March 1, 1960 H. WESSEL 2,926,370

CLEANING APPLIANCES FOR USE IN POLISHING, SCRUBBING OR WAXING FLOORS AND LIKE STRUCTURES

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Fig. 1

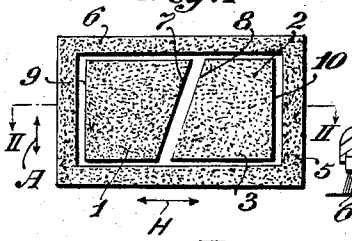



Fig. 2

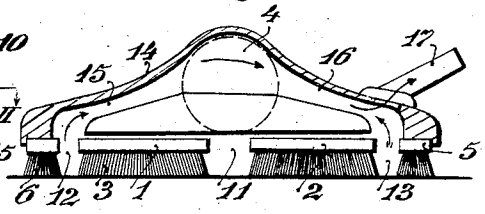



Fig. 3

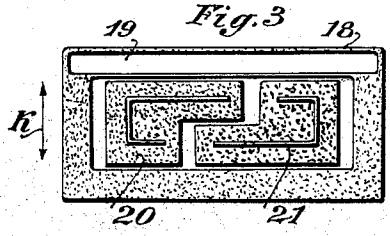



Fig. 4

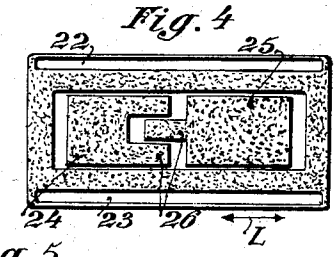



Fig. 5

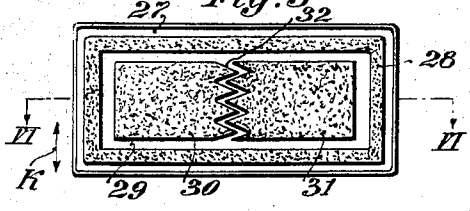



Fig. 6

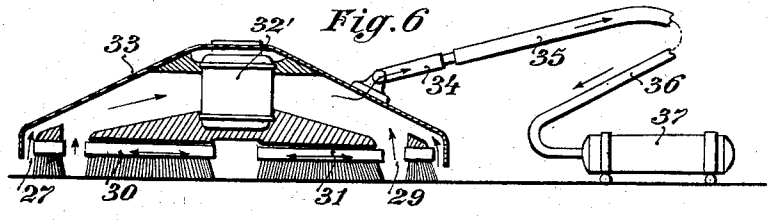
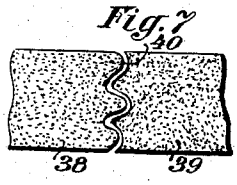



Fig. 7




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# CLEANING APPLIANCE FOR USE IN POLISHING, SCRUBBING OR WAXING FLOORS AND LIKE STRUCTURES

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1 Claim. (Cl. 15—49)

This invention relates to cleaning appliances, especially for use in polishing, scrubbing or waxing floors, walls and like structures.

Waxing machines have become known in which brushes arranged on plate shaped bodies receive a forward and backward opposite movement from suitable drive means. It has also been suggested to impart to these brushes rotating movements, apart from the forward and backward movements, which rotating movements will be carried out in a plane lying parallel to the application surface. Finally waxing machines have also been suggested, in which the brushes are fastened to brush bodies which carry out oscillating pendulum movements around horizontal axles fastened to the appliance frame. These known appliances have however not proved satisfactory, and especially the polishing and waxing accomplished by these known appliances do not conform to high quality standards.

According to the invention this disadvantage is avoided in that the edges, lying opposite each other, of the movable application implements, especially of the movable waxing brushes are provided with sloped edges, diagonal with respect to the direction of movements of the appliance as a whole in such a way that, with the sliding movement of the whole appliance, be it produced by manual or mechanical means, there is no place on the surface of application which is not polished by the application implements moving quickly forwards and backwards. It has thus shown itself to be advisable to place the movable application elements, especially the brush bodies, elastically within the appliance, especially with use of springs, soft rubber, sponge rubber, porous rubber or similar materials. Thereby it is attained that the application elements are in an elastic contact with the surface to be treated so that a uniform pressing force arises, even when there are uneven places on the surface of application. By means of this equal pressing force, a constant application and polishing effect is obtained.

Further it has proved very advantageous to provide additional brushes fixed to the appliance and arranged around the movable brush elements so as to enclose, framelike, the movable application elements either partially or completely. It has been shown that, by means of these fixed application elements, not only an especially good application, polishing and waxing effect is obtained but also that the appliance has an especially stable motion and, above all, that the undesired wandering, the so-called running, on of the appliance, observed in appliances known up to now does not occur. This wandering of the appliance with the known models was especially burdensome since it resulted in uncontrolled movements of the appliance in varying directions. For this reason the appliance in use could not be released for a moment in order, when waxing, to remove the pieces of furniture from the unapplied surfaces, since there was the danger that the appliance would of itself move on and thereby cause damage. These uncontrolled



movement impulses were also troublesome for another reason. The user had to counteract them by means of manual handling and corresponding application of bodily force.

This disadvantage is avoided by the fixed and partial or completely closed rim of stationary application elements, since a considerable part of the total weight of the appliance is borne by this rim which, for two reasons, produces a higher friction on the base for application than the movable brushes. In the first place this friction is larger because a relatively larger part of the weight of the appliance is transferred via this fixed rim of application elements to the base. This is attained by the spring arrangement of the movable application elements. This spring action is best adjusted so that it is weak enough to assure that only the pressure force, necessary for the application, polishing or waxing purposes, is applied by the movable application elements on the surface for application. In the second place, the resting or static friction between the fixed application elements and the surface comes into play, and this friction is essentially larger than the friction when moving. The application elements, moving quickly backwards and forwards, show an essentially lower friction effect than the outer resting application elements. There are thus two reciprocal and supporting effects which assure that the adhesion power of the outer resting application elements is considerably larger than that of the movable application elements. This results in the fact that, with known appliances not having such an outer rim of fixed application elements, a steady position of the appliance on the surface is not afforded.

A further disadvantage of the known appliances is due to the fact that the movable application elements must bear the whole weight of the appliance. It is thus impossible to adjust the pressure force of these application elements to correspond to the application demands; this pressure force is, on the contrary, increased where it should be decreased. A further disadvantage lies in the fact that, corresponding to the larger application pressure, a correspondingly larger force must be applied by the operator. With the appliance in accordance with the invention, the force used to move the movable application elements is essentially smaller, since here the pressure on the surface is considerably lower.

It is of advantage to provide the appliance with a dirt and dust suction device. Here, the suction device, especially the suction blower can be combined with the application appliance into one unified whole. It can, however, also be fitting to provide only a suction nozzle at the application appliance and to connect the apparatus with the suction tube of a conventional vacuum cleaner. This construction has the advantage of cheapness since it is only necessary to provide the application appliance, especially when it is a question of a waxing appliance, with the waxing device and the necessary suction opening and a suction nozzle; the other relatively expensive components necessary for the vacuum cleaner are not necessary for this application apparatus, since the functions of these components, especially the suction blower, are taken over from the vacuum cleaner where such parts are usually already present.

This form of construction has also the further advantage that the appliance can be used, as desired, with or without vacuum cleaning, in that either the suction tube of the vacuum cleaner or a normal handle is coupled with the nozzle of the appliance. Thus, the appliance can be so formed that it can be used as scrubbing machine for wet treatment of floors, in which case it is, however, necessary to seal the appliance against the entry of the liquid. This is, however, only then necessary,

when an electric motor or an electro-magnetic drive is used. With hydraulic drive, the sealing against water is not necessary.

The suction openings are arranged around the movable application elements. They can however be provided also additionally or completely outside the fixed application elements, be it on the front and/or back edge of the appliance, or also all along the periphery thereof. To provide them between the application implements is not suitable since then, especially when bristles are used as application elements, there is the danger that impurities will be sucked in between the bristles and settle there. In order to be certain to avoid, with correct arrangement of the openings outside the movable brush bodies, that impurities are, in spite of all, sucked up between the bristle tufts, it is advantageous to provide protecting guards in front or behind the first row of bristles on the movable brush bodies such guards, having a protective effect against the penetrating impurities.

For driving the movable application elements, an electric motor can be used which drives via a gear system camshafts or crankshafts, which impart the forward and backward movements, via connecting rods, to the elements. An electromagnetic oscillating device, supplied by the usual alternating current, can be used or an hydraulic drive. In addition to the simple forward and backward movements, circling movement can be imparted to the application elements in such a way that the separate parts themselves remain parallel while each point of the movable elements is moving along a circle. This is obtained by arranging the movable elements in a movable position on cranks or eccentric disks in several places, preferably four and driving them by means of a winch or an eccentric.

Since, in forming the apparatus as a waxing machine, equipped with brushes, the bristles are exposed very considerably and over a long period of time to the mass or inertia effects due to the quick forward and backward movements, it is, according to the invention, important to arrange the bristles in a rubber holder, or, if the holder is made of a firmer or more rigid material, to provide an elastic rubber inter-layer between the holder and the bearing plate 7 or rigid surface to which the holder is attached, so that the bristles are protected from the mass or centrifugal forces by the elastic give of the rubber holder, especially at the place where the bristles are fitted in, and thus the bristles do not break off. If the bristle holder is made from firmer or more rigid material, and no elastic rubber inter-layer is provided between the holder and the bearing plate to which it is attached (Fig. 9), then the danger arises that, in the course of time, heavy demands will be put on the bristles at the place of attachment to the firm material by the effect of the mass or centrifugal forces, with the result that they would quickly break off.

If the apparatus is formed as a cattle cleaning appliance, then combs or brushes are arranged on the movable elements. This formation as a cattle cleaning appliance has the advantage that it is no longer necessary, when grooming, to smooth the skin of the animal repeatedly up and down in order to obtain a sufficient grooming; it is quite sufficient when said skin is smoothed over once. Owing to the quick vibration movements of the combs or brushes, a good grooming effect is obtained by the new appliance.

It has been shown surprisingly enough that a good polishing and waxing effect can be obtained when a forced vertical component is superimposed on the forward and backward swinging or vibration movements in the horizontal plane while, at the same time, care is taken to see that the appliance as a whole does not make any considerable vertical movements. In the horizontal direction, the movements of the appliance as a whole depend on the manual movements of the person using it. The forced vertical component of movement is only imparted to some of the elements, especially the movable polishing or brush bodies.

By means of this new principle of movement, several kinds of advantages are attained. First the surface for treatment receives the desired high polish from the forward and backward polishing movements, and further, at the same time, uneven spots in the surface, especially sunken places, are also submitted in the same way to the polishing effect by means of the polishing implements. The vertical component of the movement of the polishing implements results in the fact that the separate parts of these polishing implements, especially the separate bristle tufts, not only penetrate into these sunken places but they are also pressed into these places with a certain pressure; they can thus carry out their full polishing action. This is connected with the fact that the movement is not only vertical but is superimposed by a horizontal movement effecting the polishing. How this polishing effect works out in detail will be more exhaustively explained hereinbelow.

By means of the vertical component of the movement, a further and very effective result is obtained in that the wax adhering to the polishing elements, especially the brushes, is with the occurrence of fine degrees of unevenness especially in the grain, to a certain degree hammered into these parts of the more or less rough surface to be treated, so that the wax is lodged in these hollows. By means of the new appliance relatively hard polishing wax can be used, serving as the wax base. The basic waxing can be followed by a second waxing process in which relatively soft wax can be used in order to obtain a high polish. In this manner an especially adherent wax or polish layer, giving a good high gloss, is obtained which for example is important for dancing parquets.

A third and not unimportant advantage, obtained by the vertical component of the movement, lies in the fact that impurities and especially hard particles, as sand grains and similar, can be flung off quite effectively by the mutually superimposed movements and, when a suction device is fitted to the application device, they can also be sucked in. Here it is important that jerky movements are always given to the cleaning elements which provide the self-cleaning of the appliance in that the particles of dirt and wax, gathered up and hardened in the course of time so that they adhere to the bristles, are gradually loosened and then shaken away. This effect of the new principle of movement will also be explained in more detail hereinbelow.

These and other objects of the invention will become further apparent from the following detailed description, reference being made to the accompanying drawings showing preferred embodiments of the invention.

In the drawings:

Fig. 1 is a schematic bottom plan view of one embodiment of a cleaning appliance according to the present invention;

Fig. 2 is a sectional view of the appliance of Fig. 1, the view being taken along the line II—II of Fig. 1;

Fig. 3 is a bottom plan view of another embodiment of an appliance with step-shaped moving elements;

Fig. 4 is a similar view of a different embodiment showing crenelated application elements fitting into each other;

Fig. 5 is a bottom plan view of still another embodiment in which the moving elements have their adjacent edges serrated;

Fig. 6 is a partial sectional view taken along the line VI—VI in Fig. 5 and shows additional features of the appliance;

Fig. 7 is a partial bottom plan view of two movable application elements with adjacent undulating or wavy edges fitting into each other.

Referring now to Figs. 1 and 2, the appliance consists of two movable surface contacting elements or brush

bodies 1, 2, on the underside of which the bristle tufts 3 are arranged. Forward and backward movements are imparted to these brush bodies in the direction of the arrow H by an electric motor drive means 4 via a crank drive not shown in the drawing.

The contacting elements or brush bodies 1, 2 are enclosed by a fixed frame 5 which also bears surface contacting elements or bristle tufts 6 coplanar with elements 1 and 2. The fixed frame 5 is of rhomboid shape and has long and short sides. The complementary inner end portions of edges 7, 8 of the bodies 1, 2 facing each other at an angle to the remainder of elements 1 and 2 run diagonal to the outer end edges. So that reciprocal forward and backward movements produced by drive means are possible in the direction of the arrow H, sufficient space or gaps 11, 12, 13 must be left free between the middle edges 7, 8 spaced from each other on the one hand and beyond the outer end edges 9, 10 on the other hand. Edges 9 and 10 are parallel to the short sides of the frame. The outer slits or gaps 12, 13 are at the same time used as suction slits. For this purpose a cover 14 is provided above the brushes or elements which also encloses the electro-motor drive means 4. In this cover are suction channels 15, 16, so that the air together with the impurities can be sucked up through the slits 12, 13 and via the channels 15, 16 into the suction connection 17. The middle slit or gap 11 is intentionally not joined to a suction channel since here air should not be sucked up. Otherwise the danger arises that the air will be sucked up through the bristle tufts and thus choke the spaces between the bristle tufts with impurities. The suction tube of a vacuum cleaner, not shown in Fig. 2, is coupled to the suction connection 17 in the usual way.

According to Fig. 3 which is similar in other respects to Fig. 1, a suction slit 19, extending over the whole width, is provided only on the front edge 18. The movable brush bodies 20 are step-like in shape, so that, with movements of the whole appliance in direction of arrow K, no places remain free over which the movable brush bodies have not moved up and down. In order to prevent dust and dirt being deposited in the spaces between the bristle tufts, rubber guards 21 are provided, the height of which is shorter than the projecting length of the bristle tufts.

In Fig. 4 suction slits 22, 23 are provided on the front as well as the back side of the appliance, respectively. The brush bodies 24, 25, movable in the direction of the arrow L, are produced so that they are dovetailed at 26, thus enabling their adjacent edges to fit into each other.

According to Figs. 5 and 6 a ring-formed suction slit 27 is provided outside the fixed rim 28 of the contacting elements on bristle tufts. Also a ring-formed suction slit 29 is arranged within this fixed brush rim 28 which slit lies then between the fixed brush rim 28 and the brush bodies 30, 31 moved counter to each other. The edges of the movable brush bodies 30, 31 turned to each other are serrated at 32 so that, on movement of the whole appliance in the direction of arrow K, no traces are left on the floor untreated. It can be seen from Fig. 6 that, above the two movable brush bodies 30, 31 and electric motor 32' is put in, which imparts counter directed movements via a crank drive, not shown in Fig. 6, to the brush bodies 30, 31. Air is sucked in through the suction slits 27, 29 into the hollow inside of the casing 33 of the application appliance and led via the nozzle 34, the tube lead for handling 35 and the vacuum hose 36 to the vacuum cleaner 37, in which the air is purified in the usual way by a filter. According to Fig. 7, the edges turned to each other, of the two movable brush bodies 38, 39 are undulated at 40. The same covering effect is obtained as with the serrated model, according to Fig. 5.

Various changes and modifications may be made without departing from the spirit and scope of the present invention and it is intended that such obvious changes and modifications be embraced by the annexed claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

A surface working appliance comprising a frame having long and short sides and provided with first surface contacting elements, second surface contacting elements surrounded by said frame and said first surface contacting elements, said second surface elements being of trapezoidal shape and being provided with opposite outer end edges with parallel base edges normal to said opposite end edges and with complementary inner end portions facing each other, said second elements being reciprocably movable with respect to each other and to said frame and said first elements, each of said inner end portions being parallel to each other and extending at an angle with respect to said long sides of said frame and being spaced from each other to normally form a gap at said inner end portions, said opposite outer end edges of said second elements being substantially parallel to said short sides of said frame and normal to said long sides of said frame, and drive means connected to said second elements for imparting reciprocal movement to said second elements so that said end portions closely approach each other and are always spaced from each other a distance less than the difference between the lengths of said parallel base edges of either of said second element during said reciprocal movement, whereby upon movement of said frame relative to the direction of said reciprocal movement of said second elements predetermined parts of said inner end portions of said second elements always overlap each other within the confines of said first surface elements, to thereby contact substantially the entire area of the working surface underlying said frame and said first and second elements, said first surface elements being spaced from said second surface elements, the spaces between said end portions of said second elements and the spaces between the end edges of said second elements relative to corresponding edges of said first elements located opposite said end edges of said second elements being variable during said reciprocal movement of said second elements.

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