PORTABLE ELECTRIC POLISHING MACHINE


This invention relates to a portable electric polishing machine having a cylindrical polishing means which is rotated by an electric motor mounted within a casing, and more particularly relates to a shoe polishing machine of this type including an elongated casing which is directly held in the hand of an operator.

This application is a division of earlier copending application Ser. No. 735,155, filed May 14, 1958, now Patent No. 3,027,585.

Recently, there has been considerable thought devoted to satisfying the need for a compact and efficient portable electric shoe polishing machine. A wide variety of different types of such machines have been proposed, but up to the present time none of them have been capable of fulfilling all of the very stringent requirements that a machine of this type should satisfy.

An object of this invention is to provide a relatively simple and economical portable electric polishing machine suitable for polishing shoes which is light and compact enough to permit convenient manipulation, powerful and dependable in operation, and simple and economical in structure.

In accordance with this invention, a portable electric polishing machine includes a fractional-horsepower electric motor mounted within an elongated casing. This electric motor rotatably drives a cylindrical polishing means such as a brush or buffer through a power transmission. This polishing machine is rendered powerful, compact, and flexible in operation by virtue of its incorporation of novel features including a highly efficient cooling system, highly convenient polishing attachments, and simple means for connecting these attachments to and disengaging them from a power transmission.

This highly efficient cooling system is provided by a centrifugal impeller mounted upon the motor shaft and inserted within an open-ended scroll housing mounted within the casing. A centrally-apertured disc is mounted upon the impeller adjacent the motor for effectively closing off the open end of the scroll housing. The absence of any contact between the centrifugal impeller or its shaft and the scroll housing makes it possible to provide efficient and positive air flow through the motor without incorporating unduly precise tolerances in the manufacture and assembly of these components.

Cylindrical polishing attachments, such as brushes and buffers, are detachably coupled to the power transmission by inserting lugged studs into a slotted tubular drive quill. A resilient ring disposed in a peripheral groove cut about the end of this quill maintains the lug of the stem detachably inserted within the quill, and a flat apertured resilient bar lies between the hub of the attachment and the casing to permit its downward deflection to conveniently disengage the stem from the quill.

A novel, highly efficient buffing attachment includes a disc-shaped backing plate having a stem centrally mounted on one surface and a disc-shaped pad of soft resilient material, such as sponge rubber, mounted on the other surface. A circumferential recess in the backing plate permits a polishing cloth to be conveniently detachably coupled over the pad to the backing plate by snapping a resilient ring over the polishing cloth into it. A frictional means, for example, a roughened surface within this recess, prevents the ring and cloth from turning relative to the backing plate, and the soft resiliency pad permits the polishing cloth to intimately conform to the contours of the surface being polished, such as the seams and perforations in shoes. The ease of attachment and detachment of the polishing cloths makes it extremely simple and economical to provide and utilize a separate buffing cloth for each type or color of polish applied.

Novel features and advantages of the present invention will become apparent to one skilled in the art from a reading of the following description in conjunction with the accompanying drawings in which similar reference characters refer to similar parts and in which:

FIG. 1 is a front view in elevation of one embodiment of this invention;

FIG. 2 is a side view in elevation of the embodiment shown in FIG. 1;

FIG. 3 is a cross-sectional view taken through FIG. 2 along the line 3—3 and looking in the direction of the arrows;

FIG. 4 is a bottom plan view of an aligned portion of the embodiment shown in FIG. 3;

FIG. 5 is a cross-sectional view taken through FIG. 3 along the line 5—5 and looking in the direction of the arrows;

FIG. 6 is a cross-sectional view taken through FIG. 3 along the line 6—6 and looking in the direction of the arrows;

FIG. 7 is a perspective view of a novel attachment for use with the embodiment shown in FIG. 1; and

FIG. 8 is a cross-sectional view in elevation taken through the attachment shown in FIG. 7.

In FIG. 1 is shown a portable electric shoe polishing machine 10 to which is rotatably connected a cylindrical attachment 12, for example, a brush for applying polish. The outer surface of elongated casing 14 is constructed and arranged to facilitate convenient grasping and manipulation by a human hand which is placed, for example, about an intermediate portion of the upper surface of casing 14. An aperture flat resilient bar 16, for example made as a flat spring, having a knob 18, for example, made of plastic attached to its free end, is mounted by one end, for example, by cap screws 20 to casing 14 to permit downward deflection of knob 18 to easily disengage attachment 12 from a power transmission disposed within casing 14 as is later described in detail.

Machine 10 includes a novel and highly efficient means for simply and economically providing a positive flow of cooling air through electric motor 22 as is shown in FIGS. 2—4. Casing 14, for example, includes an upper half 24 and a lower half 26. Air inlet apertures 28 are, for example, provided in the rear end of upper casing half 24 as shown in FIG. 2. Air outlet apertures 30 are, for example, provided in a lower surface of lower casing half 26 as shown in aligned portions of FIGS. 3 and 4. Motor 22 is mounted between inlet apertures 28 and outlet apertures 30. Since outlet apertures 30 are provided only in the lower half of the casing, they are not obstructed when the casing is held about an intermediate section of its upper portion.

A relatively great flow of cooling air is directed through inlet apertures 28, outlet apertures 30, and through motor 22 by a novel centrifugal fan arrangement 32 provided by a centrifugal impeller 34 mounted within an open-ended scroll housing 36 which includes a restricted outlet section 38 as shown in FIGS. 5 and 6. Outlet section 38 is mounted substantially in line with inlet outlet apertures 30 to discharge the heated motor cooling air through them. Open-ended scroll housing 36 is mounted within the casing, for example, upon the end of power transmission 40; and since the remote or open end 42 of scroll housing 36
is completely free of contact with impeller 34 or electric motor shaft 44 upon which impeller 34 is mounted, any tolerances which must be observed in manufacture and assembly are extremely rough and inexpensive to accommodate.

The open end of scroll housing 36 is effectively sealed by a centrally-apertured or annular disc 46 attached to radial blades 48 of impeller 34 as shown in FIG. 6. Annular disc 46 prevents backflow and leakage of air through the open end of scroll housing 36 while allowing air to flow to the motor in the flow of impeller 34 from which it is discharged by rotating blades 48 through restricted discharge passageway 38. Even though the cooling passageway 76 which extends through casing 14 are relatively small in comparison with those in similar devices, motor 22 which is of relatively high power for such devices, for example 1/4 horsepower, is effectively cooled by virtue of the relatively efficient performance of novel fan or air pump 32. This efficient air flow is particularly critical where the casing is directly held in the hand which greatly restricts the area available for air passageways.

Motor shaft 44 extends through fan 32 and scroll housing 36 into driving engagement with power transmission 59, for example a helical spur gear transmission which, for example, provides a step-down ratio of 20:1 from motor shaft 44 to driving quill 62. Motor shaft 44 is engaged with the first-stage gear 54 of transmission 50 by means of a worm gear 56 which is, for example, cut upon the end of shaft 44. First stage or idler gear 54 is, for example, a helical spur gear whose lower surface is engaged with output or drive gear 58, also of helical spur form. Idler gear 54 and drive gear 58 are, for example, efficiently made of a nylon composition to proved durability and quietness in operation. These gears are encased within a gear casing 60 which contains a sealed lubricant of the permanent variety.

A drive shaft 62, for example, constructed as a tubular drive quill is secured to the center of drive gear 58 and rotates within bearings 64 and 66 mounted within the gear casing 60. Bearings 64 and 66 are, for example self-lubricating, such as oilite bearings. The lower or driving end of tubular drive quill 62 is traversed by longitudinal slots 68 which receive and drive a lug 70 mounted upon stem 72 of brush attachment 12. A number of slots 68, for example, four in all, are provided about the periphery of quill 62 to permit insertion of driving lug 70 at a variety of angular orientations. A circumferential recess 74 is provided about the slotted end of quill 62 for receiving a resilient ring 76, for example, a split open spring material which lies below lug 70 when it is fully inserted within slot 68 to maintain stem 72 detachably inserted within the drive quill until enough downward pressure is exerted upon resilient bar or spring 16 to force lug 70 past retaining spring 76.

Stem 72 is permanently fastened to the cylindrical hub 78 of brush 12, for example, by bonding stem 72 within hub 78 which is, for example, made of a moldable plastic, such as a polyurethane composition. Bristles 80 are also, for example, permanently molded within the hub 78. The end 82 of stem 72 inserted within hub 78 is roughened, for example, by knurling to securely anchor it within hub 78; and the shaped projection 84 is provided upon the portion of stem 72 extending through the surface of hub 78 to govern the depth of penetration of stem 72 within hub 78 and to provide a predetermined dimension between the lower end of lug 70 and the upper end of hub 78 for accommodating resilient ejector bar 16. When bar 16 is pulled downward, it, therefore, comes immediately into contact with projection 84 to expeditiously disengage brush 12 from drive quill 62.

In FIGS. 7 and 8 is shown a novel structure for a buffer 86 having a stem 72 which is detachably coupled within drive quill 62 in a manner similar to that shown with respect to stem 72 of brush 12. Buffer 86 has the advantage of permitting convenient attachment and removal of polishing cloths or fabric 88. This permits a different cloth 88 to be used for each different type of color of polish and also facilitates their cleaning, for example, by washing. Cloth 88 is attached to buffer 86, for example, by a resilient ring 90, such as a split circular ring of spring material which is snapped over cloth 88 into a circumferential groove 92 which is disposed about the outer edge of disc-shaped backing plate 94. Recess 92 is, for example, provided within a flange 96 extending rearwardly from disc or plate 94. Flange 96 includes a relatively lower peripheral projection 98 which is disposed in front of recess 92 and a relatively higher peripheral projection 108 which is disposed to the rear or recess 92. Ring 92 is accordingly easily snapped over smaller projection 98 or recess 92.

As shown in FIG. 8, stem 72 is securely engaged within hub 102 of attachment 86, for example, by being soldered within hub 102 which, together with disc 94, is, for example, made of a shock-resistant plastic such as polystyrene.

A substantially cylindrical pad 104 of soft resilient material, for example, sponge rubber is attached to the front face of disc 94 to provide a soft equalizing sub stance in back of polishing cloth 88 which allows polishing cloth 88 to intimately conform to the contours of an article being polished, for example, the irregular portions of a shoe constituted by seams or perforations. Pad 104 is secured to the surface of a plate 94, for example, by gluing and is, for example, restrained from longitudinal movement from plate 94 by inserting it within a shallow cylindrical recess 105 in the front surface of plate 94 which is substantially equal in diameter to the diameter of pad 104.

A friction-providing means, for example, roughened surface 106 is disposed within recess 92 for preventing ring 90 and cloth 88 from turning relative to plate 94 and pad 104 when buffer 86 is rotated and applied, for example to a shoe being polished.

What is claimed is:

1. A portable polishing machine comprising an elongated casing including an inlet aperture at an end of said casing, an air outlet aperture disposed at an intermediate portion of said casing, an electric motor mounted within said casing between said inlet and outlet apertures and having a rotatable driven shaft, a centrifugal impeller mounted on said motor shaft approximately in line with said outlet aperture, a scroll housing mounted on said motor shaft and said casing at the end of said motor shaft and said outlet aperture, said housing having an impeller cavity therein adapted to receive said centrifugal impeller and said housing having a restricted outlet passageway extending outwardly from said cavity to said outlet aperture in said casing, said cavity being unbounded on the side toward said cavity through said unbounded side, said centrifugal impeller comprising radially disposed blades and an annular disc having a central aperture, said disc being fixed to and carried by said blades on the side of said impeller adjacent said motor for effectively enclosing the outer periphery of the open side of said impeller cavity to prevent backflow and leakage of air through said open side, and said central aperture of said disc admitting air, which has flowed into said casing through said inlet aperture and then over said motor, to flow into the eye of said impeller.

References Cited by the Examiner

UNITED STATES PATENTS

2,284,656 6/42 Heter ---------------- 310-62
2,546,846 3/51 Atkin ---------------- 310-62

MILTON O. HIRSFIELD, Primary Examiner.

DAVID X. SLINEY, Examiner.
UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,171,994
March 2, 1965

Lawrence I. Freedman et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, lines 38 and 39, for "manipulate" read -- manipulation --; column 3, line 17, for "1/4" read -- 1/14 --; line 35, for "proved" read -- provide --; same column 3, line 63, for "porjection" read -- projection --.

Signed and sealed this 24th day of August 1965.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents
UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,171,994

Lawrence I. Freedman et al.

March 2, 1965

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, lines 38 and 39, for "manipulate" read -- manipulation --; column 3, line 17, for "1/4" read -- 1/14 --; line 35, for "proved" read -- provide --; same column 3, line 63, for "porjection" read -- projection --.

Signed and sealed this 24th day of August 1965.

(SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents