May 2, 1933. A. A. ROTH 1,906,888

APPARATUS FOR SHARPENING TOOLS

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Fig. 1.

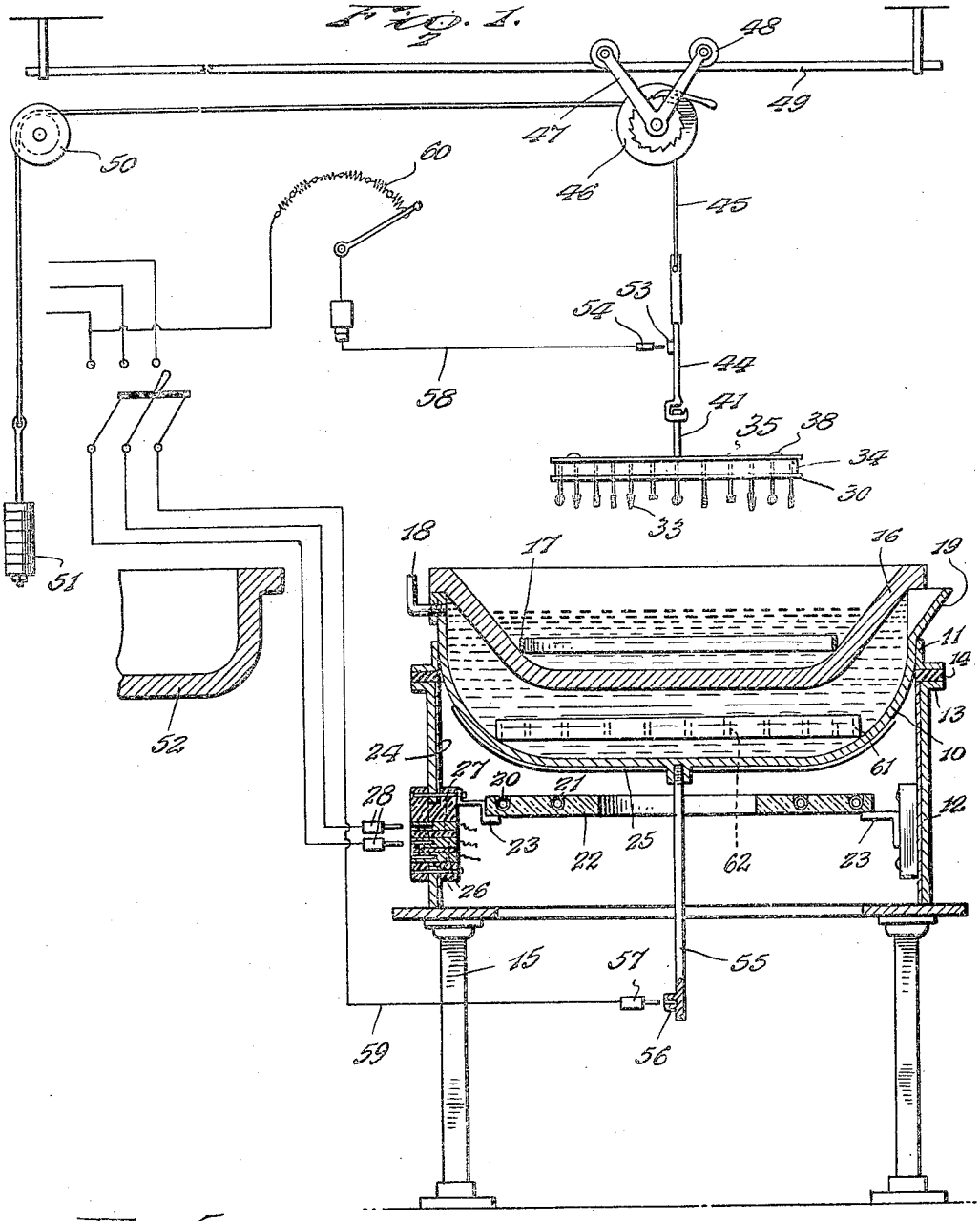
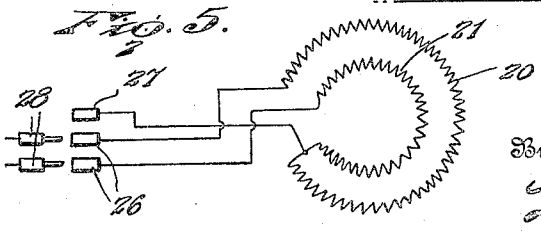


Fig. 5.



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Fig. 2.

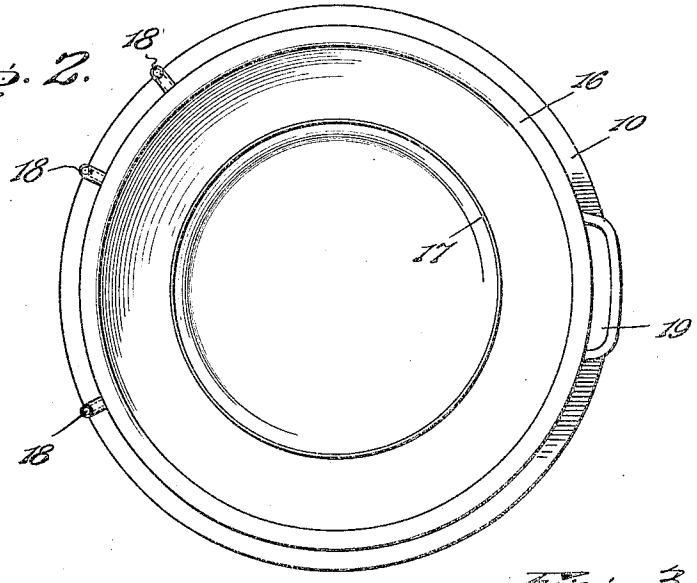


Fig. 10.

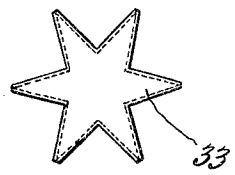


Fig. 3.

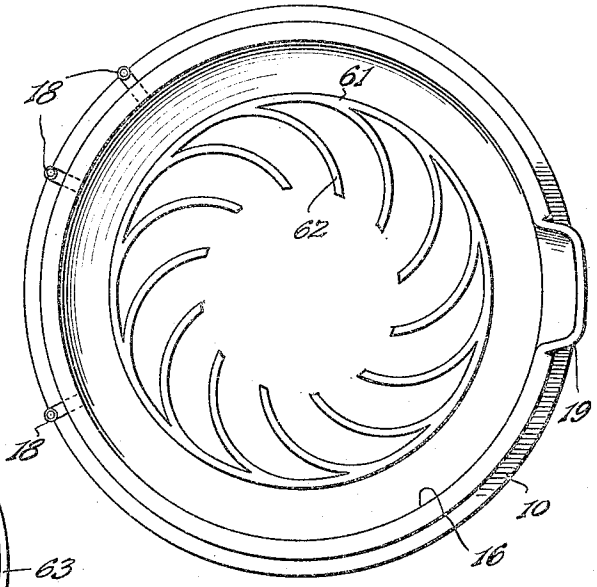
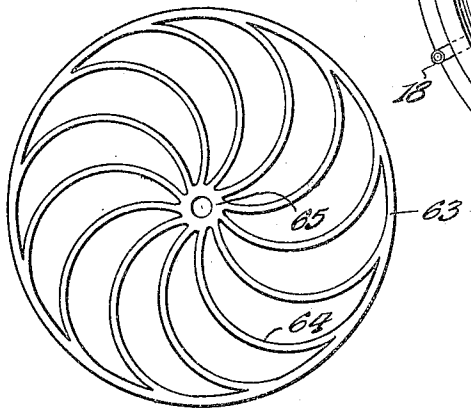


Fig. 4.



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Fig. 6.

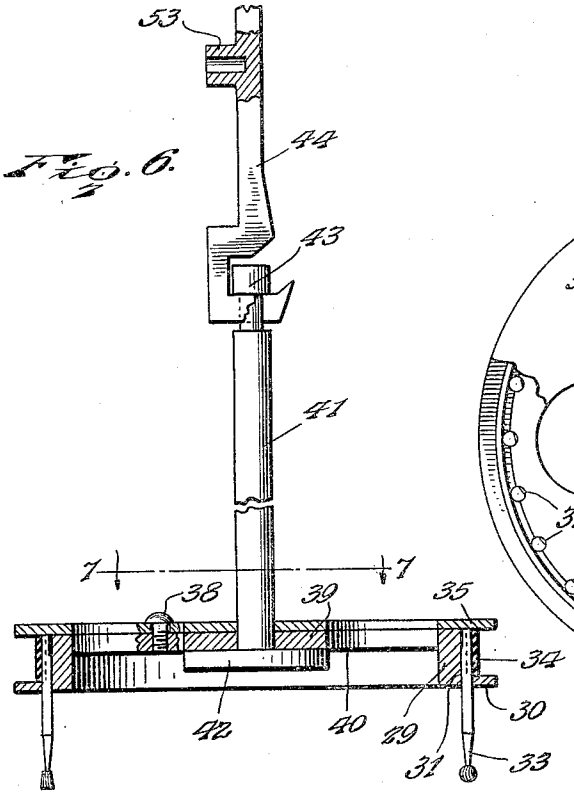


Fig. 7.

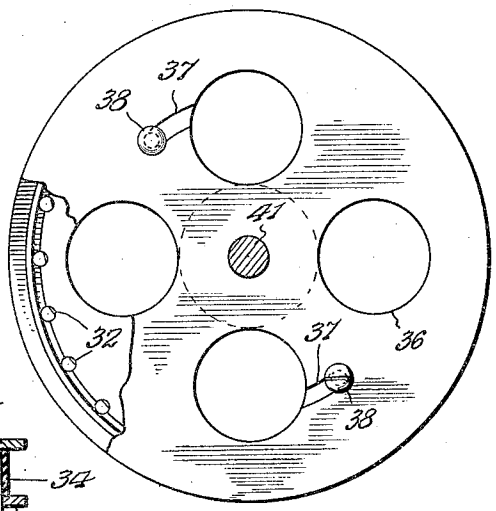


Fig. 8.

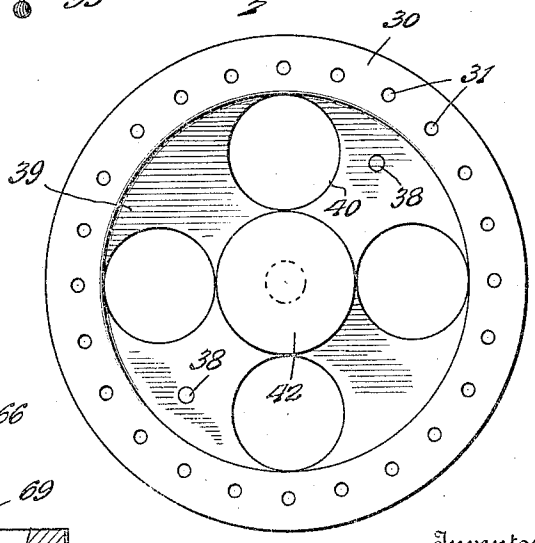
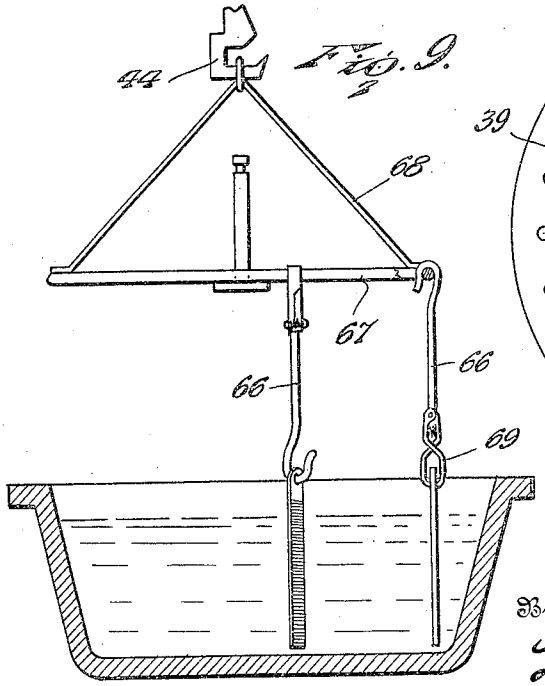


Fig. 9.



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UNITED STATES PATENT OFFICE

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APPARATUS FOR SHARPENING TOOLS

Application filed October 23, 1931. Serial No. 570,685.

This invention relates to a process and apparatus more particularly designed for sharpening dental burrs, files and like tools, by electrolysis.

An object of the present invention is to provide a heater for maintaining a predetermined temperature in the electrolyte so that the hitherto objectionable pitting and formation of deposits on the cutting edges will be eliminated.

A further object of the invention is to provide apparatus adapted to promote the flow of the electric current in all directions through the electrolyte toward the submerged tools so that even sharpening all the way around the tools will be promoted and the hitherto objectionable "taper", that is, sharpening of the cutting edge on the side of the tool toward the positive electrode and insufficient sharpening on the side away from the electrode, will be positively prevented.

With the above and other objects in view, the inventioin consists in certain novel details of construction and combinations of parts hereinafter fully described and claimed, it being understood that various modifications may be resorted to within the scope of the appended claims without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings forming part of this specification:

Figure 1 is a vertical sectional view through the apparatus by which the process is carried out,

Fig. 2 is a plan view of the metal tank and porous earthen vessel assembled,

Fig. 3 is a plan view of the metal tank and grid therein,

Fig. 4 is a plan view of a modified form of grid,

Fig. 5 is a diagrammatic view of the electric heating coil and connections,

Fig. 6 is a longitudinal sectional view of the tool holder,

Fig. 7 is a cross sectional view on the line 7—7 of Fig. 6 with a portion broken away to show the elastic band for confining the tools in the holder,

Fig. 8 is an underneath plan view of the tool holder,

Fig. 9 is a side elevation showing a modified form of tool holder for holding files, and

Fig. 10 is an enlarged cross sectional view through a dental burr showing the same dull in full lines and sharpened in dotted lines.

Referring now to the drawings in which like characters of reference designate similar parts in the various views, the apparatus is shown to comprise a metal tank 10 preferably formed of copper and having an angle iron supporting ring 11 integral with the outer face thereof. Preferably, the tank is supported by means of an annular metal base 12 having an outturned flange 13 at the top upon which the ring 11 is supported, and confined between the ring and flange is an insulating washer 14. The base may be supported in any preferred manner, and in the present embodiment, the same is shown elevated upon a table 15. The base 12 forms the housing of an electric heater which will be hereinafter fully described.

Nested within the tank is an earthen vessel 16, preferably the rim of the vessel being disposed on the rim of the tank to hold the vessel with its bottom spaced from the bottom of the tank. Preferably, both the tank and the vessel are in the nature of bowls, that is, they have no sharp rectangular corners but are of a general circular contour. The earthen vessel is adapted to be filled with the usual electrolyte or bath in which the tools to be sharpened are submerged. Preferably, the electrolyte comprises a mixture of copper sulphate, sulphuric acid, borax and acetic acid. For replenishing the metal content as the electrolyte becomes attenuated, a copper annulus 17 is placed within the bowl, as shown.

The tank 10 is adapted to be filled with water which forms a heat transmitting medium from the tank to the vessel and electrolyte. To permit the escape of vapor from the tank, a plurality of vent pipes 18, as best shown in Figs. 1 and 3, are arranged at the rim of the tank, at or above the water level. A filling spout 19 is preferably provided at a point diametrically opposite the vent pipes.

Disposed within the enclosure of the base 12, below the tank 10, there is a heater comprising, preferably, a pair of concentric resistance coils 20 and 21 mounted in an annular plate 22, of insulating material. A plurality of angular brackets 23 are arranged to project outwardly from the base 12 and support the heater base plate 22. Preferably, the base 12 is provided with an asbestos lining 24 and also the bottom of the tank 10 is preferably provided with an asbestos facing 25. Two of the ends of the heating coils 20 and 21 are provided with corresponding receptacles 26 while the opposite two ends of the coils are connected together and provided with a common receptacle 27. Two plugs 28, as shown in Fig. 5, may be connected to any suitable source of electricity. As will be apparent, when both plugs 28 are inserted in the receptacles 26, both heating coils will be connected together for maximum heating of the tank. By interchanging one of the plugs 28 with the receptacle 27, only one of the heating coils will be heated. In this way, a predetermined temperature of the fluid in the tank may be maintained to produce a corresponding temperature in the electrolyte by conduction through the earthen receptacle 16.

As best shown in Figs. 1, 6, 7 and 8, the tools to be sharpened, such as dental burrs, are secured in a holder, preferably consisting of a ring 29 having an integral flange 30 provided with perforations 31 which aline with grooves 32, best shown in Fig. 7, formed in the periphery of the ring. The shanks of the tools 33 are confined in the openings and grooves and an elastic band 34 is slipped over the shanks, as best shown in Figs. 6 and 7, to clamp them snugly against the ring 29. A cover disk 35 is disposed upon the ring 29, opposite the flange 30, and forms an abutment for the ends of the tools. The disk is provided with a plurality of perforations 36 and a pair of these perforations have slots 37 leading from them concentric with the center of the disk, as best shown in Fig. 7. The slots receive screws 38 carried by a web 39 formed integral with the ring 29. Said web is provided with openings 40 which normally aline with the openings 36, as shown in Fig. 6. By simply twisting the ring 29 and cover plate 35 relatively to each other, the screws 38 pass from the slots into the openings 36 and permit detachment of the cover plate so the elastic band 34 may be pryed out to release the tools and also to permit of the grooves 32 and openings 31 being cleaned when necessasry.

The tool holder is provided with a stem 41 having a head 42 upon which the above described holder is supported and also having the free end grooved, as shown at 43, to receive a supporting hook 44. The hook may be attached to one end of a cable 45 which is preferably trained over a ratchet pulley 46 carried by a hanger 47 which is supported by rollers 48 on a track 49. The cable is also trained over a second pulley 50 and is provided with a weight 51 which counterbalances the weight of the loaded tool holder. It will now be evident that the tool holder may be lowered or dipped into the electrolyte and maintained therein a predetermined length of time whereupon the holder may be removed and slid along the track to the cleaning vessel 52, shown in Fig. 1, where the sharpened tools may be cleansed before being removed from the holder.

By referring again to Fig. 1, it will be seen that the hook 44 is provided with a receptacle 53 to receive a plug 54. Likewise, the copper tank 10 is provided with a downwardly extending metal rod 55 which is provided with a socket 56 to receive a plug 57. The plugs 54 and 57 may be connected by conductor wires 58 and 59 to any suitable source of electric energy. Preferably, a rheostat 60 is interposed in circuit with the wire 58 so that a low voltage such as, for instance, two volts, may be maintained during the sharpening process. As will be apparent, the current passes through the metal tank 10, and water therein, through the damp earthen vessel 16 to the electrolyte.

It will be particularly observed that the earthen vessel 16 is nested within the metal tank 10, in contact with the water in the latter, so that, in a general way, it may be said that the electric current will flow from all points on the inner surface of the tank to the centrally positioned tools in the earthenware vessel. Consequently, when alternating or pulsating or even reversing current is used, the electrolyte will be disposed uniformly throughout the entire surface of each tool and alternately carried off therefrom in the usual manner to cause a sharpening of the cutting edges, as may be best shown by Fig. 10. In this figure, the dull edged tool is shown by full lines and, by dotted lines, there is indicated the film of matter evenly removed at each point around the entire circumference or perimeter or outer face of the tool.

While ordinarily the dished shape of the metal tank will be sufficient to permit adequate passage of the current from the tank inwardly toward the center of the tank, it is, in some instances, found highly desirable to

furnish circuitous paths for the electric current from the bottom of the tank and, for this purpose, I provide grids, as best shown in Figs. 3 and 4.

As shown in Fig. 4, the grid 61 is preferably formed of a copper ring having a plurality of substantially radially disposed curved spokes 62 which terminate short of the center of the ring. The ring is shown as being submerged in the tank 10 in contact with the inner face thereof so that the electric current may pass direct through a metallic path from the tank to the ring and inwardly along the curved spokes 62 toward the axis of the tank. In Fig. 4, the grid is shown to comprise a ring 63 having curved spokes 64 which are connected at the center of the ring by a common hub 65. Various other shapes of grids may be employed, it being simply beneficial that a foraminous metal grid be submerged in the tank in contact with the surface thereof to provide metallic paths for the current from the surface of the tank in circuitous or curved paths toward the axis of the tank.

It has been found, in practice, that, when the temperature of the electrolyte is maintained at about 180° Fahrenheit, the sharpening operation may be performed in a twenty-second time period for dental burrs. However, files require a longer time period, approximately three minutes, while the temperature may be maintained from 140° to 160° Fahrenheit.

It is also found desirable to suspend the files by means of hooks 66, as best shown in Fig. 9, from a metal ring 67 which is suspended from the above described hook 44 by means of metal cables 68 or metal straps. These straps, radiating from the hook, assist in balancing the weight of the files so that the same are maintained in vertical position in the electrolyte. The hooks 66 are equipped with clamps 69 so that either the hook or the clamp may be used interchangeably to secure the file to the ring 67 according to whether the file has a hole in one end or not.

Having thus described the invention, I claim:

1. Apparatus for sharpening tools comprising a tank adapted to be filled with liquid, means for heating the liquid, an earthen vessel adapted to be supported within the tank in contact with the liquid and adapted to contain an electrolyte, a holder for supporting tools in the vessel in contact with the electrolyte, and means for connecting the tank and the holder in circuit with a source of electricity.

2. Apparatus for sharpening tools comprising a metal tank adapted to be filled with liquid, a heater below the tank for heating the tank and liquid, an earthen vessel within the tank adapted to be heated by contact with the liquid and adapted to contain an electrolyte, a holder for supporting tools in the vessel in contact with the electrolyte, and means for connecting the tank and the holder in circuit with a source of electricity.

3. Apparatus for sharpening tools comprising a metal tank adapted to contain a liquid, a heater for the tank, a metal grid concentrically disposed in the tank and in contact with the inner surface thereof, an earthen vessel in the tank adapted to be filled with an electrolyte, a holder for supporting tools in contact with the electrolyte directly above the grid, and means for connecting the tank and the tool holder in circuit with a source of electricity.

4. Apparatus for sharpening tools comprising a metal tank adapted to be filled with liquid, means for heating the liquid, a metal grid having a rim in contact with the inner surface of the tank and having curved radial spokes extending toward the axis of the tank, an earthen vessel in the tank adapted to be filled with an electrolyte, a holder for supporting tools in contact with the electrolyte directly above the grid, and means for connecting the tank and the tool holder in circuit with a source of electricity.

5. Apparatus for sharpening tools comprising a metal tank adapted to contain a liquid, an earthen vessel adapted to be supported in the tank in contact with the liquid, said vessel being adapted to contain an electrolyte, a housing supporting the tank, a heater disposed within the housing for heating the tank and vessel, a tool holder disposed above the vessel adapted to dip the tools to be sharpened in the electrolyte, and means for connecting the tank and tool holder in circuit with a source of electricity.

6. Apparatus for sharpening tools comprising a metal tank adapted to contain a liquid, an earthen vessel in the tank adapted to contain an electrolyte, electric heating coils below the tank adapted to be selectively connected to a source of electricity for heating the contents of the tank and vessel to a predetermined temperature, a tool holder above the vessel for submerging the edges of the tools to be sharpened below the surface of the electrolyte, and means for connecting the tank and the tool holder in circuit with a source of electricity.

7. Apparatus for sharpening tools comprising a metal tank adapted to contain a liquid, an earthen vessel adapted to be suspended axially in the tank in contact with the liquid and adapted to contain an electrolyte, a metal member in the vessel for replenishing the metallic constituent of the electrolyte when the electrolyte becomes attenuated, a tool holder for submerging the cutting edges of the tools to be sharpened in the electrolyte, and means for connecting the

tank and tool holder in circuit with a source of electricity.

8. Apparatus for sharpening tools comprising a metal tank adapted to be filled with liquid, an earthen vessel disposed axially in the tank and adapted to contain an electrolyte, a tool holder suspended above the tank adapted to mount the tools upright thereon, means for moving the holder vertically to immerse the tools in the electrolyte in the vessel, and means for connecting the tank and tool holder in circuit with a source of electricity.

In testimony whereof I affix my signature.

AUGUST A. ROTH.