April 18, 1950 A. BIASI 2,504,795

ELECTRICAL MANICURE FILE FOR NAILS

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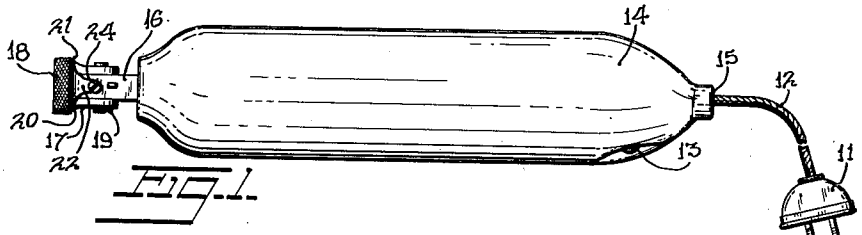


FIG. 1

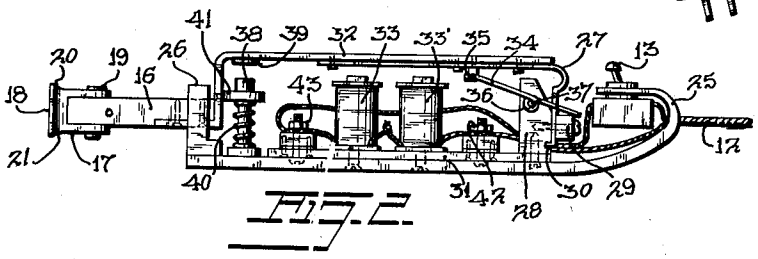


FIG. 2

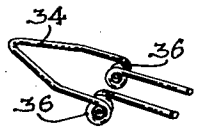


FIG. 5

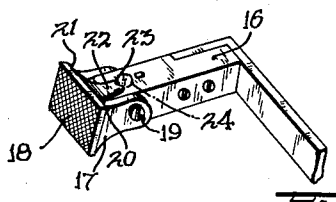


FIG. 4

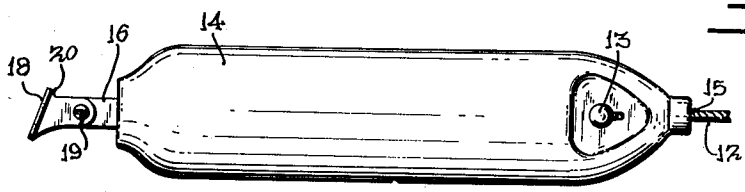


FIG. 3

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ELECTRICAL MANICURE FILE FOR NAILS

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8 Claims. (Cl. 132—75.8)

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The present invention relates to manicuring implements, and more particularly to nail files of the electrically energized type in which the file is actively reciprocated by an electromagnetic vibratory mechanism.

An object of the invention is to provide an electrically driven nail file in which the abrading element is actuated by a mechanism which is simple in construction, effective in its operation and inexpensive to manufacture.

A further object of the invention is to provide a file of this type in which the abrading surface is readily removable for replacement and in which this surface may be of such construction so that it may be discarded after a single use.

From another aspect, the invention contemplates a compact unitary electrically actuated file proportioned in its dimensions to fit the hand of the user of the device, and shaped for convenience of manipulation in the filing of nails.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawing, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawing forming a material part of this disclosure:

Fig. 1 shows a top plan view of an embodiment of the invention with the cover in place.

Fig. 2 shows a bottom plan view of the embodiment of Fig. 1 with the cover removed.

Fig. 3 is a view in elevation of the side elevational view of Fig. 1.

Fig. 4 is a perspective view of the removable abrading element.

Fig. 5 is a view in perspective of a spring which forms a part of the embodiment of the invention shown in the preceding figures.

The manicuring implement, according to the present invention, includes an electrical attachment plug 11 provided with a flexible cord 12 which delivers current through a switch 13 to a mechanism within a casing 14. Cord 12 enters the casing 14 through an aperture 15 which preferably comprises rounded surfaces or suitable bushings, as desired, to minimize wearing of the insulation of the cord 12 which will inevitably occur in the course of continued use of the device.

Casing 14 may be constructed in two or more sections to facilitate assembly during manufacture and to permit disassembly for maintenance and may be molded from suitable electrical insulating material. Extending from the casing 14 there is an oscillatory member 16 of fibrous ma-

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terial, to which a head 17 is pivotally secured by a screw 19. An abrading surface 18 is formed of thin resilient material and is secured to the head 17 by inwardly extending edge portions 20 and 21 which grip correspondingly shaped edges of the head 17. Abrading surface 18 further comprises a tongue portion 22 having a notch 23 therein which is adapted to engage the semicircular head of a screw 24. The semicircular shaped head of screw 24 facilitates rapid attachment or removal of the abrading surface 18 from the head 17. The tongue portion 22 provides a resilient spring action between the head 17 and the oscillatory member 16 and permits the abrading surface to be brought yieldingly into engagement with the nail as it is being filed by the action of the device.

Referring to Fig. 2 which shows the internal construction of the present invention, a frame member 25 supports the switch 13 and carries a guide member 26 secured thereto. An elongated flexible hinge member 27 is preferably constructed of flat strip material adapted to withstand repeated flexing. Hinge member 27 is clamped to a non-magnetic metal support 28 by adjustable block 29, support 28 being provided with an aperture adapted to receive and engage a projection 30 formed by bending the end of hinge member 27. Support 28 is carried by magnetizable base plate 31 and is preferably likewise made of magnetizable material.

An armature 32 of magnetizable material is secured to hinge member 27 and is bent to protrude through an opening in the non-magnetic metal guide member 26. Oscillatory member 16 also passes through the opening in guide member 26. A pair of electromagnets 33 and 33' are disposed in proximity to armature 32. The magnets 33 and 33' are secured to base plate 31.

A spring 34 which may be formed of wire as indicated in Fig. 5, engages a hook 35 carried by the armature 32. The coil portions, 36, 36 of the spring 34, are supported by a transverse pin 37 carried by the support 28. The outwardly extending portions of the spring 34 engage the adjustable block 29 whose position may be varied to regulate the tension exerted on the armature 32. A post 38 is disposed to engage a stop member 39 carried by the armature 32. The arrangement is preferably such that contact between the post 38 and the stop member 39 will prevent contact between the armature or parts carried thereby and the pole faces of the electromagnets 33 and 33'. A helical compression spring 40 is carried by the post 38 and engages a pro-

jection 41 which is secured to the armature 32. The action of the spring 40 aids the tension provided by the spring 34. The tension provided by the spring 34, however, is adjustable in magnitude whereas the tension provided by the helical spring 40 is relatively fixed.

Magnets 33 and 33' are connected to terminals 42 and 43. The conductors from the flexible cord 12 are terminated within the device, one of them being secured to terminal 42 and the other conductor extending through switch 13 to terminal 43.

In operation, the attachment plug 11 is inserted in a convenient outlet adapted to supply alternating current of suitable voltage. Switch 13 is then operated to establish electrical continuity to the magnets 33 and 33' which are thereupon energized by the alternating current. This energization of the magnets 33 and 33' sets up a pulsating electromagnetic field which exerts a correspondingly pulsating attraction on the magnetizable armature 32. This results in a vibratory force exerted on the armature 32 which produces the required motion of the oscillatory member 16. The resulting vibratory motion is thus transmitted to the abrading surface 18 which may be brought into contact with a nail to effect the desired filing action.

In order to secure a maximum response from the mechanical system, this may be adjusted if desired, to have a natural period which is approximately the same as that of the pulsating force set up by the magnets 33 and 33'. Approximate resonance may be obtained by the characteristics of helical spring 40 and a more exact degree of mechanical tuning may be obtained by varying the position of the adjustable block 29 to alter the tension exerted by the spring 34. In this manner a maximum amount of motion can be obtained, with any particular degree of the energization of magnets 33 and 33'.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise constructions herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new, and desire to secure by United States Letters Patent is:

1. In a device of the class described, a frame member, a magnetizable plate carried by the frame member, a pair of electromagnets having cores and pole faces, the cores being secured to the magnetizable plate in a manner adapted to produce a magnetic circuit extending between the two pole faces and including a portion of the magnetizable plate, armature means disposed in operative proximity to the pole faces, a flexible hinge member having one portion thereof secured in fixed relationship with respect to the frame member and another portion thereof adapted to support an end of the armature means, an oscillatory member carried by the other end of the armature means, a carrier member pivotally secured to the armature member, and resilient means including an abrading surface removably secured to the carrier member and further comprising a tongue portion resiliently interconnecting the resilient means and the oscillatory member and disposed to permit the abrading surface to be brought into yielding engagement with a surface to be abraded.

2. In a device of the class described, a frame member, a magnetizable plate carried by the frame member, a pair of electromagnets having cores and pole faces, the cores being secured to the magnetizable plate in a manner adapted to produce a magnetic circuit extending between the two pole faces and including a portion of the magnetizable plate, armature means disposed in operative proximity to the pole faces, a flexible hinge member having one portion thereof secured in fixed relationship with respect to the frame member and another portion thereof adapted to support an end of the armature means, an oscillatory member carried by the other end of the armature means, a carrier member pivotally secured to the armature member, resilient means including an abrading surface removably secured to the carrier member and further comprising a tongue portion resiliently interconnecting the resilient means and the oscillatory member and disposed to permit the abrading surface to be brought into yielding engagement with a surface to be abraded, said device comprising adjustable spring means operatively associated with the armature means.

3. In a device of the class described, a frame member, a magnetizable plate carried by the frame member, a pair of electromagnets having cores and pole faces, the cores being secured to the magnetizable plate in a manner adapted to produce a magnetic circuit extending between the two pole faces and including a portion of the magnetizable plate, armature means disposed in operative proximity to the pole faces, a flexible hinge member having one portion thereof secured in fixed relationship with respect to the frame member and another portion thereof adapted to support an end of the armature means, an oscillatory member carried by the other end of the armature means, a carrier member pivotally secured to the armature member, resilient means including an abrading surface removably secured to the carrier member and further comprising a tongue portion resiliently interconnecting the resilient means and the oscillatory member and disposed to permit the abrading surface to be brought into yielding engagement with a surface to be abraded, said device comprising stop means disposed to prevent mechanical contact between the pole faces of the electromagnets and any surface fixed in its relationship with respect to the armature means.

4. In a device of the class described, a frame member, a magnetizable plate carried by the frame member, a pair of electromagnets having cores and pole faces, the cores being secured to the magnetizable plate in a manner adapted to produce a magnetic circuit extending between the two pole faces and including a portion of the magnetizable plate, armature means disposed in operative proximity to the pole faces, a flexible hinge member having one portion thereof secured in fixed relationship with respect to the frame member and another portion thereof adapted to support an end of the armature means, an oscillatory member carried by the other end of the armature means, a carrier member pivotally secured to the armature member, resilient means including an abrading surface removably secured to the carrier member and further comprising a tongue portion resiliently interconnecting the resilient means and the oscillatory member and disposed to permit the abrading surface to be brought into yielding engagement with a surface to be abraded, said device

comprising means adapted to permit energization of the electromagnets from a source of alternating voltage and further comprising adjustable spring means disposed to produce mechanical resonance of the armature means at a frequency whose ratio to the frequency of the alternating voltage is substantially equal to a rational number.

5. A manicuring implement comprising an elongated frame member, a support mounted on said frame member adjacent the rear end thereof, a guide member mounted on said frame member adjacent the front end thereof and formed with an opening, a hinge member adjustably connected to said support, an armature mounted on said hinge member and having its free end extended into the opening of said guide member, means for producing oscillatory motion mounted on said frame member between said support and said guide member, and beneath said armature to oscillate the free end of said armature within the opening of said guide member, an abrading head mounted on the free end of said armature to oscillate therewith, spring means urging said armature in a direction away from said oscillatory motion producing means, and means limiting movement of said armature in a direction toward said oscillatory motion producing means under the influence of said means.

6. A manicuring implement comprising an elongated frame member, a support mounted on said frame member adjacent the rear end thereof, a guide member mounted on said frame member adjacent the front end thereof and formed with an opening, a hinge member adjustably connected to said support, an armature mounted on said hinge member and having its free end extended into the opening of said guide member, means for producing oscillatory motion mounted on said frame member between said support and said guide member, and beneath said armature to oscillate the free end of said armature within the opening of said guide member, an abrading head mounted on the free end of said armature to oscillate therewith, spring means urging said armature in a direction away from said oscillatory motion producing means, and means limiting movement of said armature in a direction toward said oscillatory motion producing means under the influence of said means, said limiting means comprising a post mounted on said frame member adjacent said guide member and beneath the free end of said armature, and a stop member on said armature in alignment with said post to strike said post when said armature is moved toward said post by said oscillatory motion producing means.

7. A manicuring implement comprising an elongated frame member, a support mounted on said frame member adjacent the rear end thereof, a guide member mounted on said frame member adjacent the front end thereof and formed with an opening, a hinge member adjustably connected to said support, an armature mounted on said hinge member and having its free end extended into the opening of said guide member, means for producing oscillatory motion mounted on said frame member between said support and said guide member, and beneath said armature to oscillate the free end of said armature within the opening of said guide member, an abrading head mounted on the free end of said armature to oscillate therewith, spring means urging said armature in a direction away from said oscillatory motion producing means, and means limiting movement of said armature in a direction toward said oscillatory motion producing means under the influence of said means, said limiting means comprising a post mounted on said frame member adjacent said guide member and beneath the free end of said armature, and a stop member on said armature in alignment with said post to strike said post when said armature is moved toward said post by said oscillatory motion producing means, and auxiliary resilient means on said post and operating between a fixed part of said armature and said frame for assisting said spring means in urging said armature away from said oscillatory motion producing means.

8. A manicuring implement comprising an elongated frame member, a support mounted on said frame member adjacent the rear end thereof, a guide member mounted on said frame member adjacent the front end thereof and formed with an opening, a hinge member adjustably connected to said support, an armature mounted on said hinge member and having its free end extended into the opening of said guide member, means for producing oscillatory motion mounted on said frame member between said support and said guide member, and beneath said armature to oscillate the free end of said armature within the opening of said guide member, an abrading head mounted on the free end of said armature to oscillate therewith, spring means urging said armature in a direction away from said oscillatory motion producing means, and means limiting movement of said armature in a direction toward said oscillatory motion producing means under the influence of said means, said limiting means comprising a post mounted on said frame member adjacent said guide member and beneath the free end of said armature, a stop member on said armature in alignment with said post to strike said post when said armature is moved toward said post by said oscillatory motion producing means, said armature having a portion extending along one side of said post, a projection mounted on said portion of said armature and slidably engaging said post, and an expansion spring on said post operating between said projection and the adjacent face of said frame member for assisting said spring means in urging said armature in a direction away from said oscillatory motion producing means.

ANGELO BIASI.

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