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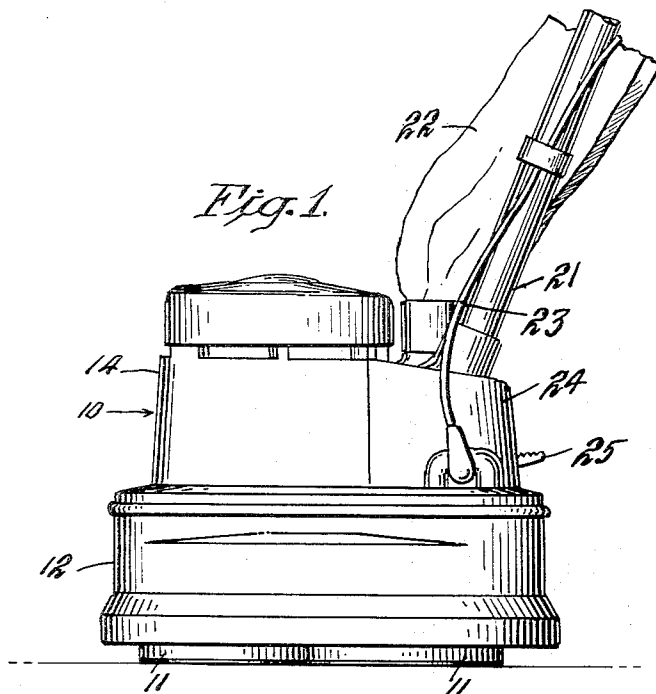
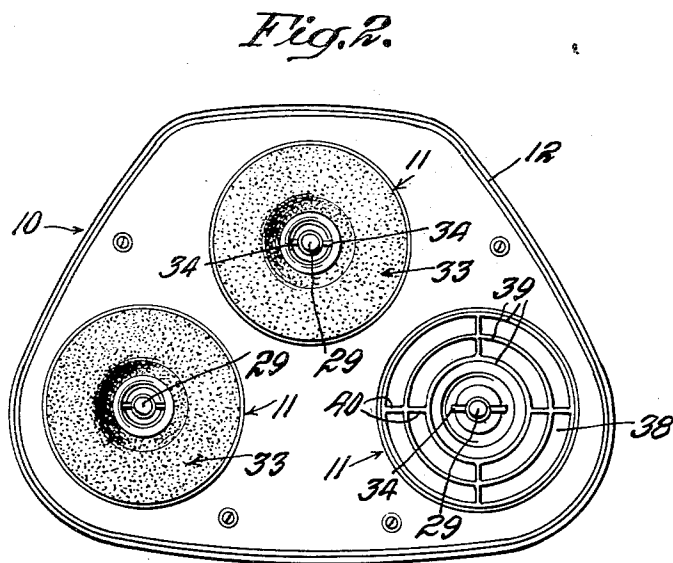
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ROTATABLE SURFACE TREATING MEMBERS

Filed March 25, 1957

2 Sheets-Sheet 1



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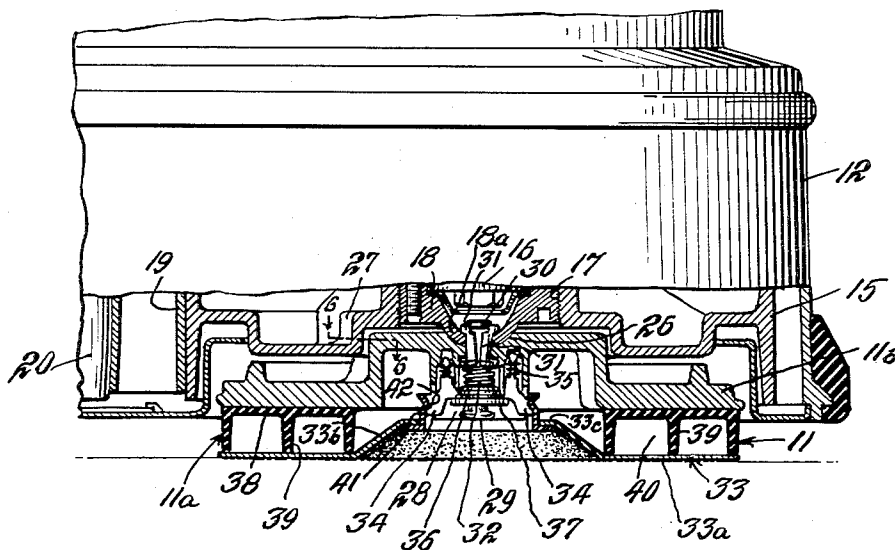
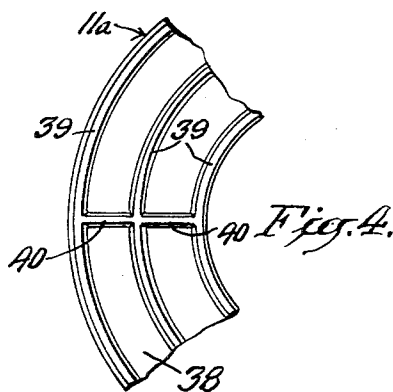
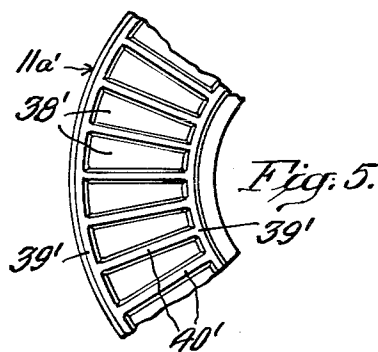
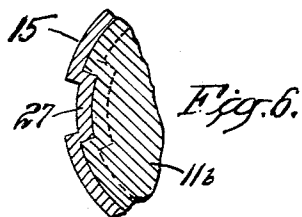
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2 Sheets-Sheet 2

Fig. 3.



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ROTATABLE SURFACE TREATING MEMBERS

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1 Claim. (Cl. 51—195)

My invention relates to surface treating apparatus having rotatable structure adapted to be positioned on a surface and be moved thereover, and more particularly to surface treating members which are detachably connected to the rotatable structure for movement therewith.

It is an object of my invention to provide an improved rotatable surface treating member having a soft or yielding cushion which is adapted to bear against a layer of material adapted to be in intimate physical contact with the surface to be treated.

Another object of the invention is to provide an improved surface treating member of this kind in which the soft or yielding cushion is formed by ribs of resilient material, such as rubber or plastic, which extend toward the surface to be treated.

A further object of the invention is to provide a soft or yielding cushion for surface treating members having ribs of resilient material which are ring-shaped and may be connected to radially extending rib sections.

A still further object of the invention is to provide an improved surface treating member having a rigid disk or head and a body of resilient material fixed thereto, such body including a flat layer secured to a face of the disk and ribs integral therewith which are substantially perpendicular to the flat layer.

The invention, together with the objects and advantages thereof, will become apparent from the following description, and the features of novelty which characterize the invention will be pointed out with particularity in the claim annexed to and forming a part of this specification.

For a better understanding of the invention, reference may be had to the following description taken in connection with the accompanying drawing, in which:

Fig. 1 is a side elevation, partly broken away, of surface treating apparatus embodying the invention;

Fig. 2 is a bottom plan view of the apparatus shown in Fig. 1;

Fig. 3 is an enlarged fragmentary view of the apparatus shown in Fig. 1, partly broken away and in section, to illustrate one of the rotatable surface treating members more clearly;

Fig. 4 is an enlarged fragmentary view of a part shown in Fig. 2 to illustrate details;

Fig. 5 is a fragmentary view similar to Fig. 4 illustrating another embodiment of the invention; and

Fig. 6 is a fragmentary sectional view taken at line 6—6 of Fig. 3.

Referring to the drawing, I have shown my invention in connection with surface treating apparatus 10 having rotatable members 11 which project downwardly beneath a hood or base 12 and arranged to be driven by an electric motor housed in an upright casing 14 positioned over an opening in the base. As will be described presently, the members 11 are detachably secured to rotatable pulleys 15 having hubs which may be journaled by bearings

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16 on pins depending downwardly from and carried by a frame disposed within the base 12. As shown in Fig. 3, the hub of each pulley is provided with an internally threaded section 17 which receives a threaded member 18 that forms a bottom end cover for the bearing 16. The rotatable pulleys 15 are driven by an endless belt 19 which may be formed of rubber or other suitable resilient material. The belt 19, which is under tension, passes over the pulleys 15 and a driving pulley 20 which is fixed to the lower end of the motor shaft.

The surface treating apparatus 10 is adapted to be manipulated by a handle (not shown) connected to the outer free end of an elongated rod 21, the lower end of which is pivotally mounted in any suitable manner to the base 12.

During operation of the apparatus 10, air may be drawn into the interior of the base 12 at the underside thereof by a fan unit which is also driven by the electric motor, dust and dirt entrained in the air being separated from the air in a filter bag 22 through which the air is discharged. In order to simplify the drawing, I have not shown the electric motor and the fan driven thereby, or the manner in which air is drawn into the interior of the base at the underside thereof and flows through the base to the filter bag 22, the illustration of these parts not being necessary for an understanding of this invention. The electrical circuit for the motor includes an electrical cord 23 and a switch which is disposed in an enclosure 24 adjacent to the casing 14 and adapted to be controlled by a foot-operated member 25 extending rearwardly from the enclosure.

As best shown in Fig. 3, each rotatable member 11 comprises a disk 11b having a central opening, the surface 26 at the opening being curved and conforming to the lower spherical part 18a of the bearing end member 18. With this arrangement, the rotatable members 11 can assume different angular positions with respect to the axes of rotation of the pulleys 15, thus enabling the members 11 to be in intimate physical contact with surfaces that are not perfectly level. In order that positive driving movement will be effected from the pulleys 15 to the disks 11b of the members 11, portions of the pulleys and the raised sections of the disks are of zig-zag shape and are interlocked, as indicated at 27 in Fig. 6.

For detachably connecting a member 11 to one of the pulleys 15, each member 11 is provided with mechanism 28 which forms a unitary part thereof and comprises a spindle having an operating button 29 at one end and an enlarged head 30 at its opposite end. The spindle is enveloped by a pair of elongated elements or catches 31 which form a split sleeve and are maintained in a holding position within the spherical-shaped part 18a by the enlarged head 30 of the spindle, as seen in Fig. 3.

When it is desired to remove a member 11 from the pulley 15 to which it is attached, the operating button 29 is pushed upwardly. Upward movement imparted to the spindle causes the enlarged head 30 to move upwardly beyond the upper ends of the catches 31. With upward movement of the spindle, a spring 32, under increased tension, acts against the lower ends of the catches 31 and causes the upper ends of the catches to move toward one another and hug the narrow section of the spindle immediately beneath the enlarged head 30. Since the upper ends of the catches 31 now do not project radially outward beyond the edge of the opening in the spherical-shaped part 18a, the member 11, together with the mechanism 28 which forms a unitary part thereof, can be withdrawn from the pulley 15. After the catches 31 have been moved downwardly through the opening in part 18a, the

operating button 29 may be released, whereupon the upper ends of the catches 31 will again spread apart.

It is often desirable to attach a sheet of material on the member 11 to effect a particular surface treatment. For example, it may be desirable to attach an abrasive sheet 33 to the member 11 when a sanding or grinding operation must be effected, as illustrated in Figs. 2 and 3. The sheet 33, which is formed with a central opening and is ring-shaped, is adapted to be held in position by a plurality of movable catches 34.

The catches 34, at regions intermediate their ends, are formed with inwardly extending projections. The underside of the disk 11b is formed with recesses to receive the narrow upper parts of the catches 34. About these narrow upper parts are disposed helical springs 35 which are under tension between shoulders on the catches 34 and stepped parts or shoulders at the undersides of the disks 11b. In Fig. 3 the catches 34 are spread apart by an enlarged portion 36 of the spindle and the extreme bottom ends thereof effectively hold the sheet 33 in position, as will be described presently.

To release the flat sheet 33 from the member 11, the operating button 29 is moved upwardly, which causes the enlarged portion 36 of the spindle to move upwardly with respect to the catches 34. Due to the tension of the springs 35, the catches 34 are moved toward one another against the underside of the enlarged portion 36 of the spindle. In this manner, the extreme lower ends of the catches 34 move toward one another and become ineffective to hold the sheet 33 in position against the member 11. Both the catches 34 and the spindle are always held fast to the disk 11b by a resilient ring-shaped member 37 which is held in position at the underside of the disk 11b in any suitable manner.

In accordance with my invention, the one-piece surface treating member 11 comprises a resilient element 11a having a resilient ring-shaped flat portion 38 and resilient downwardly extending wall-like elements or ribs 39 and 40 formed integrally therewith. The element 11a desirably is formed of rubber or soft plastic material, the flat ring-shaped portion 38 of which is fixed to the disk 11b, as by a suitable adhesive. The ribs 39, which are spaced from one another, are ring-shaped and concentrically disposed one within another, as best shown in Fig. 2, and are connected by the radially extending ribs 40. As best seen in Figs. 3 and 4, the depth or vertical extent of the resilient ribs 39 and 40 is more than twice the maximum thickness of the ribs, all of the resilient ribs being flexible and movable about the regions at which they are integrally joined to the resilient disk 38.

When it is desired to perform a sanding or grinding operation with the surface treating apparatus 10 illustrated and described above, members 11 of the kind shown in Figs. 2 and 3 are particularly suitable, because the resilient element 11a provides a soft or yielding cushion or backing for a sheet of abrasive material.

The sheet 33, which may be sandpaper, emery cloth or the like, is formed with a flat portion 33a which bears against the ribs 39 and 40 and a cone-shaped inner portion 33b provided with a horizontally disposed inner flange 33c. The flange 33c defines the central opening in the sheet 33 through which is inserted a split sleeve member 41 having a rim at one end which is adapted to bear against the flange 33c and a bead 42 at its opposite end at the underside of which the extreme lower ends of the catches 34 are adapted to bear to hold the sheet 33 in position on the resilient element 11a.

By employing the split sleeve 41 which is resilient in character, the sheet 33 can easily be fixed in position against the resilient element 11a even when the disk 11b is fastened to the pulley 15 and the parts of the mechanism 28 are in the positions shown in Fig. 3, the extreme lower ends of the catches 34 in such case being spread apart. When the lower ends of the catches 34

are spread apart in the manner shown in Fig. 3 and it is desired to secure the sheet 33 in place against the resilient element 11a, the resilient split sleeve 41 can be forced against the catches 34 to cause the extreme lower ends thereof to move inwardly, against the tension of springs 35, until the bead 42 rides over the lower ends of the catches, at which instant the catches 34 again spread apart and bear against the underside of the bead to assume their normal sheet-holding position illustrated in Fig. 3.

In Fig. 5 I have shown another form of resilient element 11a' which differs from the element 11a in that only two ring-shaped ribs 39' are provided on a flat portion 38', the ribs 39' being connected to a number of radially extending ribs 40'. In both the embodiments of Figs. 4 and 5, the radially extending ribs 40 and 40' reinforce and brace the ring-shaped ribs 39 and 39', respectively, to provide a soft or yielding cushion or support for the abrasive sheet 33, all regions of which are subjected to a substantially uniform pressure during operation of the surface treating apparatus.

In view of the foregoing, it will now be understood that an improved cushion 11a has been provided which includes the flat disk portion 38 fixed to and overlying the rotatable member 11b and two groups of wall-like elements 39 and 40 formed integrally with the disk portion and projecting from the exposed face thereof. The elements 39 in one group, which are of annular form, are disposed concentrically with respect to one another about the axis of rotation of the member; and the elements 40 in the other group extend radially between and interconnect the elements 39. By forming the disk portion 38 and elements 39 and 40 of resilient material, the outer extremities of the wall-like elements provide spaced apart linear supporting zones for the sheet 33 of surface treating material. The wall-like elements 39 of annular form are free of any gaps or breaks and provide linear supporting zones about the axis of rotation of the member 11b which are continuous.

While I have shown and described particular embodiments of the invention, it will be apparent to those skilled in the art that various changes and modifications may be made without departing from the spirit and scope of the invention, as pointed out in the following claim.

What is claimed is:

In apparatus of the class described having a rotatable member which is provided with an essentially flat surface and adapted to be positioned over a surface and be moved thereover, the combination of a one-piece backing member for a sheet of surface treating material which is formed only of resilient material and includes a resilient flat disk in intimate physical contact with the flat surface of the rotatable member and integrally joined ribs formed entirely of said resilient material, said ribs when unstressed being substantially perpendicular to said disk and projecting vertically downward from said resilient flat surface and having the outer free ends thereof terminating substantially the same distance below said flat surface, a plane passing through the outer free ends of said ribs being removed from and substantially parallel to said flat surface, said ribs including a first group of ring-shape disposed concentrically one with respect to another about the axis of rotation of said member and a second group extending radially between the ribs of the first group and interconnecting the latter, the depth or vertical extent of said resilient ribs being more than twice their maximum thickness, the outer free ends of said ribs providing spaced linear supporting zones for the sheet of surface treating material, the ring-shaped ribs in the first group providing linear supporting zones which are continuous, said resilient ribs and resilient flat disk to which said ribs are joined providing flexible connections at the regions they are joined to one another with said ribs being movable with respect to said resilient flat disk while the latter is in intimate physical contact

with the flat surface of said rotatable member, and said resilient flat disk and resilient ribs being so constructed and formed of material of such resiliency that said one-piece backing member forms a yielding cushion for distributing pressure from said rotatable member substantially uniformly to all regions of the sheet of surface treating material adapted to be held against the outer free ends of said resilient ribs.

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