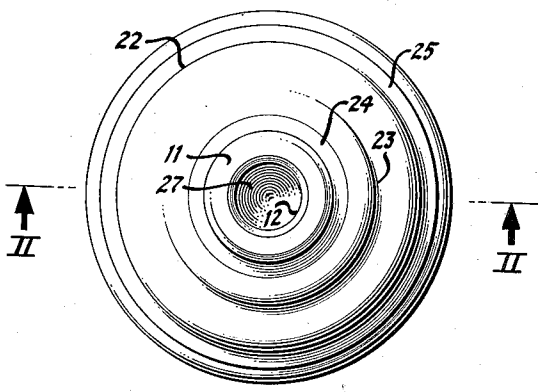
Oct. 23, 1956 B. TOCCI-GUILBERT 2,767,528

BACK PAD SUPPORT

Filed Dec. 29, 1953

2 Sheets-Sheet 1

FIG. 1



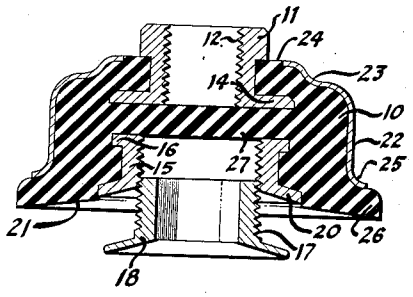


FIG. 2

INVENTOR.
BERNE TOCCI-GUILBERT
BY Henry Gifford Hardy.
ATTORNEY

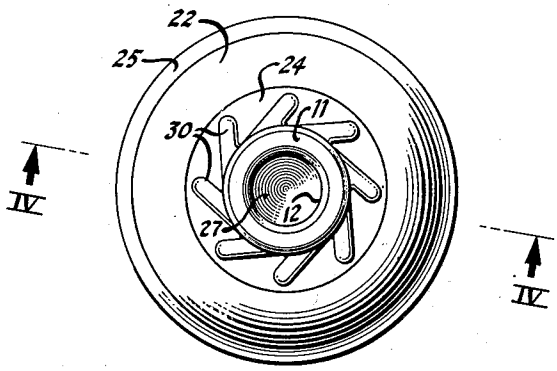
Oct. 23, 1956 B. TOCCI-GUILBERT 2,767,528

BACK PAD SUPPORT

Filed Dec. 29, 1953

2 Sheets-Sheet 2

FIG. 3



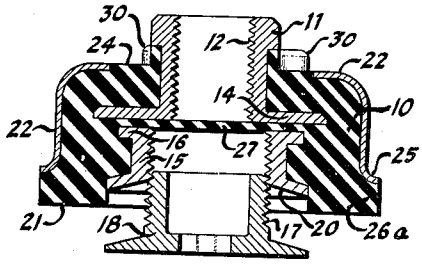


FIG. 4

INVENTOR.
BERNE TOCCI-GUILBERT
BY Henry Gifford Haase
ATTORNEY

United States Patent Office 2,767,528 Patented Oct. 23, 1956

2,767,528

BACK PAD SUPPORT

Berne Tocci-Guilbert, San Francisco, Calif., assignor to Berne Tocci-Guilbert, San Francisco, Calif., and Henry Gifford Hardy, Berkeley, Calif., jointly as trustees

Application December 29, 1953, Serial No. 400,988

5 Claims. (Cl. 51—197)

The present invention is a continuation in part of my copending application, Serial No. 149,138, which was filed March 11, 1950, issued as Patent No. 2,666,281, June 29, 1954, and is entitled "Back Pad."

The present invention relates to improvements in back pad supports for use in connection with grinding or sanding discs, buffing pads and the like which are normally attached to sanding, grinding and polishing machines, and particularly the invention is directed to a support which will provide an oscillatory movement, especially when applied to the work for flat grinding, sanding, or polishing and which will absorb the axial distortion and strain on the shaft and bearings on the shaft of the grinding machine when applied to the work at a point near the periphery of the grinding disc and spaced from the axis of the drive shaft.

The invention contemplates the employment of features formerly obtainable only with the addition of a special piece of equipment known as an oscillator and described in my Patents No. 2,633,008, No. 2,629,990 and No. 2,486,078 wherein the beneficial results of both pieces of equipment are obtained but in a manner and different structure presently found more desirable, more efficient and more readily manufactured.

It has been found that many of the beneficial results of the extended resilient facing could be obtained in an oscillator adapted for attachment to the spindle shaft of a sanding or grinding machine and the usual back pad for supporting a surfacing disc or for attaching a grinding stone.

As disclosed in my Patent No. 2,629,990 a protective shell has been found desirable in order to control and limit the amount of oscillatory movement to that found useful in this operation and to effect a protection for the resilient material itself against damage, chipping or any other destruction which would cause unbalanced rotation. However, providing a shell merely as an attachment has, on occasion, been found to be undesirable because of independent movement between the shell, itself, and the resilient body, the loosening of the shell under axial distortion of working pressures, safety difficulties, and many other features. Accordingly, it is an object of the present invention to overcome the objections and criticisms found in using the tool.

It has also been found desirable for certain types of work not to have the shell contact the coupling between the spindle shaft and the hub to which it is attached, and, in the same manner and for the same reasons, secure the effect of a stabilizer plate which is found in my application Serial No. 149,138, filed March 11, 1950, now Patent No. 2,666,281.

In addition, it has been an object of the present invention to secure a wider face of rubber or other resilient material, for contact with the back pad without increasing the size of the shell, not only to give better support for the back pad, but to give a wider cross section of the rubber or other resilient material for additional strength in the device, itself.

Further, in manufacturing the shell, especially by means of dies requiring a deep draw, a shell with a bell mouth will give support to the periphery of the rubber or other resilient material which extends beyond the main diameter of the shell.

In addition, the rubber or other resilient material which is molded and formed and which is exposed between the hub and the shell may be utilized by forming them into vanes which can either establish an up or draw current, or a down current to blow the dust and work residue away from the working area.

These objectives are attained by the disclosure of this invention.

Further objects are to provide a construction of maximum simplicity, economy and ease of assembly and fabrication, also such further objects, advantages, and capabilities as will fully appear and as are inherently possessed by the device and the invention described herein.

The invention further resides in the combination, construction and arrangement of parts illustrated in the accompanying drawings, and while there is shown herein a preferred embodiment and one variant form thereof, it is to be understood that the same is merely illustrative of the invention and that the invention is capable of modification and change and comprehends other details of construction without departing from the spirit thereof or the scope of the appended claims.

Referring to the drawings:

Figure 1 is a top plan view of the back pad support of the present invention

Figure 2 is a vertical section taken on the line II—II of Figure 1.

Figure 3 is a top plan view of a variant form thereof.

Figure 4 is a vertical section of the device shown in Figure 3 taken on the line IV—IV of Figure 3.

Referring now particularly to the drawings, in which like reference numerals indicate like parts in the several views, the complete back pad support ready for attachment to the spindle shaft of a power tool as an integral unit, is shown generally in plan view in Figure 1.

Figure 2, which is a vertical section of the device shown in Figure 1, exhibits the nature and structure of applicant's device. The main body portion **10** is preferably molded rubber, either natural or synthetic, but it is to be understood that it may be of any suitable resilient, flexible material. It is molded and formed integrally with the several parts which are nonresilient and nonflexible, either in their function or structure. The hub **11**, which is preferably metallic, is the only rigid support and attachment to the spindle shaft of the tool. It may be threaded as at **12** for attachment to the spindle shaft, or such attachment may be accomplished in any other suitable manner. Obviously, the threads **12** are against the direction of rotation of the shaft so that the device tightens on the shaft in use, rather than loosens. The hub is provided with an internal flange **14** which extends outwardly. Axially aligned with the hub **11** but spaced therefrom is the grommet **15**. This grommet is provided with outwardly extending internal flanges **16** which represent a surface separated from, but opposed to the faces of the flange **14**. The grommet is preferably threaded internally at **17** to receive the retaining nut **18**. Even when the retaining nut **18** is completely received within the grommet **15**, the inner terminus of the nut is separated from the hub **11** and the faces of the flange **14** so that there is never, at any time, any metal-to-metal contact. The grommet **15** is provided with an outer face **20** which extends laterally only a short distance, leaving a substantial exposed bearing face **21** of the resilient material.

The device is sheathed by a substantially nonresilient, preferably metallic, shell **22**, which may be shaped as at

23 for added structural strength. Here again, it is to be noted that the shell 22 has no metal-to-metal contact with any other metal parts. It extends toward but does not reach the hub on the upper lateral surface, leaving the portion of the resilient material 24 exposed. Likewise, the vertical cylindrical portion of the shell preferably terminates with a bell mouth as at 25 which is short of the bearing face 21, leaving a substantial lateral flange 26 between the curve of the bell mouth 25 and the face 21. In the manufacture of the device the parts are placed in their relative positions and rubber, either natural or synthetic, is molded and vulcanized to the individual parts so that when the parts are removed from the mold, it is as a single integral unit with all the metal parts bonded to the rubber or resilient material in a strong single unitary structure. Accordingly, the word integral as used here does not mean that this device can be assembled as parts on a shaft to form an operating unit. The resilient materials fills the entire space within the shell and preferably provides a web 27 between the opposing faces of the flange 14 and 16 which unifies the two sides (as viewed in section in Figure 2), into a single interlocked mass. The web 27 also provides a strengthening of the internal structure of the complete unit inasmuch as the shear stress due to the torque, normally occurs in the area where there is no lateral metal reinforcement. To be sure the shell 22 reinforces and prevents shear stresses from setting up from the outside, but the web insures against an internal shearing.

Referring now to Figures 3 and 4, precisely the same parts are involved except that the exposed area of the resilient material on the upper surface 24 is arranged with vanes 30 molded of the resilient material itself and integral with the main body portion 10. These vanes may be tangential as shown in Figure 3 or they may be radial, curved or any suitable form to accomplish a disturbance of the air adjacent the perimeter of the tool. It is desirable and extremely useful at times, to establish this turbulence in the air surrounding the oscillator, both for the dissipation of the frictional heat transmitted during operational rotation and for assisting in the displacement of particles removed during the sanding or grinding operation. It will also be noted that the peripheral flange 26*a* of the resilient body material between the resilient bearing face 21 and the bell mouth 25 of the shell 22 is sheared off evenly with the terminus of the bell. Whether it extends beyond as in Figure 2 is not material, but it is necessary that there be a cushion between the bearing face which rests against the back pad and supports the same and the terminus of the shell 22.

The purpose of the peripheral flange 26 and 26*a* is both structural and functional. In the first place, it presents a wider face of the resilient material against and in support of the back pad without increasing the main outer diameter of the shell. In the second place, it gives a better support for the pad by increasing the available area. It also gives a wider cross section of resilient material for strength. Providing a bell mouth 25 means that there are no sharp edges to cut into the resilient material of this peripheral flange.

It is also of importance to note that the reducing of the exposed face 20 of the grommet 15 provides both rigid and resilient contact for bearing against and supporting the back pad. This is an important feature as it permits resilient bearing and support to the back pad in the areas of greatest axial distortion and metal bearing and support against the areas adjacent the axis. As in my application Serial No. 149,138, now Patent No. 2,666,281, the interposition of this support when attached to the spindle shaft of a tool between the drive and the back pad the working surface of an abrasive disc held in position for rotation by the retaining nut 18 or between a stone held in position by the grommet 15, produces a nonmetallic resilient cushioning coupling, which sets up a vibratory oscillating torque when under working conditions the tool is

applied to a work surface either in grinding, sanding, polishing or similar operation. This causes a muffing or rubbing action in addition, which breaks the concentric lines of rotation of the tool when working pressure is applied. The absence of concentric grinding torque prevents the burning and deep scoring of any surface as well as eliminating the buffing rings. Flat grinding, sanding and the like is essentially not possible without the oscillatory action provided for herein. The frictional torque is either greater than the operator can hold when pressure is applied to the work or else it stops the motor. Likewise, in the absence of oscillatory action, the abraded material, especially when used in surfacing marble, cork, rubber, or other soft surfaces, remains under the working area of the abrasive and there is not enough motion to cause it to be thrown aside. This results in the filling up and fouling of the abrasive material and requires frequent replacement of the cutting or surfacing material. With the oscillatory movement provided for herein it is impossible to apply pressure at any one point and, therefore, even under heavy working pressures it is completely practical to use the entire face of the abrasive without arresting the speed of the motor or danger of jerking the tool from the control of the operator. Likewise, the abrasive is never filled or fouled because the movement constantly throws the abraded particles to the side. The oscillatory, nutative movements of this back pad support in operation under work conditions is nonconcentric and totally unpredictable. When working pressure is applied the lower lateral surface 21 of the resilient material 10, presses against the back pad, or against the grinding stone and accommodates itself to any irregularities to provide a secure and yielding contact. This also equalizes the pressure throughout the entire mass of resilient material. The bell mouth 25 of the shell does not limit or react adversely no matter what pressure is required and will not cut through or weaken the peripheral flange 26 or 26*a*, which greatly extends the contact surface as well as increases the strength of the resilient section. Thus, by using this support, the speed and other benefits are not only possible, but entirely practical.

It is well-known that conventional grinding, polishing and sanding is done only with a small portion of the grinding wheel or disc actually in contact with the material. This means that conventional grinding is done with the grinding pad or wheel at an angle to the work so that only about three-eighths of an inch of the perimeter of the ordinary sanding disc or grinding wheel is actually in contact with the work surface. The sizes of discs used for this high speed work range from small five-inch discs to medium seven-inch discs and large nine-inch discs, although larger sizes have been used for specific purposes. It will be noted, therefore, that the point where pressure is applied against the work is spaced several inches from the axis of the spindle shaft of the motor. The resulting leverage inherently means that there will be axial distortion. In the conventional manner of mounting the back pad rigidly to the spindle shaft, the axial distortion is transmitted directly to the bearings and the motor. This results in excessive wear and damage to the tool. It will be seen that even where the conventional grinding or sanding position causing axial distortion is used with the back pad support disclosed herein, such distortion is not transmitted to the spindle shaft of the motor because there is no rigid coupling between the grommet 15 and the hub 11. The resilient body 10 and its web 27 yield under the axial misalignment of the grommet 15 and the pressures exerted by the peripheral flanges 14 and 16, respectively. Likewise, it is to be noted that toward the perimeter of the support of the present invention where the distortion is usually greatest, the support contact is an exposed portion 21 of the resilient material 10 and, therefore, this distortion is immediately transmitted to the main body and redistributed. Thus, any axial misalignment caused by working pressures between the hub 11, which is rigidly

attached to the spindle shaft of the driving motor and the grommet **15**, as well as the supporting surface **21** are completely absorbed, compensated for and not transmitted to the shaft of the motor. The wear and damage to the motor and its bearings are eliminated and the loss of time and expense in connection with servicing such tools is reduced to a bare minimum.

However, whether the support is used for flat grinding or for the conventional angle grinding or surfacing, the jar and vibration resulting from working pressure against the object which is normally transmitted through the hands, arms and shoulders of the operator, bringing discomfort and early fatigue, is not experienced by the use of this back pad support, by eliminating the cause and by the absorption of certain stresses in operation.

The driving member or hub **11** is formed in axial alignment with the driven member or grommet **15** but in spaced relation due to being imbedded and bonded to the resilient body material **10**. Likewise, the shell **22** is in dynamic balance with and spaced from the hub **11** and the grommet **15** by the body material **10** to which it is bonded. No metal-to-metal contact is possible either in the coupling or in axial distortion under operating conditions. It will also be observed that the flange **14**, or the disc **14***a*, performs and accomplishes purposes similar to the stabilizer plate **16** disclosed in my copending application, Serial No. 149,138.

It will be seen that all of the objectives of the present invention and many more are obtained by the structure herein diclosed.

I claim:

1. An oscillating torque mounting for back pads with sanding discs and the like comprising an attachable integral unit adapted for interposed attachment between the spindle shaft of a power tool and the supporting back pad of the sanding disc, said unit comprising a nonresilient driving hub member for attaching directly to the spindle shaft having an internal flange thereon, a nonresilient driven hub member adapted to receive and retain the back pad and sanding disc in a plane perpendicular to its axis, in axial alignment with said driving hub but spaced therefrom and having an internal flange the face of which is opposed to but spaced from said first flange, a nonresilient shell member having its substantially horizontal top portion spaced from said driving hub above said first flange the wall of which terminates axially in a bell mouth below said second flange, and a body of rubber molded within said shell, surrounding said hubs and forming a driving connection therebetween including an exposed annular area between said shell and said driving hub and a peripheral flange adjacent the bell mouth of said shell, said rubber body having a maximum diameter only slightly larger than said shell with each of said nonresilient members being securedly bonded to said rubber body.

2. An oscillating torque mounting for back pads with sanding discs and the like comprising an attachable integral unit adapted for interposed attachment between the spindle shaft of a power tool and the supporting back pad of the sanding disc, said unit comprising a nonresilient driving hub member for attaching directly to the spindle shaft having an internal flange thereon, a nonresilient driven hub member adapted to receive and retain the back pad and sanding disc in a plane perpendicular to its axis, in axial alignment with said driving hub but spaced therefrom and having an internal flange the face of which is opposed to but spaced from said first flange, a nonresilient shell member having its substantially horizontal top portion spaced from said driving hub above said first flange the wall of which terminates axially in a bell mouth below said second flange, and a body of rubber molded within said shell, surrounding said hubs and forming a driving connection therebetween including an exposed annular area between said shell and said driving hub, having an integral peripheral flange adjacent the bell mouth of said shell and of substantially the same diameter and an exposed surface area for gripping contact with the outer surface of a back pad, each of said nonresilient members being securely bonded to said rubber body.

3. An oscillating torque mounting for grinding stones and the like comprising an attachable integral unit adapted for interposed attachment between the spindle shaft of a power tool and the grinding stone, said unit comprising a nonresilient driving hub member for attaching directly to the spindle shaft having an internal flange thereon, a nonresilient driven hub member adapted to receive and retain the grinding stone in a plane perpendicular to its axis, in axial alignment with said driving hub but spaced therefrom and having an internal flange the face of which is opposed to but spaced from said first flange, a nonresilient shell member having its substantially horizontal top portion spaced from said driving hub above said first flange the wall of which terminates axially in a bell mouth below said second flange, and a body of rubber molded within said shell, surrounding said hubs and forming a driving connection therebetween including an exposed annular area between said shell and said driving hub, having a peripheral flange adjacent the bell mouth of said shell of substantially the same diameter and an exposed surface area for gripping contact with the outer surface of a grinding stone, each of said nonresilient members being securely bonded to said rubber body.

4. An oscillating torque mounting for back pads with sanding discs and the like comprising an attachable integral unit adapted for interposed attachment between the spindle shaft of a power tool and the supporting back pad of the sanding disc, said unit comprising a non-resilient driving hub member for attaching directly to the spindle shaft having an internal flange thereon, a nonresilient driven hub member adapted to receive and retain the back pad and sanding disc in a plane perpendicular to its axis, in axial alignment with said driving hub but spaced therefrom and having an internal flange the face of which is opposed to but spaced from said first flange, a nonresilient shell member having its substantially horizontal top portion spaced from said driving hub above said first flange the wall of which terminates axially in a bell mouth below said second flange, a body of rubber molded within said shell, surrounding said hubs and forming a driving connection therebetween including an exposed annular area between said shell and said driving hub, a peripheral flange adjacent the bell mouth of said shell and an exposed surface area for gripping contact with the outer surface of a back pad, each of said nonresilient members being securely bonded to said rubber body, and exposed vanes on the outer surface adjacent said driving hub for creating air disturbance during operational rotation.

5. An oscillating torque mounting for grinding stones and the like comprising an attachable integral unit adapted for interposed attachment between the spindle shaft of a power tool and the grinding stone, said unit comprising a nonresilient driving hub member for attaching directly to the spindle shaft having an internal flange thereon, a nonresilient driven hub member adapted to receive and retain the grinding stone in a plane perpendicular to its axis, in axial alignment with said driving hub but spaced therefrom and having an internal flange the face of which is opposed to but spaced from said first flange, a nonresilient shell member having its substantially horizontal top portion spaced from said driving hub above said first flange the wall of which terminates axially in a bell mouth below said second flange, a body of rubber molded within said shell, surrounding said hubs and forming a driving connection therebetween including an exposed annular area between said shell and said driving hub, a peripheral flange adjacent the bell mouth of said shell and an exposed surface area for gripping contact with the outer surface of a grinding stone, each

of said nonresilient members being securely bonded to said rubber body, and exposed vanes on the outer surface adjacent said driving hub for creating air disturbance during operational rotation.

References Cited in the file of this patent

UNITED STATES PATENTS

2,295,282	Mall	Sept. 8, 1942
2,394,882	Weynand	Feb. 12, 1946
2,439,751	Olsen	Apr. 13, 1948
2,486,078	Tocci-Guilbert	Oct. 25, 1949
2,629,990	Tocci-Guilbert	Mar. 3, 1953
2,633,008	Tocci-Guilbert	Mar. 31, 1953
2,666,281	Tocci-Guilbert	Jan. 19, 1954