

Feb. 6, 1940.

E. G. PETERSON

2,189,472

BUFFING DEVICE

Filed Sept. 27, 1937

3 Sheets-Sheet 1

Fig. 1

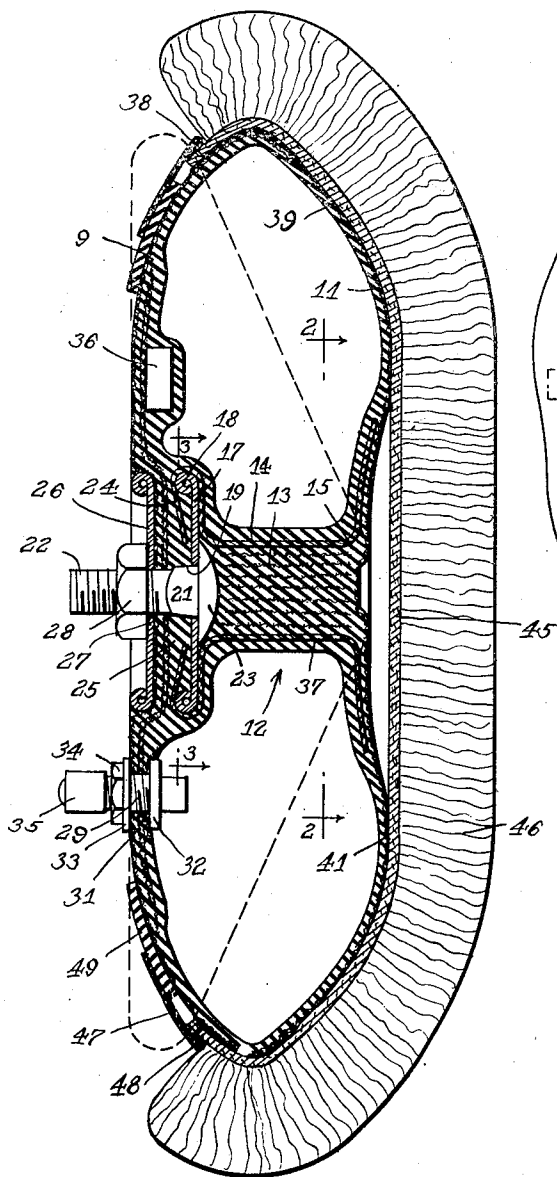


Fig. 2

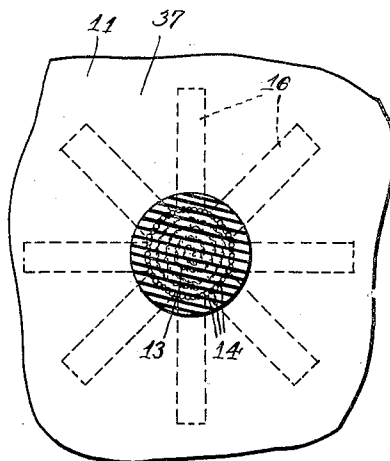
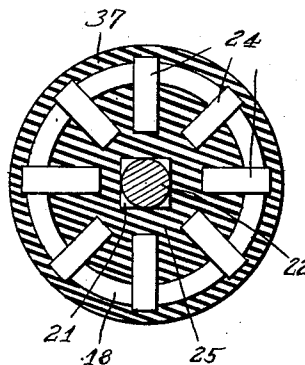


Fig. 3



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Fig. 4

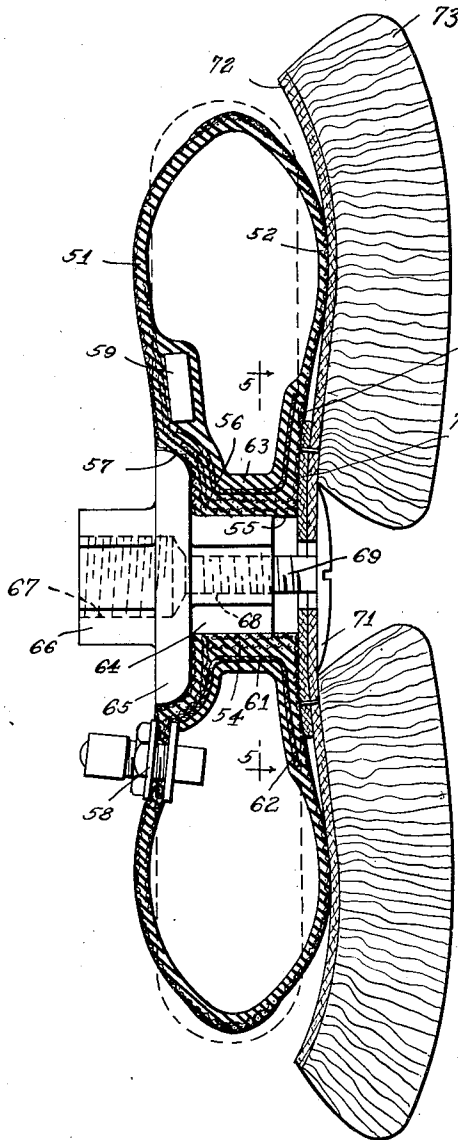
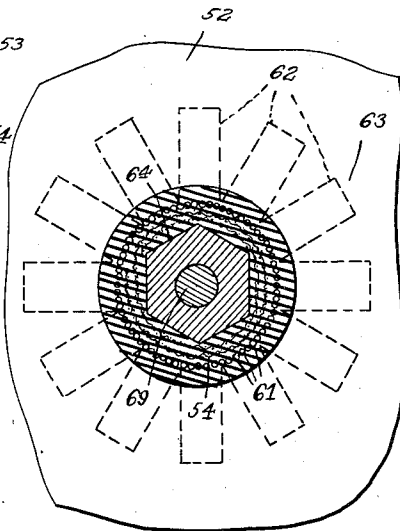


Fig. 5



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3 Sheets-Sheet 3

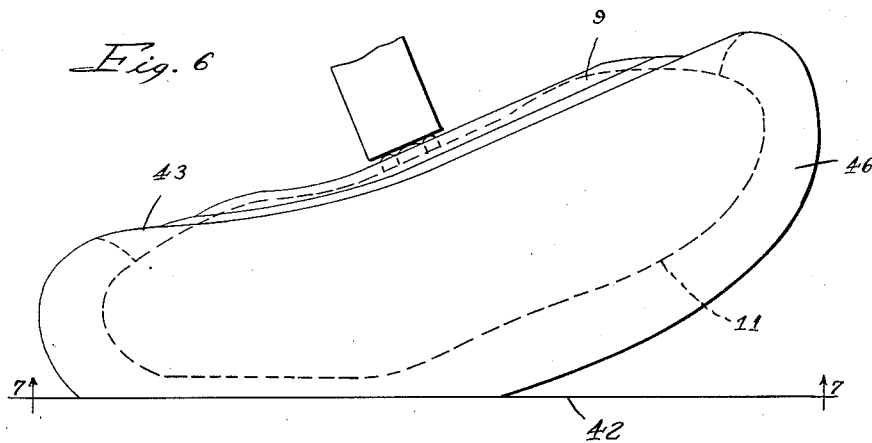
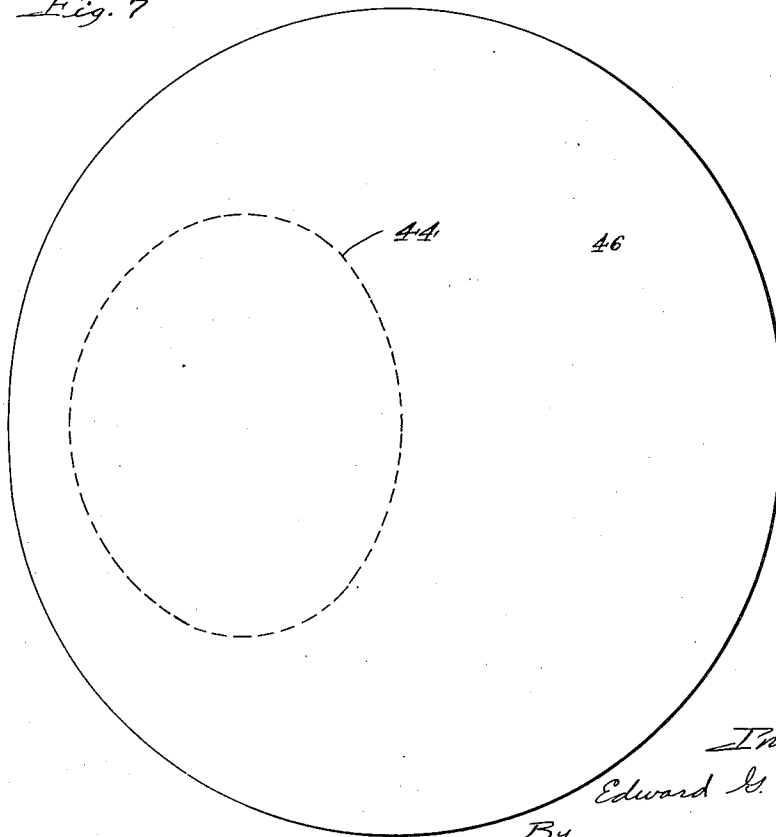


Fig. 7



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UNITED STATES PATENT OFFICE

2,189,472

BUFFING DEVICE

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Application September 27, 1937, Serial No. 165,784

5 Claims. (Cl. 51—196)

This invention relates to buffing and abrading devices and has special reference to a head or supporting device for high speed buffing and abrading surfaces.

In the art of high speed machine polishing and fine grinding such as with fine grit abrading materials, sheep skin buffing covers and the like, much difficulty has been encountered in properly supporting the pad so as to give uniform action over the surface treated. Due to the high speed and the difficulty in obtaining uniform resiliency and pressure across the surface of the buffing pad, it has been impossible to use machines of this type for fine work such as the polishing out of furniture. Numerous devices have been employed, but the one now most commonly used in the polishing of automobile finishes and the like is a disk of relatively stiff but flexible rubber driven from its center, upon which is placed a disk of softer material such as sponge rubber, which in turn carries the polishing surface. These heads are normally driven from two types of devices, one comprising a motor supported in a casing from which a shaft extends at right angles to the axis of the casing, the pad being supported on this short shaft and the motor being manipulated in order to move the buffer over the surface. The second type comprises a motor supported at a remote point, driving a flexible shaft which extends to the work and has a protruding driving shaft frequently extending at right angles to the flexible shaft, the buffing head being carried on the protruding shaft and driven thereby.

An object of the invention is to provide a generally improved support for buffing surfaces.

A further object of the invention is to provide a disk-like polishing head wherein the major portion of the radius is a thin walled gas cell under relatively low pressure adapted to be distorted by pressure against the work so as to give nearly straight line polishing action and provide substantially uniform pressure over the polishing area.

Further objects of the invention are to provide a pneumatic polishing head of improved structure, to provide improved means for supporting the head on drive mechanism, and to provide improved means for supporting polishing surfaces on the head.

Another object of the invention is to provide an improved buffing and abrading cover for pneumatic polishing heads.

Other objects and advantages will become apparent to those skilled in the art from the fol-

lowing description and the accompanying drawings, in which—

Figure 1 is a section through a polishing head embodying my invention showing a lamb's wool cover in position on the head and showing in dotted lines the uninflated shape of the head;

Fig. 2 is a section on the line 2—2 of Figure 1;

Fig. 3 is a section on the line 3—3 of Figure 1;

Fig. 4 is a section through a second embodiment of my invention showing a modified form of cover in position thereon;

Fig. 5 is a section on the line 5—5 of Fig. 4;

Fig. 6 is a section through the form shown in Figure 1 showing the manner in which the head is applied to the work and the distortion thereof, and

Fig. 7 is a view taken on the line 7—7 showing the manner in which the head flattens to provide a wide buffing area.

The invention contemplates a buffing head of wafer-like appearance when inflated having opposed sides which extend outwardly from the axis of rotation and converge at the periphery of the head so as to provide an annular pneumatic ring or air chamber, the sides of which are flexible but substantially inelastic so that the periphery can be distorted by pressure of the head against the work with the axis of the head at an acute angle with respect to the work, as a result of which the pressure of the pad is distributed over the work in a manner which approaches uniformity. The two sides of the pad are interconnected along their centers so as to lend a certain amount of rigidity to the structure and maintain alignment and balance under rotation. In this manner I obtain a pneumatic head which is capable of high speed operation, which provides a comparatively wide area of contact with the work and provides substantially uniform pressure over the entire area of contact. This is illustrated in that by applying this head to a conventional polishing motor and pressing the head and attached buffing surface against the surface of a piece of furniture, as shown in Fig. 6, I am enabled to apply sufficient pressure to very materially reduce the speed of the motor and even to slow the motor below its most efficient operating speed and at the same time produce a polished surface of superior quality without in any way damaging the surface of the furniture, thus showing the uniformity of pressure over the polishing area, the greater softness of the head and the greater area contacting the work.

Referring first to Figures 1-3, inclusive, the form therein shown has a pair of spaced side

members designated generally by the numerals 9 and 11. These members have circular peripheries and when the cell is uninflated have the general shape shown in dotted lines in Figure 1, the member 9 being substantially flat and the member 11 being conical in shape. These members are formed of composite rubber and fabric of relatively thin cross-section such as to be relatively flexible but substantially inelastic. Other equivalent material may be used so long as it possesses the required flexibility and imperviousness to air and is substantially inelastic. Connecting the disk-like members 9 and 11 at their centers is a shaft designated generally by the numeral 12, this shaft being formed of composite rubber and fabric, in the present instance so as to lend rigidity to the structure and yet retain a certain limited amount of flexibility. The central portion 13 of this shaft is formed by rolling together superimposed layers of fabric and sheet rubber to form a solid cylinder of the requisite radius and length. Surrounding the central portion 13 is a layer of cord cemented together by means of rubber and extending longitudinally of the shaft portion 12. These cords are of substantially greater length than the central portion 13 and are spaced radially at the forward end, as shown at 15, to provide a plurality of radially disposed anchor portions designated by the numeral 16 in Fig. 2. These anchor portions are vulcanized to the inner space of the side members 11 for the purpose of retaining the shaft properly in place with respect to the side members and to provide driving force between the shaft and the side members 11. The forward end of the shaft portion 13 likewise abuts against the inner face of the side members 11 and is vulcanized thereagainst.

Positioned against the rear end of the shaft 12 is a metal disk or washer 17 having the peripheral edges thereof curled inwardly as shown at 18 to prevent the edges of the disk from cutting into the adjacent portions of the air cell under the force applied in rotating the head. A square or other plane faced opening 19 is provided at the center of the washer 17 for the reception of the squared end 21 of a bolt 22, the head 23 thereof abutting against the forward side of the washer. The bolt 22 serves for attachment of the head to driving mechanism. The rear end of the shaft 12 is abutted against the head 23 and the washer 17 and the rear end of the cord portion 14 which, like the forward end thereof, is longer than the shaft and is spread outward radially, is bent inward over the rear side of the washer as shown at 24. The rear side of the washer 17 and the end portions 24 are covered with a layer of rubber, as shown at 25, against which the side member 9 is applied. The bolt 22 passes through the rear of rubber 25 and through the side member 9. A washer 26 having a central opening 27 is seated on the bolt 22 against the outer face of the side member 9 and is pressed thereagainst by the nut 28 threaded on the bolt 22. An air valve 29 of conventional design passes through an opening 31 in the air cell formed by the side members 9 and 11 and by the shaft 12 and is secured therein in air tight relationship by spaced washers 32 and 33 on opposite sides of the side member 9, compressed thereagainst by a nut 34. The air valve has a cap 35 of conventional design. On the opposite side of the shaft 12 and diametrically opposed to the air valve 29 is a weight 36 substantially equal to the weight of the air valve 29 and placed with respect thereto in such manner

as to counterbalance the weight of the air valve so as to give dynamic balance to the head. The shaft portions 13 and 14, the washer 17 and the weight 36 are covered with a layer of rubber, as indicated at 37, in order to seal the junction between the parts and to retain the parts in their proper location. When the head is thus constructed it is inserted in a mold of proper shape and the whole structure vulcanized according to the usual vulcanizing methods.

When the head is inflated the side members 9 and 11 take substantially the shape shown in full lines in Figure 1. The exact shape will, of course, depend considerably upon the pressure with which the cell is inflated. This causes each of the side members to take an arcuate shape as shown at 38 and 39 so that the two side members join in an arc at their periphery. It will be observed that the curved portion 39 of the front side member 11 has a curve on a somewhat greater radius than the side member 9, and that it projects outwardly beyond the plane of the forward end of the shaft 12, as shown at 41. This arrangement thus permits the head to deflect, as shown in Figs. 6 and 7, without having the shaft bear against the surface of the work. In Fig. 6 the numeral 42 designates the surface of the work and from this figure it will be seen that as the head is pushed against the work the rear side wall is deflected outwardly as shown at 43 due to its thin section and flexible nature. In this way, the pressure of the gas in the air cell is increased in proportion to the deflection and flattening action so that the pressure against the work is distributed substantially uniformly over the area of contact. Furthermore, because of the arcuate side walls, the extreme flexibility and resiliency thereof and the uniform distribution of pressure, the area of contact between the head and the work is substantially greater than has heretofore been possible with buffing heads of this general type. The manner in which the side member 11 flattens under the pressure is illustrated in Fig. 7, wherein the dotted line 44 indicates the margin of the contacting area.

Referring again to Figure 1, the head is provided with a sheep's wool cover wherein the numeral 45 designates the leather or skin portion, and the numeral 46 designates the wool thereon. A circular strip of cloth 47 is sewed to the angular edge of the leather portion 45 as shown at 48 and projects inwardly over the side member 9. Attached to and vulcanized to the cloth strip 47 is a ring of resilient and elastic rubber 49 also projecting inwardly from the periphery of the cover. Through this arrangement the cover can be placed on and removed from the head without deflating the face, the rubber ring 49 being stretched outwardly to permit the passage of the head.

The embodiment of the invention shown in Figs. 4 and 5 is similar in principle to that shown in Figure 1 and has a pair of side portions 51 and 52 which are nearly parallel in the uninflated condition, as shown in dotted lines in Fig. 4, the side 52 sloping outward slightly from the periphery toward the center. When inflated, the head takes the position shown in full lines in Fig. 4, the side portions bowing outward slightly midway between the shaft and the periphery of the head. The sides 51 and 52 are formed of the same material as heretofore described, and the outwardly bowed wall 52 provides a central hollow 53 which serves a purpose presently to be described. In this embodiment, the centrally dis-

posed shaft is in the form of a sleeve, the inner portion 54 thereof being of the same material and being wound in the same way as the portion 13, but leaving a centrally disposed opening 55 for the reception of a metal fitting, as will presently be described. In this instance, the portion 54 abuts directly against the side portion 51, as shown at 56, the side portion 53 being curved inwardly to provide a centrally disposed recess 57. An air valve 58 is provided identical in every respect to the air valve 29 and a counterweight 59 serves to counterbalance the air valve 58 as heretofore described. The shaft in this instance is also provided with an annular layer of cord cemented together by means of rubber, as shown at 61, the ends 62 thereof extending beyond the ends of the central portion and being splayed and radially applied against the inner surfaces of the side portions 51 and 52. The shaft and adjacent parts are likewise covered with a layer of rubber 63 for the purpose of sealing the junction between the parts and holding the parts rigidly and firmly in place. When thus assembled, the head is placed in a mold and the parts vulcanized together to form a single unitary structure.

The opening 65 is provided with shape characteristics having plain surfaces, in this instance in the form of a hexagon, for the reception of an adapter having a hub portion 64 complementary in shape to the opening 65 and of a size to be received therein and also having a flange portion 65 to seat in the recess 55. Beyond the flange portion 65 is a boss 66 tapped and internally threaded as shown at 67 for the reception of a driving implement. The hub portion 64 is also tapped and internally threaded as shown at 68 for the reception of the screw 69 having a large head 71. The screw 69 and head 71 serve to retain in position against the side member 52 a sheep's wool cover which has the usual leather or skin portion 72 and wool portion 73. The center of the cover has an opening for the passage of the screw 69 and a reinforcing disk 74 attached to the rear thereof, the head 71 of the screw 69 forcing the cover firmly against the head and thus retaining the cover in place.

While I have thus described and illustrated specific embodiments of the invention, I am aware that numerous alterations and changes may be made therein within the spirit of the invention, and I do not wish to be limited except as required by the prior art and the scope of the appended claims.

I claim:

1. A buffing and grinding head comprising a molded disk-like body having a central hub portion of relatively small radius and an annular flexible walled pneumatic ring having side walls forming part of said disk laterally deflectable by pressure against the work, said body being formed of composite rubber and fabric, a driving shaft member for attachment to drive mechanism molded into said central hub portion, and means for inflating the annular ring portion.

2. A buffing and grinding head comprising

spaced disk-like portions of composite rubber and fabric of relatively thin cross-section, flexible, inelastic, and impervious to air, connected at their periphery to form a wafer-like air cell, a central hub portion of composite rubber and fabric connecting said members near their centers, said hub portion having an axial opening extending through said disk-like portions, a metal driving member seated in said opening for attaching the head to drive mechanism, and means for inflating said air cell, said disk-like portion and said central hub portion being vulcanized together to produce a one-piece composite rubber and fabric structure.

3. A buffing and grinding head comprising spaced disk-like portions of composite rubber and fabric of relatively thin cross-section, flexible, inelastic, and impervious to air, connected at their periphery to form a wafer-like air cell, a central hub portion of composite rubber and fabric connecting said members near their centers, said hub portion having an axial opening extending through said disk-like portions, a sheet-like buffing and abrading element seated against one of said disk-like portions and having a central opening, a metal driving member seated in the opening of said hub portion, said driving member having a portion projecting from said hub portion on the opposite side of said head from the buffing and abrading member for attachment to drive mechanism, and means passing through the opening of said buffing and abrading member and engaging said metal portion for attaching and securing the buffing and abrading element thereto.

4. The combination in a buffing head of spaced disk-like portions of resilient material impervious to air connected at their periphery to form an air tight wafer-like structure, a central portion connecting said portions to form an annular pneumatic ring, means on said central portion for attachment to drive mechanism, means for inflating the annular ring portion, and a cover comprising a working surface shaped to seat against one of said disk-like portions, a ring of fabric secured at its annulus to the periphery of said working surface adapted to seat against the other of said disk-like portions, said ring having a central opening for the passage of said annular ring when inflated, and a ring of resilient rubber secured to said fabric around said opening adapted to seat against said other disk-like portion to retain the cover in place and to be stretched for the passage of said annular ring.

5. As an article of manufacture, a cover for a buffing and polishing head comprising a circular body portion shaped to form a hollow chamber for reception of the head and having an exterior buffing surface and a base portion extending inwardly over the chamber at the periphery of said body portion, said base portion comprising a ring of fabric secured to the annular edge of said body portion, and an elastic ring secured to the fabric, said elastic ring being sufficiently elastic for the passage of the head therethrough.

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