking a pattern on portions of said surface, the body of the stencil preventing the passage of sparks between the said electrodes and the other portions of said surface.

2. In an electric marking device, an object to be marked which is formed of conductive material, a stencil mounted upon a surface of said object having openings therein defining a pattern to be marked on said surface, a roller having projections extending therefrom constituting a continuous, regular array of spark electrodes, and an impulse generator connected to said roller and said object whereby, when the roller is passed over the stencil, sparks pass between said object and said electrodes through the openings in said stencil thereby marking a pattern on portions of said surface and the body of the stencil prevents the passage of sparks between said electrodes and the other portions of said surface.

3. In an electric marking device, an object having a metal surface to be marked, a stencil mounted on said object having openings therein defining a pattern to be marked on said surface, a metal marking member having a knurled face with a continuous series of spark points extending therefrom, said member being adapted for contact with said stencil whereby spark gaps are formed between said surface and the spark points overlying the openings in the stencil and the body of the stencil is interposed between said member and the other portions of said surface, and an impulse generator connected to said metal surface and said marking member.

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