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BACK PAD

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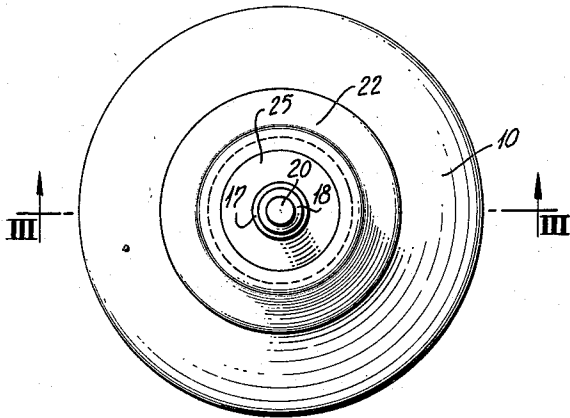


FIG. 1

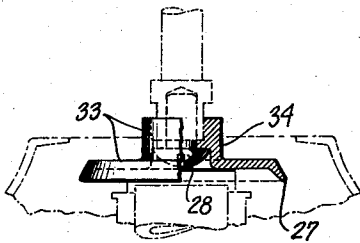


FIG. 4

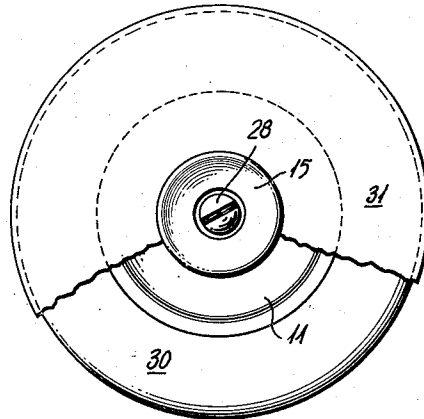


FIG. 2

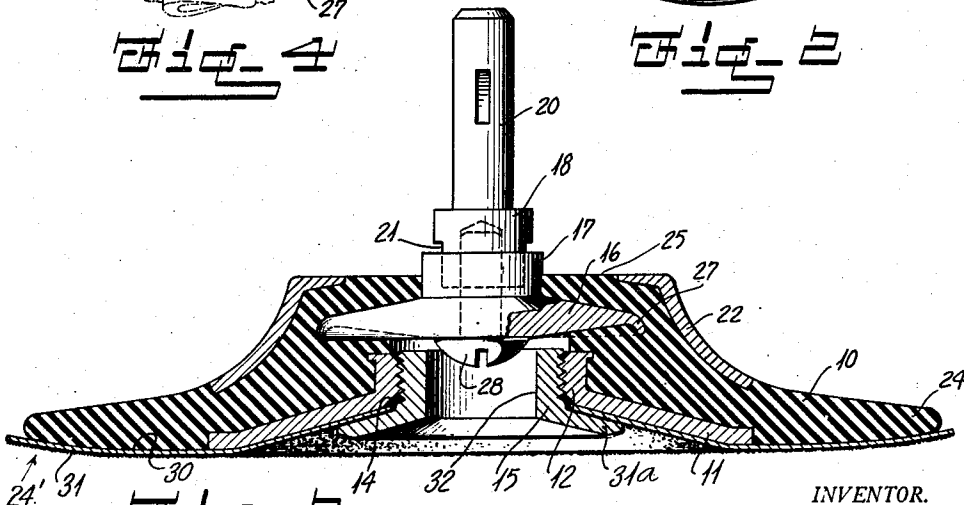


FIG. 3

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2,666,281

BACK PAD

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1

The invention relates to improvements in back pads for use in connection with grinding or sanding discs, buffing pads, and the like, which are normally attached to sanding and polishing machines, and particularly the invention is directed to a back pad which will provide an oscillatory movement especially when applied to the work for flat grinding, sanding or polishing and which will also absorb axial distortion and strain on the shaft and bearings of the grinding machine, when applied to the work at a point near its periphery, 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 used in conjunction with the usual back pad construction, wherein the beneficial results of both pieces of equipment are combined in a single unit without extending the length of the drive shaft and increasing the distance to the work.

In general, an embodiment of the present invention employs the usual resilient, flexible back pad but in this invention it is countersunk at its central portion and reinforced thereat with a fully bonded top plate to receive and hold the sanding and grinding disc with suitable resilience and flexibility toward the periphery. Axially imbedded in said resilient material is a central disc which is spaced from contact with any of the other elements and which functions to stabilize the tendency of axial displacement or distortion of the drive shaft during operation. Although the stabilizing disc is spaced from the top plate, any tendency to have the resilient material shear due to a sudden difference in torque, is prevented and minimized by an outward flaring base plate likewise bonded to the resilient material.

It is an object of the present invention to provide a back pad which in and of itself will absorb any axial misalignment during rapid rotation when only a small portion of the periphery is applied to the work.

It is likewise an object of the present invention to provide a resilient back pad which will permit high speed grinding, sanding, polishing or like operation with the axis of the drive shaft substantially at right angles to the plane of the work surface.

It is also an object of the present invention to provide a resilient back pad which combines an oscillator with the normal resilient or flexible back pad without in any way increasing the length of the shaft, thus permitting surface

2

grinding or other treatment of large, flat or curved surfaces without concentric grooving, hill and dale cutting or the other deleterious results normally incident to such work, especially when done at high speeds.

A further object of the invention is to furnish a back pad with free floating motion which, in conjunction with appropriate abrasives, will accomplish very fine finishes (lap grinding and polishing) with very low abrasive pressures and with no tendency to walk, dig or make concentric rings.

It is a further object of the present invention to provide a back pad for grinding, polishing and buffing purposes which will not only have the necessary rigidity for applying force to the disc face at the point of work, but which at the same time will minimize the axial distortion of the power shaft connected to the driving mechanism.

Still another object is to supply a combined oscillating back pad wherein the resilient portions are never in direct shearing relation.

Another object of this invention is to provide a back pad which will operate successfully in sanding, grinding, polishing and like operations at peripheral pressures greater than now used without transmitting axial distortion and misalignment to the operating shaft.

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

The invention further resides in the combination, construction and arrangement of parts illustrated in the accompanying drawings, and while there is shown therein a preferred embodiment and several modifications, it is understood that the same are merely illustrative of the invention, and that the invention is capable of modification and change and contemplates such 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 completely assembled oscillating back pad of the present invention.

Figure 2 is a bottom plan view of the assembled invention with a portion of the abrasive disc broken away to disclose a portion of the top plate and the flexible periphery of the pad.

Figure 3 is a vertical section taken on the line III—III of Figure 1, looking in the direction of the arrows.

Figure 4 is a fragmentary view, partly in ele-

vation and partly in section, showing a variant form of central stabilizing disc which is better suited for die stamping.

Referring now to Figures 1 to 3 of the drawings in which like reference numerals are used to designate the same parts in the several views, and particularly to Figure 3, the completely assembled oscillating back pad of the present invention is shown in vertical section. The main body portion 10 of the back pad is preferably moulded rubber, either natural or synthetic, and can be made from any suitable resilient, flexible material. The outer surface of the body 10 is dished at its central portion and reinforced with and bonded to an inwardly sloping top plate 11 which has an axial bore 12 threaded at 14 to receive the retaining nut 15. Above the top plate 11, but without any contact therewith, a stabilizing disc 16 is imbedded in the resilient, flexible material forming the body 10. The stabilizing disc 16 is in axial alignment with the bore 12, but is placed in a plane substantially at right angles thereto. The stabilizing disc 16 is preferably provided with a hub 17 which is adapted to receive the collar 18 of the shaft 20. As is usual in equipment of this kind, the rotating drive shaft 20 has its collar 18 flattened on one or two sides as at 21 to form a positive coupling for high speed, rotating attachment. The upper shoulders of the resilient back pad material are protected by an outward flaring base plate 22 securely bonded to the body 10. It is to be noted that the base plate 22 which is preferably of metal, not only gives strength and rigidity to the device at the points where rough handling and continued use would do the most damage, but also does not interfere with the peripheral portion 24 of the back pad where flexibility is essential. The upper surface 25 of the body 10 is not required to be completely covered by the top plate 22, and it may be desirable to provide resilience adjacent the shaft 20. The perimeter of the stabilizing disc 16 is preferably turned downwardly as at 27 in order to assist in the acceptance of and adjustment for the axial distortion as well as to prevent cutting or damaging the body material under compression.

The top plate 11, the base plate 22 and the stabilizing disc 16 are preferably fabricated individually and then placed in a mould and bonded with the body material so that the entire back pad becomes an integral unit. If the body is a vulcanizable material such as rubber, the vulcanizing assists in bonding all of the elements securely in position.

The oscillating back pad of the present invention which is formed of the top plate 11, the stabilizing disc 16 and the base plate 22 securely bonded in and to the resilient body 10 to form a unitary structure, may be attached to the rotating shaft 20 of any sanding, grinding or polishing machine in any suitable manner. However, it is here shown attached in Figure 3, by means of a threaded screw 23 which is received by the axially tapped collar 18 to the drive shaft 20. It will be observed that if pressure is exerted at the point 24' on the perimeter the pressure, being off center with respect to the axis of the shaft 20, would normally tend to cause axial misalignment of the shaft 20, producing abnormal wear and damage to the bearings and gears of the drive mechanism. In this instance, however, the under surface of the stabilizing disc 16 will tend to compress the resilient body material occupying the space between it and the inner surface of the

top plate 11 on the left hand side as shown in Figure 3. Correspondingly, the upper surface of the stabilizing disc 16 will tend to compress the resilient material of the body between it and the inner surface of the base plate 22 on the right hand side as shown in Figure 3. In this manner a force exerted at point 24' is compensated for by the adjustment of the stabilizing disc 16 freely within the resilient material of the body 10 and in this manner axial misalignment is avoided, and axial distortion prevented.

An abrasive disc 31 is adapted to be received against the outer circular face 30 of the body member 10, and is retained in position between the outer flange 31a of the nut 15 and the outer face of the top plate 11. The nut 15 is centrally bored as at 32 so that the screw 23 is always available for attaching, detaching, tightening or any other purpose, whether or not the abrasive disc 31 is in place.

A modified form of the stabilizing disc 16 is shown as member 33 in Figure 4. Its hub 34 is somewhat more substantial and extensive than the one shown in Figure 3 and the surfaces of the disc are preferably flat instead of tapering. The perimeter has the same downwardly turned edge 27. The screwhead 28, however, is countersunk into the hub 34 which provides an additional safety feature. The general result and function of the modified disc is precisely the same as that described above.

It is, of course, apparent that any kind of grinding or polishing device may be substituted for the abrasive disc 31 and that the retaining nut 15 may be removed entirely and a polishing or buffer head or bonnet may be affixed in such a manner as to cover the entire face 31 and the perimeter 24, for polishing, waxing and the like.

The interposition of a resilient material of the backing pad with the coupling of the drive shaft produces a resilient cushioned coupling which sets up a vibratory oscillating torque when the back pad of the present invention is applied to the work for surface grinding, sanding, polishing or like operation. This causes a buffing or rubbing action as well which breaks the concentric lines of rotation of the abrasive when the working pressure is applied. The absence of concentric grinding torque prevents burning and deep scoring of any surface, as well as the elimination of buffing rings. Flat grinding, sanding and the like is essentially not possible without the oscillatory action provided 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 in use on marble, cork, rubber and other soft surfaces, remains under the working area of the abrasive as there is not enough motion to cause it to be thrown aside. This results in filling up and fouling of the abrasive material and requires frequent replacement. With the oscillatory movement provided herein, it is impossible to apply pressure at any one point and, therefore, even at heavy pressures it is very practical to use the entire face of the abrasive without arresting the speed of the motor. Likewise, the abrasive is never filled or fouled because the movement constantly throws the abraded particles to the outside.

The rubber body portion 10 is preferably of a composite structure comprising an inner portion extending outwardly to about the shoulder of the base plate 22 and an outer portion extending out-

5

wardly therefrom. The inner portion is preferably a softer grade of rubber adapted to prevent axial distortion and provide the required oscillatory motion, and the outer portion is preferably a harder grade of rubber to provide adequate resilient support for the abrasive disc 34.

It will thus be apparent that an oscillating back pad has been provided in several forms. In all of these forms a yielding, resilient cushion is provided between the shaft coupling and the working surface, without exposing the cushion to sheering. In one embodiment, the stabilizer plate is embedded in and keyed to the cushion. In another embodiment, the stabilizer plate and the coupling member are preferably constructed of stampings which are easily fabricated, and the coupling member keys the stabilizer plate to the cushion. In yet another embodiment, the rubber body portion is cut off to provide an oscillator for a conventional abrading disc.

It is to be understood that the present invention in its various embodiments is adapted for and equally effective whether attached to portable or stationary grinding and finishing machines.

I claim:

1. Polishing and abrading apparatus of the character described, comprising a body of rubber of substantially frusto-conical, annular shape with a flared base, a top plate bonded to the base of said body, said top plate having a diameter substantially less than said base, a stabilizer plate bonded within said rubber body a substantial distance above said top plate, said plates being arranged concentrically to said rubber body, means for clamping a sanding disc or the like to said top plate without contacting said stabilizer plate and means for coupling a shaft to said stabilizer plate to rotate the apparatus about the common axis of said plates and rubber body.

2. Polishing and abrading apparatus of the character described, comprising a top plate adapted to serve as an abutment and holding means for an abrasive disc, a stabilizing plate spaced therefrom in concentric relation thereto,

6

a body of resilient material disposed between said plates and encompassing both sides of said stabilizing plate forming a unitary integral structure, and means for coupling said stabilizing plate to a shaft for rotating said apparatus about the common axis of said plates, and means cooperating with said top plate only for clamping an abrasive disc to said base plate.

3. Polishing and abrading apparatus of the character described, comprising an annular body of rubber of generally frusto-conical shape with a flared base, a top plate bonded to and integral with the base of said body, a stabilizer and coupling plate bonded to, integral with and embedded in said body in spaced relation to said top plate, said plates being in concentric relation to said body, an annular reinforcing member encompassing the upper edges of said body, means cooperative with said top plate only for clamping an abrasive disc or the like to said top plate and means for coupling a shaft to said stabilizer plate for rotating the apparatus about the common axis of said body and plates.

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