June 9, 1953 E. LIST 2,641,721

SANDING, SCRAPING, AND POLISHING MACHINE

Filed March 27, 1951

Fig. 1.

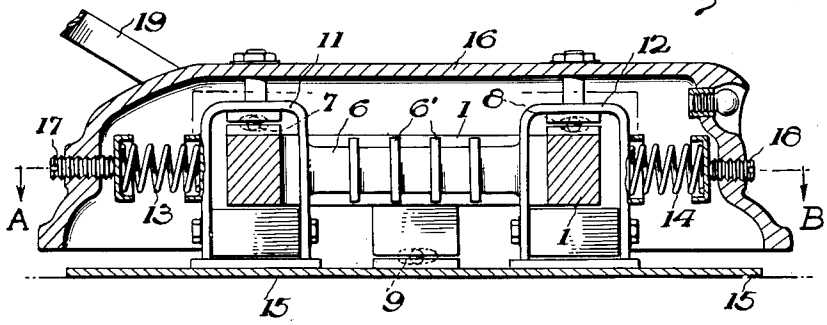
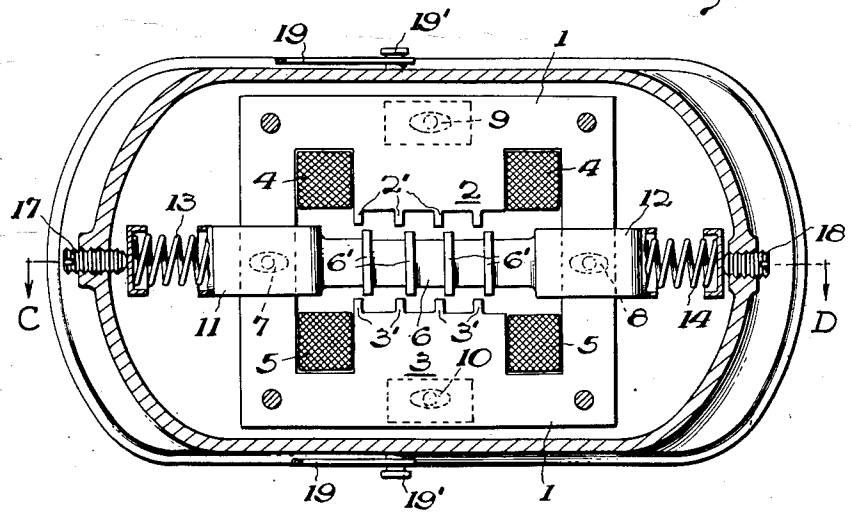


Fig. 2.



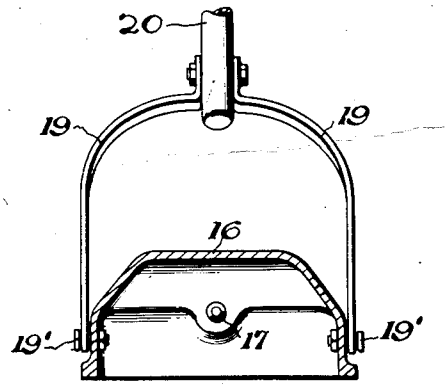


Fig. 3.

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SANDING, SCRAPING, AND POLISHING MACHINE

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4 Claims. (Cl. 310—29)

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The present invention refers to an electrically-driven machine for sanding, grinding, cleaning and polishing.

Known machines for cleaning and polishing floors for example consist essentially of an electric rotary motor provided with brushes for thus treating the floors. The electric motor is mounted on a vertical shaft and by means of a mechanical transmission drives several (generally three) circular brushes the spindles of which are, likewise, vertical.

Besides the foregoing there are also known machines which operate by transforming the rotary motion of an electric motor, by means of an eccentric device, into a to-and-fro movement.

All these machines are voluminous and, therefore, costly to produce.

In addition to the above, small polishing machines are known which employ an electromagnetic oscillating motor the mobile core of which is joined to a metal plate that is applied to the work. Such arrangements have, so far, only been designed as small units, operated by hand.

The new machine according to this invention, for sanding, grinding, cleaning and polishing is characterized by the provision of an electromagnetic or electrodynamic oscillating motor as driving means for a work plate joined thereto, directly or through short levers, said motor being installed within a flat casing in such a manner that the height thereof is the smallest of its dimensions, the oscillating work plate covering the greater part or all of the lower face of the armature. The entire assembly is, furthermore, seated on several longitudinal ball bearings.

This particular feature of a substantially very reduced height, enables the machine to be used efficiently in situations where the kind so far known could not be applied, such as underneath furniture. Also, the machine according to this invention has the advantage of requiring very little storage space, a quite important detail in the modern small apartment.

The fact that the work plate covers the greater part or all of the lower face of the armature in itself as a protection against dust and lint entering the machine.

In order to ensure that the oscillatory motion of the armature can take place in a lengthwise direction only without any crosswise displacement whatsoever, the invention provides several longitudinal ball bearings guiding the armature in the manner indicated.

Also according to the invention, said machine is provided with two electrical mass units, the

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larger of which is formed by the magnetic stator, the coils, the case and other accessories, whereas the smaller is represented by the mobile core.

Above-mentioned features are based on the fact that, in an oscillating system of two bodies or masses, the smaller mass is the one accomplishing the greater movement, while the greater mass accomplishes the smaller movement, mathematically expressable by the equation ma=constant, where m is the mass and a the travel thereof. Therefore, if the armature is connected only to the oscillating plate accomplishing the work, the mass of such an assembly will be small compared with the sum of the masses of the other parts of the machine and will therefore be capable of oscillating more amply. In order to reduce the mass of this assembly, it would also be possible to divide the oscillating work plate and joint one part thereof to the greater mass formed by the magnetic stator, the coils and the case.

An improvement on the idea of assuring a lengthwise oscillatory motion through the arrangement of guiding ball bearings, consists in placing two bearings on the longitudinal axis and separate bearings at a certain distance at both sides of the longitudinal axis, on the bottom face of the armature. These two latter bearings prevent the armature from rotating on the longitudinal axis.

Another way of placing longitudinal ball bearings, is to arrange three or more thereof between the armature and the stator, pressing the former elastically, by means of a spring, against the latter.

As set forth above, the case of the machine likewise oscillates. These oscillations, although small, bear a certain proportional relation to those of the armature. One particular feature of the invention resides in that the stator and the core are elastically seated on the case and that a compensating mass or body is associated with said stator, thus enabling the casing to remain quite still.

Instead of ball bearings flat springs capable of guiding the core in a lengthwise direction may be employed. These springs can at the same time function, totally or partially, as operating or work springs.

The work plate, which is joined to the core of the electromagnet, is covered with any material appropriate for the end in view, such as emery, sandpaper, etc. The plate can similarly be provided with a brush or a file. For scraping action, the plate can be ribbed by any suitable process, such as stamping.

A handle, provided with a switch, may be fitted to the case. Vibration absorbers can be arranged between the case and said handle; a similar effect can be obtained by providing the handle with rubber foam grips.

A further feature of this novel machine is that the front of the case can carry one or two small lights to illuminate the floor over which same is run. This detail is particularly useful, for, as stated above, the machine may be built to polish floors also underneath furniture, where there is generally little light for working. Lamps installed in those lights may operate on a low-voltage current obtained, in accordance with the invention, from some turn of wire wound in the iron core of the oscillating motor.

In order that the present invention may be more clearly understood and readily put into practice, an example referring to a floor polishing machine will be described with particular reference to the attached sheet of drawings, in which: Fig. 1 is a lateral section through C—D of Fig. 2. Figure 2 is a plan view of the machine as seen through section A—B and, finally, Figure 3 is a front sectional view of the casing and support of the machine.

Like numerals represent like or similar parts throughout the several figures of the drawing.

The machine as illustrated comprises essentially an oscillating motor consisting of an iron body 1 shaped like a shell-type transformer the core of which is open and provides two poles 2 and 3. These poles are equipped with coils 4 and 5, respectively, series-connected and joined to a source furnishing alternating current. Poles 2 and 3 are indented at 2', 3' respectively, being provided, in the embodiment illustrated, with four teeth each. Core 6 is situated in the aperture between the poles and has similarly 4 teeth 6', arranged as shown in Figure 2 when the coil is not connected to the supply line.

In order to enable the core to be moved longitudinally without any kind of transversal motion, four bearings 7, 8, 9 and 10 are provided of one or several balls each of which two, 7 and 8, are situated on the lengthwise axis and the other two, 9 and 10, at a certain distance and at both sides of longitudinal axis CD on the bottom face of the armature.

The core, at both its ends, is joined to two U-shaped pieces 11 and 12, formed of metal strip. These pieces communicate the core with two springs 13 and 14, which maintain said core in the neutral position illustrated in Figure 2. By providing parts 11 and 12 the need of perforating the outer legs of the metal package is avoided and, at the same time, the upper portions of 11 and 12 serve to receive the seating of two of said ball bearings.

It is not absolutely necessary that the stator and the core of the armature have four teeth. It is possible to increase the number of teeth or reduce same to one. Increasing the number of teeth diminishes the stroke of the armature and increases the pushing strength, while a reduction in the number of teeth increases the length of the stroke but diminishes the strength.

When a magnetic tension occurs between poles 2 and 3, according to the rhythm of the alternating current, passes through the pole teeth and through the core teeth, giving the core a lengthwise push. Core teeth 6' thus tend to form a magnetic bridge between pole teeth 2' and 3'. When the magnetic flux diminishes down to zero, core 6 returns to its neutral position impelled by springs 13 and 14.

Metal plate 15 is connected to core 6 and in this manner oscillates together with same. Said plate is provided with means for quickly fastening thereto sundry sanding, grinding, cleaning or polishing tools.

The long ends of case 16 carry two adjusting screws 17 and 18, whereas its sides are provided with pins 19' for receiving the support 19 for the handle 20. Support 19 is shaped in such a manner that, on being bent round shaft 19' it occupies a horizontal position without changing the height of the machine, a most advantageous feature, not only for polishing a floor underneath some article of furniture but also for storing the machine without occupying much space.

21 is a low-voltage lamp, illuminating the floor in front of the machine.

What is claimed is:

1. In a machine having a reciprocating motion for polishing, sanding and abrading, the combination comprising, a flat shell-like casing having an opening at its lower side, a magnetic stator housed within said casing, means for connecting said stator to the interior of said casing, said stator having three legs formed with longitudinally aligned openings for an armature, the center leg having a rectangular opening, the opposite sides of said opening having uniformly spaced teeth, coil means on the stator in connection with a source of alternating current, guide means fixed to the inside of the casing, an armature supported and guided by the guide means for longitudinal motion with respect to said stator and having a number of teeth equal to the number of teeth on the one side of the stator opening, the spacing of the armature teeth being uniform and equal to that of the teeth on the stator, two cylindrical compression springs each mounted on the inside of the casing and in opposition to one another, and engaging opposite ends of the armature thereby normally urging said armature to a neutral position in which the stator teeth are out of alignment with the armature teeth, and a work plate affixed to the armature reciprocatable therewith and projecting from the opening in the casing below the lower side thereof for engagement with a surface to be treated.

2. In a machine having a reciprocating motion for polishing, sanding and abrading, the combination comprising, a flat shell-like casing having an opening at its lower side, a magnetic stator housed within said casing, means for connecting said stator to the interior of said casing, said stator having three legs formed with longitudinally aligned openings for an armature, the center leg having a rectangular opening, the opposite sides of said opening having uniformly spaced teeth, coil means on the stator in connection with a source of alternating current, guide means fixed to the inside of the casing, an armature supported and guided by the guide means for longitudinal motion with respect to said stator and having a number of teeth equal to the number of teeth on the one side of the stator opening, the spacing of the armature teeth being uniform and equal to that of the teeth on the stator, two cylindrical compression springs each mounted on the inside of the casing and in opposition to one another, and engaging opposite ends of the armature thereby normally urging said armature to a neutral position in which the stator teeth are out of alignment with the armature teeth, and a work

plate affixed to the armature reciprocatable therewith and projecting from the opening in the casing below the lower side thereof for engagement with a surface to be treated, said work plate being secured to said armature by inverted U-shaped members carried by each end of the armature.

3. In a machine having a reciprocating motion for polishing, sanding and abrading, the combination comprising, a flat shell-like casing having an opening at its lower side, a magnetic stator housed within said casing, means for connecting said stator to the interior of said casing, said stator having three legs formed with longitudinally aligned openings for an armature, the center leg having a rectangular opening, the opposite sides of said opening having uniformly spaced teeth, coil means on the stator in connection with a source of alternating current, guide means fixed to the inside of the casing, an armature supported and guided by the guide means for longitudinal motion with respect to said stator and having a number of teeth equal to the number of teeth on the one side of the stator opening, the spacing of the armature teeth being uniform and equal to that of the teeth on the stator, two cylindrical compression springs each mounted on the inside of the casing and in opposition to one another, and engaging opposite ends of the armature thereby normally urging said armature to a neutral position in which the stator teeth are out of alignment with the armature teeth, a work plate affixed to the armature reciprocatable therewith and projecting from the opening in the casing below the lower side thereof for engagement with a surface to be treated, said springs being mounted between each end wall of said casing and one of said armature carried members, and means in each end of the shell for adjusting the tension of said springs.

4. In a machine having a reciprocating motion for polishing, sanding and abrading, the combination comprising, a flat shell-like casing having an opening at its lower side, a magnetic stator housed within said casing, means for connecting said stator to the interior of said casing, said stator having three legs formed with longitudinally aligned openings for an armature, the center leg having a rectangular opening, the opposite sides of said opening having uniformly spaced teeth, coil means on the stator in connection with a source of alternating current, guide means fixed to the inside of the casing, an armature supported and guided by the guide means for longitudinal motion with respect to said stator and having a number of teeth equal to the number of teeth on the one side of the stator opening, the spacing of the armature teeth being uniform and equal to that of the teeth on the stator, two cylindrical compression springs each mounted on the inside of the casing and in opposition to one another, and engaging opposite ends of the armature thereby normally urging said armature to a neutral position in which the stator teeth are out of alignment with the armature teeth, and a work plate affixed to the armature reciprocatable therewith and projecting from the opening in the casing below the lower side thereof for engagement with a surface to be treated, said work plate being secured to said armature by inverted U-shaped members carried by each end of the armature, each of said armature carried members having the bight portion thereof engaging one of the guide means and said work plate engaging the other guide means.

ENRIQUE LIST.

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