April 2, 1963 D. R. FEGLEY ETAL 3,083,508

VIBRATORY SANDING TOOL

Filed May 9, 1962 3 Sheets-Sheet 1

Fig. 1.

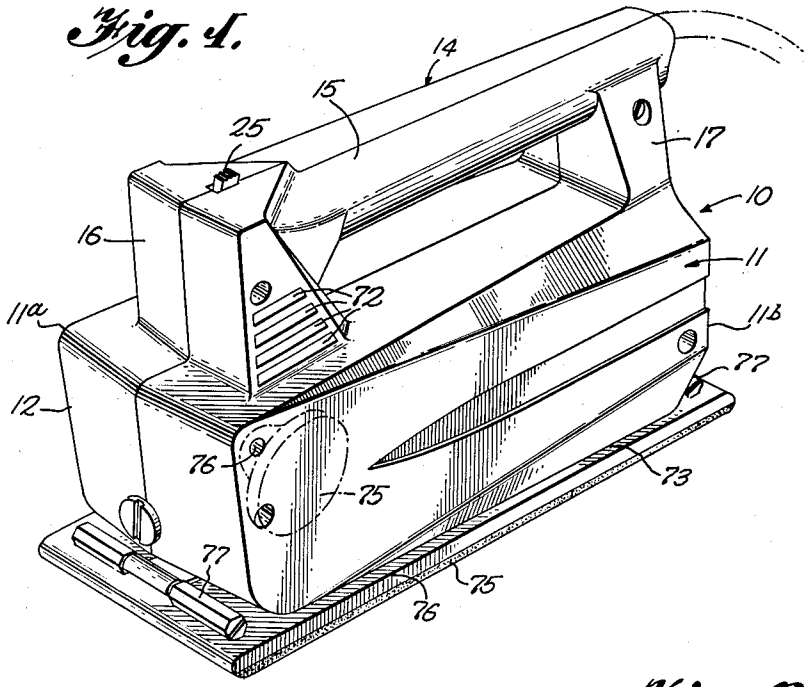
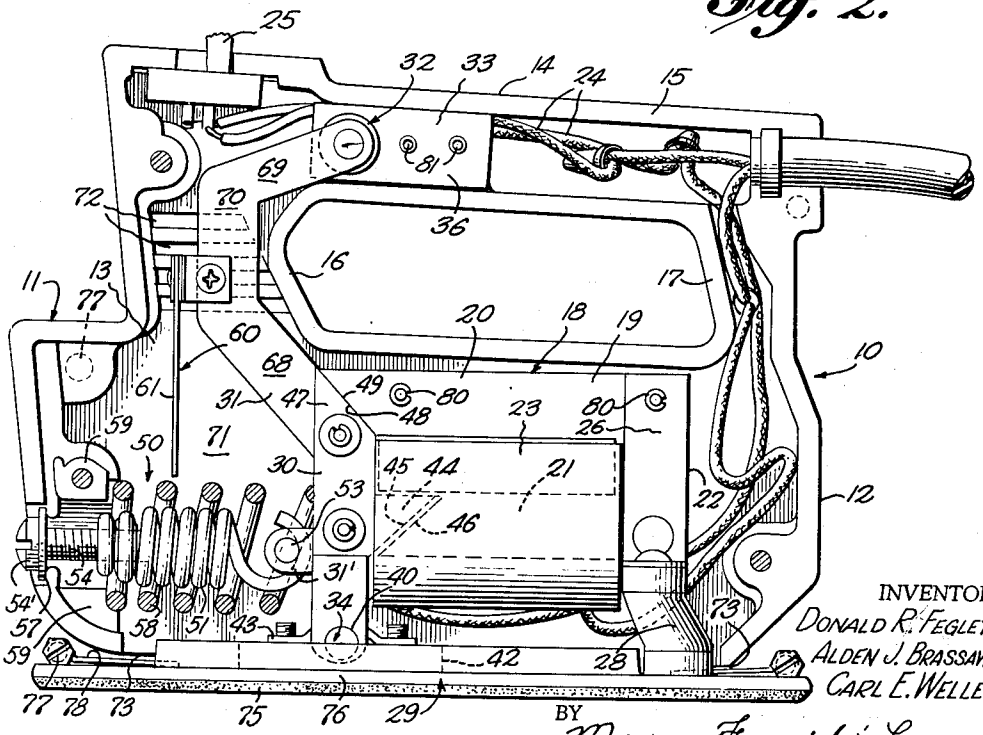


Fig. 2.



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Fig. 3.

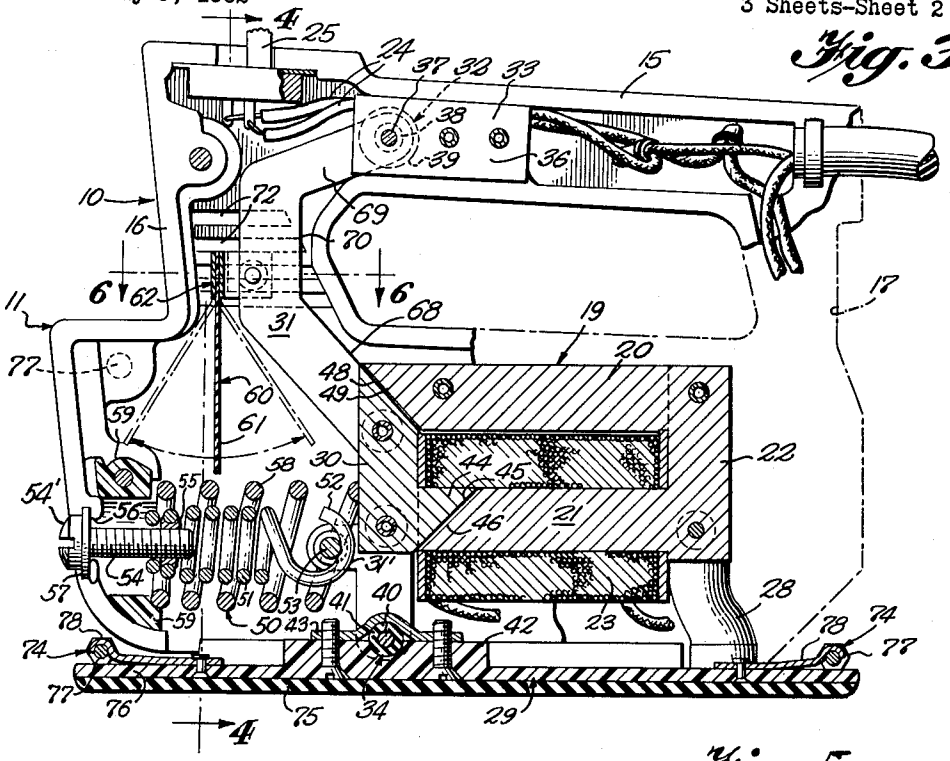
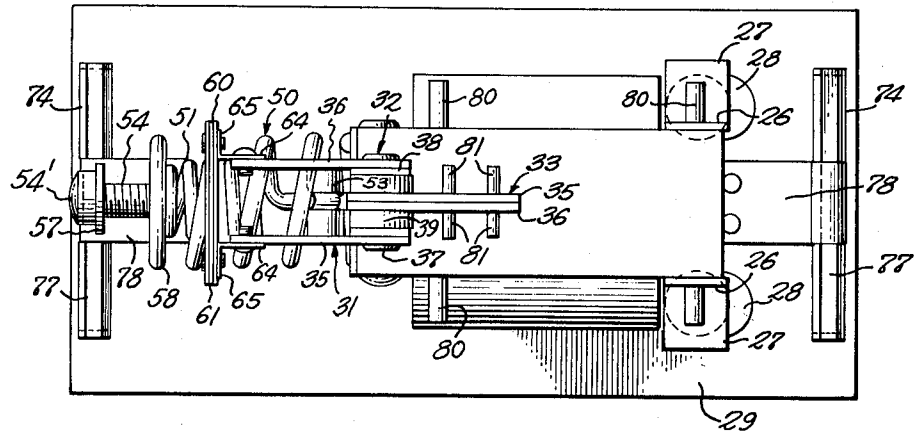


Fig. 5.



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Fig. 4.

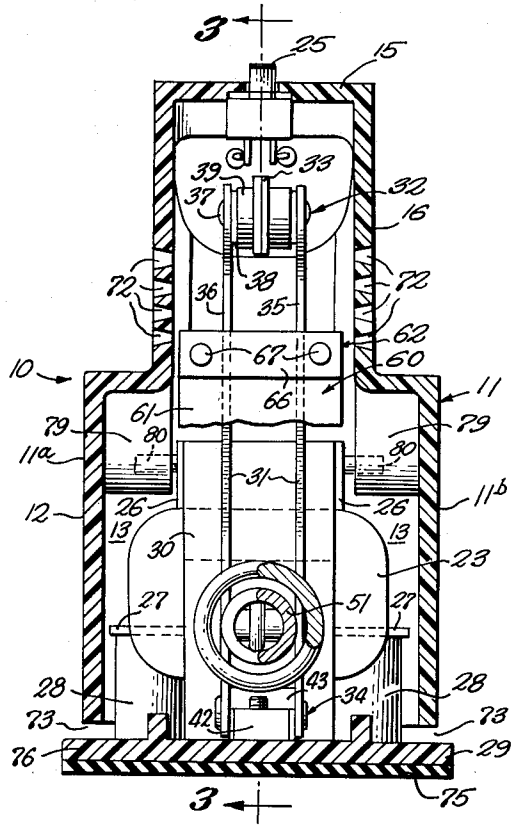
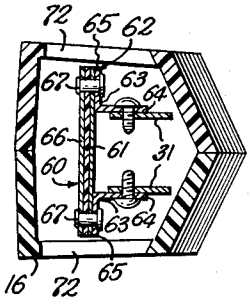


Fig. 6.



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3,083,508

VIBRATORY SANDING TOOL

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12 Claims. (Cl. 51—170)

The present invention relates in general to vibratory electric tools, and more particularly to portable vibratory electromagnetic devices for sanding, polishing, cleaning and like applications.

Many of the hertofore commercially available devices designed for sanding, polishing or cleaning surfaces have employed a plate or shoe for supporting an abrasive sheet, a polishing pad or like sheet material wherein the plate or shoe is reciprocated by a rotary electric motor. These devices involve a relatively complex construction and accordingly high production costs. Such devices have also been responsible for damage to furniture or other work surfaces to which they are applied when not used with great care as the high rotary inertia of the rotating components and the rotary power present render the control of pressure upon the work surface rather critical.

More recently, vibratory electromagnetic motors have been employed for reciprocating the abrading or polishing pads of such tools as a means of reducing the complexity and production costs of the tools. These vibratory motors comprise an alternating current electromagnet having a stator core fixed to the tool casing associated with a movable armature connected to the plate or shoe on which the abrading sheet or polishing pad is supported to reciprocate the plate in the directions of armature movement. Frequently the armature in such tools is pivoted to the tool casing and the sheet supporting shoe, and has such a short radius arm that the abrading or polishing sheet is moved along a noticeably arcuate path, making it difficult to maintain uniform application of pressure to the work and avoid formation of identations in the work surface, and increasing the minimum practical size, weight and power requirements of the tool.

Further, considerable heat is evolved by such electromagnetic motors which may be a source of discomfort to the user and accelerated deterioration to the tool. As the power requirements are increased by the pivoted armature designs of short radius arms, the heat evolved is accordingly increased. Size restrictions on tools of this type have made it difficult to provide adequate heat dissipation by natural circulation or ventilation to insure comfort to the user and maximum life for the tool.

An object of the present invention is the provision of a novel electro magnetic vibratory tool for sanding, polishing and like applications, which is constructed and operates in a novel manner and alleviates the above-mentioned disadvantages.

Another object of the present invention is the provision of a vibratory sanding tool or the like having novel arrangement of components to produce smooth, high-frequency reciprocative movement of a sanding plate in a substantially rectilinear reciprocative path.

Another object of the present invention is the provision of a novel vibratory electromagnetic sanding tool and the like having means for facilitating forced air circulation within the interior of the casing to reduce heat accumulation within the casing during operation.

Another object of the present invention is the provision of a novel vibratory electromagnetic sanding tool having fan means disposed within the casing activated by resonant response to vibratory frequencies present within the casing and coupled with vibratory forces therein for effectively circulating cooling air about the operating components and rendering the device cool in operation.

Other objects, advantages and capabilities of the present invention will become apparent from the following detailed description taken in conjunction with the accompanying drawings illustrating a preferred embodiment of the invention.

In the drawings:

FIGURE 1 is a perspective view of a vibratory sander constructed in accordance with the present invention;

FIGURE 2 is a side elevation of the sander with the proximal casing half removed;

FIGURE 3 is a longitudinal vertical section view of the sander, taken along the line 3—3 of FIGURE 4;

FIGURE 4 is a vertical transverse section view taken along the line 4—4 of FIGURE 3;

FIGURE 5 is a top plan view of the sander with the casing removed; and

FIGURE 6 is a fragmentary section view taken along the line 6—6 of FIGURE 3.

Referring to the drawings, wherein like reference characters designate corresponding parts throughout the several figures, there is illustrated a preferred embodiment of the vibratory electromagnetic sanding tool embodying the present invention which is indicated generally by the reference character 10. The sander 10 comprises a casing 11 formed of complementary molded halves 11*a*, 11*b* including a lower housing portion 12 defining a chamber 13 for enclosing the principal working components of the sander and a handle portion 14 having a generally inverted U-shaped configuration projecting upwardly from the lower housing portion 12. The handle portion 14 includes an elongated hollow grip member 15 and handle post members 16, 17, at least the forwardmost of which is hollow, extending upwardly from the lower housing portion 12 to the front and rear end portions of the grip member 15.

The sander 10 is powered by an electromagnet 18 having a C-shaped core 19 of iron core laminations formed with parallel, vertically spaced, horizontally disposed legs 20 and 21 and a vertically extending bridge portion 22 interconnecting the left-hand ends of the two legs 20, 21 as viewed in FIGURES 2 and 3. Wound upon the uppermost core leg 20 is an electromagnet coil 23 which is supplied with 60-cycle alternating current voltage at 100 volts through leads 24 controlled by a manual switch 25. A pair of L-shaped mounting bracket members 26 are fixed in laterally flanking relation to the bridge end of the electromagnet core 19 and have outwardly projecting flanges or feet 27 at the lower ends thereof to which are secured flexible rubber mounting blocks 28 of a known type having tapped metallic mounting strips embedded therein along the upper and lower faces of the blocks. The flexible rubber mounting blocks 28 are provided to suspend a sandpaper supporting plate or shoe 29 below the electromagnet.

An armature 30 formed of iron core laminations and having a substantially L-shaped configuration is disposed closely adjacent to the free ends of the stator core legs 20 and 21. The armature 30 is carried by an elongated lever 31 pivotally connected at its upper end as indicated at 32 to a lever anchoring member 33, which in this embodiment is formed of a pair of of flat metallic plates, fixed in the handle grip member 15 as hereinafter more specifically described to provide a pivot or fulcrum for the armature supporting lever 31 which is spaced above the stator core 19 a distance corresponding substantially to the height of the upper core leg 20 above the shoe 29. The lower end of the armature supporting lever 31 is pivotally connected as indicated at 34 to the shoe 29 at a point spaced longitudinally from the connections of the

rubber mounting blocks 28 with the shoe 29. The armature supporting lever 31 in the preferred embodiment herein described is formed of two elongated metallic strap members 35, 36 which flank the anchoring member 33, the pivotal connection 32 being a somewhat deformable connection formed by a pin, bolt or rivet 37 extending through the strap members 35, 36 and a rubber sleeve or grommet 38 which in turn is fitted in the bore of a metallic sleeve 39 extending through a suitable opening in the anchoring member 33.

The lower ends of the strap members 35, 36 of the armature supporting lever 31 are similarly secured to the shoe 29 by means of a rivet or bolt 40 extending through a rubber sleeve or grommet 41 seated in a concave, upwardly opening recess in a raised boss 42 integral with the shoe 29, the rubber sleeve 41 being held in the concave recesses of the boss 42 by a clamping strip 43 suitably secured to the boss 42 and having an upwardly arching medial portion to fit over the rubber sleeve 41.

The generally L-shaped armature 30 includes a horizontal leg portion 44 shown in the accompanying drawings as having a substantially right-triangular profile providing a downwardly and forwardly inclined planar face 45 which in the proximal limit position of the armature 30 relative to the core 19 closely approaches and lies substantially parallel to the inclined face 46 of the lower stator core leg 21. Similarly the upper end of the vertical leg 47 of the armature is shaped to provide an upwardly and forwardly inclined face 48 substantially paralleling the inclined face 49 of the upper stator core leg 20 when the armature occupies its proximal limit position relative to the core.

The armature 30 is normally held in a floating condition spaced from the pole faces 46 and 49 of the stator core 19 at the medial position in its vibratory stroke by means of a spring assembly 50 similar to the spring assembly shown in earlier U.S. Patent No. 2,790,276 granted April 30, 1957, to Sarkis Doctor Acopian, which includes a tension coil spring 51 having a hook-shape formation 52 on the end thereof adjacent the armature 30 which is looped about a securing pin 53 on an extension 31' of the armature supporting lever 30. The opposite end of the tension coil spring 51 is coupled to an adjusting screw 54 by means of constricted coil spring turns at the end of the coil spring 51 adjacent the adjusting screw 54 which restrains a threaded washer member 55 within the constricted end portion of the coil spring 51 and into which the adjusting screw 54 is threaded. The threaded stem of the adjusting screw 54 extends through an accommodating aperture 56 in the casing 11 and has an enlarged head 54' bearing upon a washer 57 which in turn shoulders on the portions of the casing 11 bounding the aperture 56. A larger diameter compression coil spring 58 is coaxially disposed in surrounding relation about the tension coil spring 51 and bears against the adjacent portions of the armature 30 and lever straps 35, 36 at one end and against flat shoulders formed on bosses 59 located internally of the lower housing portion 12 of the casing 11.

To provide for adequate ventilation of the electromagnet core and insure such air movement about the interior components of the sander which produce heat as to provide for effective dissipation of this heat by air convection currents, a vane type fan unit indicated generally by the reference character 60 is mounted on the armature supporting lever 31 at a location between the electromagnet core 20 and the pivotal connection 32 for the lever to be actuated by resonant response to vibratory movement imparted to the armature 30 and lever 31. This resonant vane fan unit 60 includes a rectangular fan vane 61 of very thin material which is capable of flexing in response to vibration of the lever 31. The upper end portion of the vane 61 is mounted in a fan mounting bracket 62 comprising a pair of angle plates 63 each having flanges 64 disposed in parallel to each other laterally lapping and affixed to the lever strap members 35, 36 and having oppositely projecting flanges 65 aligned in a common plane against which the uper end portion of the fan vane 61 is fixed by a hold-down plate 66 and rivets 67. In one preferred example, the fan is 1.5 inches wide and approximately $1\frac{15}{16}$ inches long and is formed of type XC 114 two-ply unidirectional Scotch-ply manufactured by Minnesota Mining and Manufacturing Company having a thickness of .013±.002 inch, the Scotch-ply being an epoxy plastic material with glass-fiber reenforcing embedded therein in a selected orientation, as distinguished from random fiber arrangement. It will be apparent, however, that the exact length of the fan vane 61 will vary somewhat with variations in the thickness and the fiber distribution of the material from which it is formed. In practice, the fan is adjusted as to length to provide the proper resonance when it has been assembled on the sander armature which is vibrated by a bench device at a preselected frequency. If the natural resonant frequency of the material in a given installation is found to be too high, weight in the form of tape can be attached to the fan to reduce the resonant frequency to the desired value. If the natural resonant frequency is too low, it can be increased by shortening the length of the fan vane.

It will be noted from the drawings that the strap members 35, 36 forming the armature supporting lever 31 are so shaped as to provide a forwardly off-set region of generally U-shaped configuration in the zone between the electromagnet 18 and the anchoring member 33. The off-set region is defined by the forwardly converging inclined leg portions 68, 69 and the vertical bridge portion 70, the angle members 63 of the fan mounting bracket 62 being secured to the lever strap members 31 at a point along the forwardly off-set vertical bridge portion 70 so that the fan vane 61 works in a zone disposed immediately above the spring assembly 50. A cavity or chamber 71 is provided in the lower housing portion 12 of the casing 11 above the spring assembly 50 and forwardly or to the left (as viewed in FIGURES 2 and 3) of the upper leg 20 of the stator core 19 in which the resonant fan vane 61 works. Also, the forwardmost handle post member 16 which accommodates the forwardly off-set portion of the armature supporting lever 31 is provided with ventilating openings 72 adjacent and immediately above the upper end portions of the fan vane 61 for intake of ambient air in response to movement of the fan vane. Similarly, the bottom edges of the casing halves of the casing 11 are spaced above the shoe 29 to provide a continuous air outlet opening, indicated generally at 73, adjacent the lower edges of the casing.

A gripping and tensioning mechanism 74 of similar construction to that illustrated in said earlier U.S. Patent No. 2,790,276 is provided at each longitudinal end of the shoe 29 to grip the edges of the sandpaper sheet or other working sheet material in tight condition extending above the lower face of the resilient pad 75 of foam rubber or the like cemented to the under face of the rigid platen portion 76 of the shoe 29. The gripping and tensioning mechanism in the preferred embodiment comprises a bar 77 of hexagonal cross-section along the major portion of its length and having a circular cross-section intermediate portion about which extends an inverted substantially U-shaped portion of a leaf spring 78 which is secured at its other end to the platen 76 by rivets or the like. The ends of the hexagonal bars 77 are slotted to receive a screwdriver blade or the like by which the gripping and tensioning devices may be rotated to effect tensioning of the sandpaper sheet over the lower face of the pad 75.

Each of the casing halves 11*a*, 11*b* is provided with bosses or like formations 79 on the inner surfaces thereof projecting toward the electromagnet 18 into butting relation with the sides of the upper leg 20 of the stator core 19, these formations 79 having openings therein

to receive outwardly projecting stubs 80 which are rigidly affixed to the stator core 19 for securely fixing the stator core in stationary condition within the casing 11.

Similarly the anchoring member 33 for the upper pivoted end of the armature supporting lever 31 is fixed in stationary relation within the hollow grip member 15 of the handle portion 14 by providing oppositely projecting stubs or anchoring pins 81 fixed to the plates forming the anchoring member 33, which project into accommodating openings in the housing halves 11*a*, 11*b* adjoining surface formations or bosses in the grip member 15 which abut the sides of the anchoring member 33.

In the operation of the sander construction described above, actuation of the manual switch 25, which is here illustrated as mounted in the grip member 15 of the handle portion 14, closes the supply circuit to the coil 23 of the electromagnet 18. Variations in the magnetic field produced in response to variations in the 60-cycle A.C. supply current to the electromagnet coil vibrates the armature 30 at twice the applied alternating current frequency toward and away from the stator core legs 20 and 21. The movement of the lever 31 and armature 30 occurs about the pivot point 37 which is spaced a sufficient distance above the electromagnet 18 so that the lower connecting point 34 of the lever 31 with the shoe 29 moves along a slightly curved path having a large radius compared to the height of the upper core leg 20 from the shoe 29. The limited range of vertical or radial deformation accommodated by the rubber sleeves 38 and 41 which surround and determine the positions of the pivot pin 37 and connecting pin 40, together with the properties of the flexible rubber mounting blocks 28 and their position, cause the shoe 29 to be reciprocated in a substantially planar path in response to vibratory movement of the armature 30. The compression spring 58 assists the magnet in attracting the armature 30 and the tension spring 51 has the function of returning the armature to its outermost position during each decay of the flux established by current flow in the electromagnet coil 23 from a maximum to zero. In performing the function of returning the armature 30 to its outermost position, the tension spring 51 additionally imposes a compression on the compression spring 58 whereby the latter may supplement the flux in attracting the armature 30 during the next quarter cycle. The tension spring 51 is coupled to the adjusting screw 54 so that effective adjustment to compensate for production variations in parts, assembly, spring rates, and operating line voltages may be made by slight turning of the screw 54. The springs 51 and 58 are preferably selected to provide a total spring rate which will, in combination with the mass, give the system substantially a natural frequency of from 10 to 20 cycles below the operating frequency of 120 cycles per second, when operated on a 60 cycle power supply. The tension spring 51 is, of course, adjusted so as to cause the armature 30 to reverse its direction of travel toward the core 19 just before the armature 30 actually contacts the ends of the stator core legs 20 and 21 so as to eliminate chatter.

In practice, the springs are selected to hold the natural resonant frequency of the system of between 104 and 107 cycles per second. If the natural resonant frequency is much higher than this, the stroke becomes longer, the current higher, and the tool stalls very easily. If the natural resonant frequency is much below 104 cycles per second, the stroke shortens, the current drops, and it becomes difficult to stall. As the force is great enough at 104 cycles for all practical sanding purposes, the further shortening of the stroke is undesirable.

During vibration of the armature 30 and armature supporting lever 31 about their pivot point 37, vibratory forces having a frequency of approximately 120 cycles per second arising from movement of the lever 31 are transmitted through the fan mounting bracket 62 to the resonant fan vane 61, which then flexes in a vibratory fashion about its fixed upper end in a manner indicated in dotted lines to FIGURE 3 to induce forced air currents in the interior of the casing surrounding the electromagnet coil 23 and dissipate the heat generated by the coil. Because of the positioning and movement of the fan vane 61, ambient air is drawn through the ventilating openings 72 in the forwardmost handle post member 16 and circulates downwardly in the zone of the fan vane 61 where it is forced rearwardly about the electromagnet coil 23 and escapes through the air outlet opening 73 between the bottom of the casing 11 and the shoe 29. By this arrangement, the physical vibratory movement of the armature supporting lever 31 provides the motive force for the fan vane 61, the fan vane being resonant at the approximate frequency of vibration of the lever 31 so that maximum flexing occurs at the frequency of vibration produced by the 60-cycle current supplied to the electromagnet windings 23. By this construction, no additional electrical supply or expensive or space-consuming fan motor is required to provide forced circulation of ambient air about the electromagnet coil to effect cooling thereof.

The configuration of the casing 11 provides a particularly convenient arrangement for manipulation of the sander. By providing a handle spaced above the casing portion which houses the working components, the hand of the operator is less intimately coupled to the vibrations generated in the lower housing portion and the fingers lie inwardly of the vertical planes bounding the sides of the lower casing portion so that the sander may be operated immediately alongside walls or surfaces perpendicular to the work surface without injury. To facilitate manipulation of the sander, a removable guide knob 75 is provided having a stub or pin 76 which may be inserted into openings 77 or 78 on opposite sides of the lower casing portion and having a friction fit therewith, to be grasped by one hand of the operator while the other hand grips the handle member 15 for convenient two-hand manipulation of the sander.

While but one preferred example of the present invention has been particularly shown and described, it is apparent that various modifications may be made therein within the spirit and scope of the invention, and it is desired, therefore, that only such limitations be placed on the invention as are imposed by the prior art and set forth in the appended claims.

What is claimed is:

1. A vibratory electromagnetic tool for sanding, polishing and the like comprising a casing, a reciprocative platen supported below said casing adapted to support a surface treating sheet, an alternating current electromagnet for reciprocating said platen including a core having a pair of pole faces and an electromagnet coil adapted to be energized by alternating current electrical energy, armature means pivotally mounted for swinging movement toward and away from said core upon operation of the electromagnet, said armature means including lever means pivotally supported at a fixed location adjacent its upper end in said casing at a point spaced above said electromagnet core, means coupling said lever means to said platen to reciprocate said platen responsive to variations in the magnetic flux in said core, and fan means mounted on said lever means resonantly responsive to vibrations of said lever means during operation of the tool for inducing forced air circulation within said casing about the coil of said electromagnet.

2. A vibratory electromagnetic tool for sanding, polishing and the like comprising a casing, a reciprocative platen supported below said casing adapted to support a surface treating sheet, an alternating current electromagnet for reciprocating said platen including a core having a pair of pole faces and an electromagnet coil adapted to be energized by alternating current electrical energy, armature means pivotally mounted for swing movement toward

and away from said core upon operation of the electromagnet, said armature means including lever means pivotally supported at a fixed location adjacent its upper end in said casing at a point spaced above said electromagnet core, means coupling said lever means to said platen to reciprocate said platen responsive to variations in the magnetic flux in said core, and resonant vibration responsive fan means for inducing forced air circulation within said casing including a flexible vane member having a natural resonant frequency approximating the frequency of vibration of said lever means during operation of said tool located internally of said casing, and means resiliently mounting said fan vane member adjacent one end thereof in depending relation from said lever means to transmit vibrations of said lever means to said fan vane member and induce resonant flexing of the latter responsive to vibration of said lever means to produce forced air circulation within said casing.

3. The combination recited in claim 2, wherein said casing member has air inlet vent openings adjacent said vane member for admission of ambient air to a zone surrounding said vane member upon flexing of the same and air outlet opening means adjacent the bottom of said casing for exit of air from said casing.

4. The combination recited in claim 2, wherein said flexible vane member comprises a substantially rectangular thin panel of epoxy resin material and selectively oriented glass fiber reenforcing embedded therein.

5. A vibratory electromagnetic tool for sanding, polishing and the like comprising a casing, a reciprocative platen supported below said casing adapted to support a surface treating sheet, an alternating current electromagnet for reciprocating said platen including a core having a pair of vertically spaced core legs disposed with their axes in substantial parallelism with the plane of said platen and terminating in vertically spaced pole faces, an armature for coacting with the core of said electromagnet, lever means rigidly connected to said armature for supporting the latter extending generally vertically of said tool having a pivotal connection at the lower end of said lever means with said platen, connecting means adjacent the upper end of said lever means pivotally supporting the same at a fixed location internally of said casing, the spacing between said pivotal connections being at least about twice the height of the uppermost of said core legs from said platen, support members depending from said core at a location spaced longitudinally of the platen from said lever means and affixed to said platen to movably support the latter from said core, resonant vibration responsive fan means for inducing forced air circulation within said casing including a flexible vane member having natural resonant frequency approximating the frequency of vibration of said lever means during operation of said tool located internally of said casing, and means resiliently mounting said fan vane member in depending relation from said lever means to transmit vibrations of said lever means to said fan vane member and induce resonant flexing of said fan vane member relative to said fixed support responsive to vibration of said lever means.

6. A vibratory electromagnetic tool for sanding, polishing and the like comprising a casing having a lower housing portion and a handle of inverted generally U-shaped configuration spaced above said lower portion and connected thereto by vertical posts and a reciprocative platen supported below said casing adapted to support a surface treating sheet, an alternating current electromagnet for reciprocating said platen including a U-shaped core having a pair of vertically spaced core legs disposed with their axes in substantial parallelism with the plane of said platen and terminating in vertically spaced pole faces lying in substantially parallel planes inclined to the axes of said core legs, an armature for coacting with the core of said electromagnet including a pair of inclined faces disposed to lie in substantial parallelism with said pole faces when said armature is at a proximal limit position relative to said core, lever means rigidly connected to said armature for supporting the latter extending generally vertically of said tool having a pivotal connection at the lower end of said lever means with said platen, connecting means adjacent the upper end of said lever means pivotally supporting the same at a fixed location internally of said handle, the spacing between said pivotal connections being at least about twice the height of the uppermost of said core legs from said platen, support members depending from said core at a location spaced longitudinally of the platen from said lever means and affixed to said platen to movably support the latter from said core, resonant vibration responsive fan means for inducing forced air circulation within said casing including a flexible vane member having natural resonant frequency approximating the frequency of vibration of said lever means during operation of said tool located internally of said casing, and means resiliently mounting said fan vane member in depending relation from said lever means to transmit vibrations of said lever means to said fan vane member and induce resonant flexing of said fan vane member relative to said fixed support responsive to vibration of said lever means.

7. A vibratory electromagnetic tool for sanding, polishing and the like comprising a casing having a lower housing portion and a handle of inverted generally U-shaped configuration spaced above said lower portion and connected thereto by vertical posts and a reciprocative platen supported below said casing adapted to support a surface treating sheet, an alternating current electromagnet for reciprocating said platen including a U-shaped core having a pair of vertically spaced core legs disposed with their axes in substantial parallelism with the plane of said platen and terminating in vertically spaced pole faces lying in substantially parallel planes inclined to the axes of said core legs, an armature for coacting with the core of said electromagnet, lever means rigidly connected to said armature for supporting the latter extending generally vertically of said tool and through one of said vertical posts into said handle, said lever means having a resiliently deformable pivotal connection at the lower end of said lever means with said platen, deformable pivotal connecting means adjacent the upper end of said lever means pivotally supporting the same at a fixed location internally of said handle, the spacing between said pivotal connections being at least about twice the height of the uppermost of said core legs from said platen, flexible deformable rubber support members depending from said core at a location spaced longitudinally of the platen from said lever means and affixed to said platen to movably support the latter from said core and resiliently accommodate movement of the platen in a plane paralleling the axes of the core leg in response to magnetic forces of the core on the armature, and resilient spring means extending between said armature and said casing for storing up energy during retraction and attraction strokes of said armature relative to said core to assist return of said armature toward said core from the remote limit position of said armature and for retracting said armature from said pole faces upon decay of magnetic flux, resonant vibration responsive fan means for inducing forced air circulation within said casing including a flexible vane member having natural resonant frequency approximating the frequency of vibration of said lever means during operation of said tool located internally of said casing, and means resiliently mounting said fan vane member in depending relation from said lever means to transmit vibrations of said lever means to said fan vane member and induce resonant flexing of said fan vane member relative to said fixed support responsive to vibration of said lever means.

8. A vibratory electromagnetic tool for sanding, polishing and the like comprising a casing having a lower housing portion and a handle of inverted generally U-shaped configuration spaced above said lower portion and connected thereto by vertical posts and a reciprocative platen supported below said casing adapted to support a surface treating sheet, an alternating current electro-

magnet for reciprocating said platen including a U-shaped core having a pair of vertically spaced core legs disposed with their axes in substantial parallelism with the plane of said platen and terminating in vertically spaced pole faces lying in substantially parallel planes inclined to the axes of said core legs, an armature for coacting with the core of said electromagnet, lever means rigidly connected to said armature for supporting the latter extending generally vertically of said tool and through one of said vertical posts into said handle, said lever means having a resiliently deformable pivotal connection at the lower end of said lever means with said platen, deformable pivotal connecting means adjacent the upper end of said lever means pivotally supporting the same at a fixed location internally of said handle, the spacing between said pivotal connections being at least about twice the height of the uppermost of said core legs from said platen, flexible deformable rubber support members depending from said core at a location spaced longitudinally of the platen from said lever means and affixed to said platen to movably support the latter from said core and resiliently accommodate movement of the platen in a plane paralleling the axes of the core leg in response to magnetic forces of the core on the armature, and resilient spring means extending between said armature and said casing for storing up energy during retraction and attraction strokes of said armature relative to said core to assist return of said armature toward said core from the remote limit position of said armature and for retracting said armature from said pole faces upon decay of magnetic flux, resonant vibration responsive fan means for inducing forced air circulation within said casing including a flexbile vane member having natural resonant frequency approximately the frequency of vibration of said lever means during operation of said tool located internally of said casing, means resiliently mounting said fan vane member in depending relation from said lever means to transmit vibrations of said lever means to said fan vane member and induce resonant flexing of said fan vane member relative to said fixed support responsive to vibration of said lever means, the vertical post through which said lever means projects having air inlet openings therein disposed immediately above said fan means for passage of ambient air into said casing responsive to flexing of said fan vane member, and said casing being spaced above said platen to provide a continuous air outlet opening bounding the lower edge of said casing.

9. A vibratory electromagnetic tool for sanding, polishing and the like comprising a casing having a lower housing portion and a handle of inverted generally U-shaped configuration spaced above said lower portion and connected thereto by vertical posts and a reciprocative platen supported below said casing adapted to support a surface treating sheet, an alternating current electromagnet for reciprocating said platen including a U-shaped core having a pair of vertically spaced core legs disposed with their axes in substantially parallelism with the plane of said platen and terminating in vertically spaced pole faces lying in substantially parallel planes inclined to the axes of said core legs, an armature for coacting with the core of said electromagnet including a pair of inclined faces disposed to lie in substantial parallelism with said pole faces when said armature is at a proximal limit position relative to said core, lever means rigidly connected to said armature for supporting the latter extending generally vertically of said tool having a pivotal connection at the lower end of said lever means with said platen, connecting means adjacent the upper end of said lever means pivotally supporting the same at a fixed location internally of said handle, the spacing between said pivotal connections being at least about twice the height of the uppermost of said core legs from said platen, and support members depending from said core at a location spaced longitudinally of the platen from said lever means and affixed to said platen to movably support the latter from said core.

10. A vibratory electromagnetic tool for sanding, polishing and the like comprising a casing having a lower housing portion and a handle of inverted generally U-shaped configuration spaced above said lower portion and connected thereto by vertical posts and a reciprocative platen supported below said casing adapted to support a surface treating sheet, an alternating current electromagnet for reciprocating said platen including a U-shaped core having a pair of vertically spaced core legs disposed with their axes in substantial parallelism with the plane of said platen and terminating in vertically spaced pole faces lying in substantially parallel planes inclined to the axes of said core legs, an armature for coacting with the core of said electromagnet, lever means rigidly connected to said armature for supporting the latter extending generally vertically of said tool and through one of said vertical posts into said handle, said lever means having a resiliently deformable pivotal connection at the lower end of said lever means with said platen, deformable pivotal connecting means adjacent the upper end of said lever means pivotally supporting the same at a fixed location internally of said handle, the spacing between said pivotal connections being at least about twice the height of the uppermost of said core legs from said platen, flexible deformable rubber support members depending from said core at a location spaced longitudinally of the platen from said lever means and affixed to said platen to movably support the latter from said core and resiliently accommodate movement of the platen in a plane paralleling the axes of the core leg in response to magnetic forces of the core on the armature, and resilient spring means extending between said armature and said casing for storing up energy during retraction and attraction strokes of said armature relative to said core to assist return of said armature toward said core from the remote limit position of said armature and for retracting said armature from said pole faces upon decay of magnetic flux.

11. A vibratory electromagnetic tool for sanding, polishing and the like comprising a casing having a lower housing portion and a handle of inverted generally U-shaped configuration spaced above said lower portion and connected thereto by vertical posts and a reciprocative platen supported below said casing adapted to support a surface treating sheet, an alternating current electromagnet for reciprocating said platen including a U-shaped core having a pair of vertically spaced core legs disposed with their axes in substantial parallelism with the plane of said platen and terminating in vertically spaced pole faces lying in substantially parallel planes inclined to the axes of said core legs, an armature for coacting with the core of said electromagnet, lever means rigidly connected to said armature for supporting the latter extending generally vertically of said tool and through one of said vertical posts into said handle, said lever means having a resiliently deformable pivotal connection at the lower end of said lever means with said platen, deformable pivotal connecting means adjacent the upper end of said lever means pivotally supporting the same at a fixed location internally of said handle, the spacing between said pivotal connections being at least about twice the height of the uppermost of said core legs from said platen, flexible deformable rubber support members depending from said core at a location spaced longitudinally of the platen from said lever means and affixed to said platen to movably support the latter from said core and resiliently accommodate movement of the platen in a plane paralleling the axes of the core leg in response to magnetic forces of the core on the armature, and resilient spring means extending between said armature and said casing for storing up energy during retraction and attraction strokes of said armature relative to said core to assist return of said armature toward said

core from the remote limit position of said armature and for retracting said armature from said pole faces upon decay of magnetic flux, said spring means imparting to the system of movable components a natural resonant frequency which is within the range of 10 to 20 cycles below twice the frequency of the alternating current supplied to the electromagnet.

12. A vibratory electromagnetic tool for sanding, polishing and the like comprising a casing having a lower housing portion and a handle of inverted generally U-shaped configuration spaced above said lower portion and connected thereto by vertical posts and a reciprocative platen supported below said casing adapted to support a surface treating sheet, an alternating current electromagnet for reciprocating said platen including a U-shaped core having a pair of vertically spaced core legs disposed with their axes in substantial parallelism with the plane of said platen and terminating in vertically spaced pole faces lying in substantially parallel planes inclined to the axes of said core legs, an armature for coacting with the core of said electromagnet, lever means rigidly connected to said armature for supporting the latter extending generally vertically of said tool and through one of said vertical posts into said handle, said lever means having a resiliently deformable pivotal connection at the lower end of said lever means with said platen, deformable pivotal connecting means adjacent the upper end of said lever means pivotally supporting the same at a fixed location internally of said handle, the spacing between said pivotal connections being at least about twice the height of the uppermost of said core legs from said platen, flexible deformable rubber support members depending from said core at a location spaced longitudinally of the platen from said lever means and affixed to said platen to movably support the latter from said core and resiliently accommodate movement of the platen in a plane paralleling the axes of the core leg in response to magnetic forces of the core on the armature, and resilient spring means extending between said armature and said casing for storing up energy during retraction and attraction strokes of said armature relative to said core to assist return of said armature toward said core from the remote limit position of said armature and for retracting said armature from said pole faces upon decay of magnetic flux, said spring means imparting to the system of movable components a natural resonant frequency which is within the range of 10 to 20 cycles below twice the frequency of the alternating current supplied to the electromagnet.

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