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(54) A tool for honing and the like.

(57) There is described herein a tool for honing or the like, bearing an abrasive sheet (46) which has been applied on the working surface thereof, having previously interposed a resilient material layer (50) therebetween, adapted to provide a slight yielding effect while the tool performs its abrasive action on the surface of the workpiece.

The tool according to this invention may be either a rotating type tool, known in the specific branch of the art as "backing plate" and it is substantially disc-shaped, or an oscillating type tool, i. e. having a substantially rectangular work surface.

According to a further feature of the tool of this invention, it comprises a shank (22, 36, 54) for its fastening to a driving apparatus, which is interchangeable, and makes it possible to use the tool with different type apparatuses.

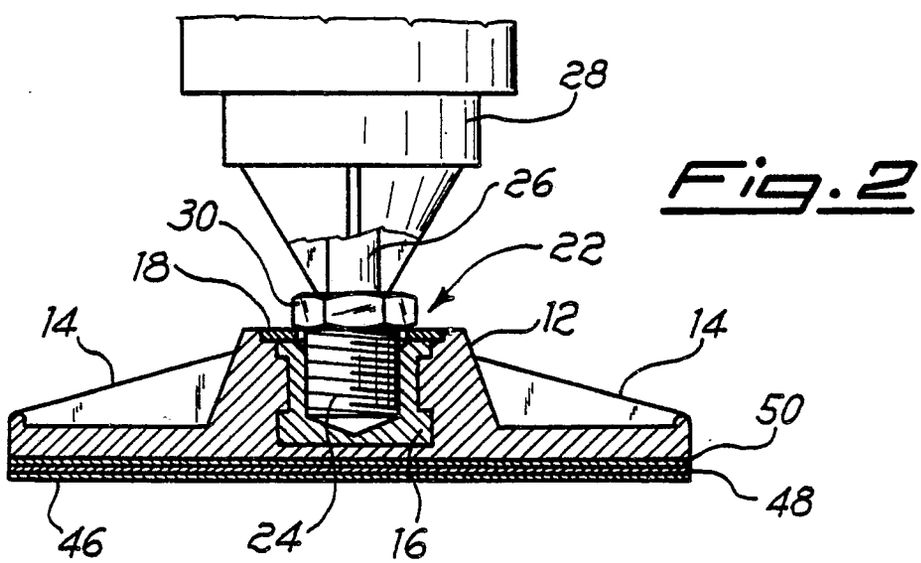


Fig. 2

EP 0 397 624 A2

A TOOL FOR HONING AND THE LIKE

This invention relates to a tool for honing and the like.

Tools of the above type are already known and it is known as well that they may be grouped in two main classes, the first one including the substantially disc-shaped tools, known as "backing plates", which are subjected to a rotating motion, while the second includes the tools having a substantially rectangular working surface, and which are subjected to a linear oscillating motion.

The active or working surface of both types of tools mentioned above is lined,according to known techniques, with an abrasive material sheet which, through the motion the tool is subjected to, will perform a honing operation on the surface to be machined.

Particularly in the case of the "backing plates", which will be called like that throughout this specification, the abrasive disc is applied by means of a "Velcro" type fastening, whereby the abrasive disc may be easily replaced once it has worn out or when replacement is needed with a different grain disc.

In the tools subjected to an oscillating linear motion the abrasive material sheet is applied to a support body of the driving apparatus and fastened thereto at the ends, by means of locking hooks.

However, conventional tools have drawbacks concerning the abrasive action they perform during the honing operation. In fact, as it is known in the backing plates the body to be lined with the abrasive material is made of a stiff material whereby the honing action provided by the tool is particularly strong in that the abrasive material sheet lies directly in contact with the support body.

For oscillating tools the abrasive action is lacking because the abrasive sheet is kept in place only at the ends thereof by means of the above mentioned locking hooks which do not allow for thorough adhesion over the whole vibrating surface.

The above drawbacks are particularly bothersome for the tools designed for the so called "do it yourself" environment, where the users often lack the necessary experience and skills of the professional users.

A further drawback of the conventional backing plates stems from the fact that their shank, i.e. the rear projection thereof which is to be fastened in a suitable seat of the driving apparatus, is integral with the tool itself or, in any case, it is set for a single type tool. As it is apparent, in this condition , a tool provided with a particularly shaped shank can be used only for a certain type of driving apparatus, just because said shank will be compatible with said apparatus.

Based on the above, the user working with more than a single machine tool will need to stock as many tools having shanks adapted to match the seats of the various tools.

There has now been devised, and it makes the subject of this invention, a tool for honing and the like which does away with all the drawbacks of conventional tools. The features as well as the advantages of the tool according to the present invention will become apparent from the following detailed description, reported herein as a non limiting example, of two embodiments of the tool, said description being made in reference to the attached figures, wherein:

Figure 1 is a longitudinal, partially exploded , sectional view, of a first embodiment of the tool according to this invention;

Figures 2 to 4 show how the inventive tool may be mounted on different machine tools thanks to its interchangeable shank;

Figure 5 is an exploded perspective view shoxing an embodimental alternative of the tool of the present invention;

Figure 6 is a side elevational view, partly in longitud inal section, of the tool of Figure 5 after assembly.

Referring in particular to Figures 1 to 4, the tool according to this invention is a rotary working motion type tool and therefore it comprises the so called "backing plate" made of a substantially circular body 10 having a substantially frustoconical shaped projection 12 provided on the rear face thereof. Still on the rear face of circular body 10 there is provided a plurality of ribs 14 connecting projection 12 with the peripheral edge of body 10, and having a height tapering down towards said edge.

The tool according to this invention is made of rubber and therefore it can be manufactured through a single molding operation. The properties of the rubber mix are chosen in such a way as to provide the tool at the same time with enough stiffness to perform the honing action, together with such a flexibility to allow the same to deform moderately according to the shape and the type of the surface to be machined.

It should further be noted that ribs 14, besides comprising a tool stiffening member, provide a useful means for increasing the heat exchange towards the environment, while reducing the degree of heating of the tool.

Within projection 12 there is embedded, during the molding step itself, a metal bushing 16 on top of which there is fastened a metal washer 18, at the upper end of projection 12.

Both bushing 16 and washer 18 provide a stiffening of the tool, in the connecting position thereof with the fastening shank to the driving apparatus, whereby high strength properties may be attained, also at high operating speeds.

Inner surface 20 of bushing 16 is threaded in order to enable different shanks to be fastened, or to enable the tool to be mounted on an operating apparatus which does not require a fastening shank.

Figure 2 shows how the tool according to the invention may be used in a first way, by means of a shank 22 comprising a threaded portion 24 adapted to threadedly engage within bushing 16, and an unthreaded portion 26 where it is possible to tighten the locking chuck 28 of an electric drill. Between portions 24 and 26 there is provided a further slightly projecting and substantially nut-shaped portion 30, adapted to allow shank 22 to be tighten on the tool by means of a suitable implement.

Figure 3 shows a further advantageous embodiment of the tool, according to the invention in case it has to be used with an angular electric sanding machine having a shaft 32, threaded at end 34, which can screw directly within bushing 16.

Figure 4 shows a further advantageous application of the tool of this invention, when the same is used with an angular pneumatic sanding machine, of a planetary type. In this case there is used a shank 36 having a first threaded portion 38 adapted to screw into bushing 16, and a second threaded portion 40 adapted to screw into a seat provided on purpose in head 42 of the sanding machine. Shank 36 as well has a substantially nut shaped intermediate projection 44, for the same purpose already explained about shank 22 of Figure 2.

According to one of the basic features of the tool according to this invention, it is particularly important the way according to which abrasive disc 46 is lined onto the tool.

The above lining operation is performed preferably, although not exclusively, by means of a "Velcro" type fastening since in that way abrasive disc 46 may be replaced rapidly and easily.

Referring in particular to Figure 1, the non abrasive face or rear face of abrasive disc 46 has a substantially hairy, plush-like consistency, adapted to enable it to be temporarily locked on the opposite face of an intermediate disc 48, the latter having a substantially wrinkled consistency or provided with micro-hooks adapted to grip into the rear surface of abrasive disc 46.

According to this invention, intermediate disc 48 does not get fastened directly onto the backing plate working surface, but in an original way which allows the machining surface comprising abrasive disc 46 to be made yielding or in any case flexible.

The lining operation of the intermediate disc 48 onto the backing plate is performed after having interposed a layer of resilient material 50 which is fastened on a face thereof to the backing plate and,on the opposite face,to disc 48.

The application of resilient material layer 50 to the backing plate may be performed in any known way, for instance by glueing or by ultrasonic welding, since said resilient layer 50 is preferably, although not exclusively,made of plastic material.as it will be specified in the following.

The application of intermediate disc 48 to layer 50 may be performed in any way already known, like for instance by glueing.

The material comprising layer 50 is advantageously a material of substantially spongy consistency, or in any case moderatly yielding in compression, and for said purpose it is possible to use advantageously, although not exclusively, a semi-hardened polyurethane.

According to a further equally advantageous possibility the layer of resilient material 50 may be comprised of a bi-adhesive material, having both faces lined with a peelable protection silicon paper. For instance, said bi-adhesive material may be a material commercially known by the abbreviation Fas-Tape 432, sold by the Company Vagnone & Boeri, Turin, Italy. If this solution is chosen, it will be possible to commercialize the intermediate discs 48 with the bi-adhesive layer 50 applied thereto, i.e. completely ready to be lined onto the backing plate after having simply peeled off the second silicon paper sheet.

What has been explained above concerning the application of abrasive disc 46 and of intermediate disc 48 remains true also for a backing plate like the one shown in Figures 2, 3 and 4, as well as for the embodimental variation of Figures 5 and 6 which will be described in the following.

In the embodimental variation of Figures 5 and 6, wherein the same members common to Figures 1 to 4 bear the same reference numbers, the frustoconical projection 12 has a central longitudinal passage 52 which allows a shaft 54 to be introduced from the backing plate front side. Shaft 54 has a head 56 which is received in a suitable seat of passage 52, while the shank thereof project behind the backing plate and has a locking nut 58 threaded thereon, in order to retain shaft 54 on the backing plate and to provide a shank thereof.

In the embodiment of Figures 5 and 6 the projecting portion of shank 54 is not threaded whereby this backing plate may be used for instance for an electric drill. However, said projecting portion could be threaded as well and could be used for applying the backing plate to other apparatus.

A further particularly advantageous application

of the tool of this invention is the one concerning the case of an orbital honing machine. The tool of this machine tool, which is not shown in that it is known per se, performs a linear reciprocating motion and the abrasive sheet is fastened to a suitable support member thereof by means of locking hooks or springs which retain the ends of said abrasive sheet onto the ends of said support member. In this case there is a remarkable drawback that, while the abrasive sheet ends are securely fastened to said support member, the whole remaining portion of the abrasive sheet, i.e. a major portion of the length thereof, is not retained by the support member in any way, whereby it is loose relative to said support member and forms a sag relative to it. As it is apparent, in these conditions the honing operations cannot take place correctly.

According to this invention the abrasive material sheet is no longer fastened by means of said locking hooks or springs, but by means of said resilient bi-adhesive material layer, with the double advantage of enabling the abrasive sheet to be fastened onto the support member over the whole length thereof, and of using shorter abrasive material sheets in that it is no longer necessary to use sheets long enough to partially surround the support member thereof in order to be hooked by said springs. As it is apparent, besides an improvement in the honing operations performance, this provides as well remarkable savings concerning the material used.

As in the case of the backing plate, also the abrasive sheet of an orbital honing machine may be sold with the layer of resilient material already lined on the rear face thereof, so that afterwards it can be fastened onto the machine tool support member having previously peeled off the protecting silicon paper sheet.

From what has been described above, the advantages achievable through this invention should be apparent, and they may be summarized in a high performance flexibility, both concerning the use of resilient material layer 50 and concerning the interchangeability of the tool shank.

It should eventually be apparent that variations and/or modifications may be made to the tool for honing or the like according to this invention, without exceeding the scope of protection of said invention.

Claims

1. A tool for honing or the like including a support body having an abrasive material sheet fastened thereto and provided, on the rear side thereof, with means for locking it on a driving apparatus, characterized in that abrasive sheet (46) is lined onto the support body (10) after having interposed a resilient material layer (50) therebetween.

2. The tool of Claim 1, characterized in that the material comprising the resilient layer(50) is a substanttially spongy material.

3. The tool of Claim 1, characterized in that the material comprising resilient layer (50) is a semihardened polyurethane.

4. The tool of Claim 1, characterized in that the layer of resilient material (50) is fastened by glueing to support body (10), and to an intermediate member(48) of a "Velcro" type fastening means onto which abrasive sheet (46)is subsequently lined.

5. The tool of Claim 1, characterized in that the layer of resilient material (50) is adhesive on both surfaces thereof, one of the surfaces being fastened to support body (10)of the tool, while the other is fastened to an intermediate member(48) of a "Velcro" type fastening means onto which abrasive sheet (46) is subsequently fastened.

6. The tool of Claim 1, characterized in that the locking means thereof to the driving apparatus adapted to subject said tool to a rotary motion, are interchangeable.

7. The tool of Claim 6, characterized in that the means for locking the tool on the operating apparatus comprise a shank(22)having a threaded portion(24) adapted to be threaded into a bushing(16) embedded into the tool body, and an unthreaded portion (26) adapted to be tightened into the locking chuck of an electric drill.

8. The tool of Claim 6, characterized in that the means for locking the tool on the operating apparatus include a shank (36) having a first threaded portion (38) adapted to be threaded into a bushing (16) embedded into the body of the tool, and a second threaded portion (40) adapted to be threaded into a suitable seat of head(42) of the operating apparatus.

9. The tool of Claim 6, characterized in that in bushing (16) there is directly screwed a threaded portion(34) of the end of a shank(32) of the operating apparatus.

10. The tool of Claim 6, characterized in that the means for locking the tool to the operating apparatus comprise a shank (54) which can be inserted from the tool front face through a central longitudinal passage (52) therefore, having a head (56) adapted to be received into a suitable seat within the passage (52), while the shaft of shank (54) projects from behind the tool, and on a threaded portion thereof there is screwed a locking nut (58) adapted to retain shank(54)on the tool.

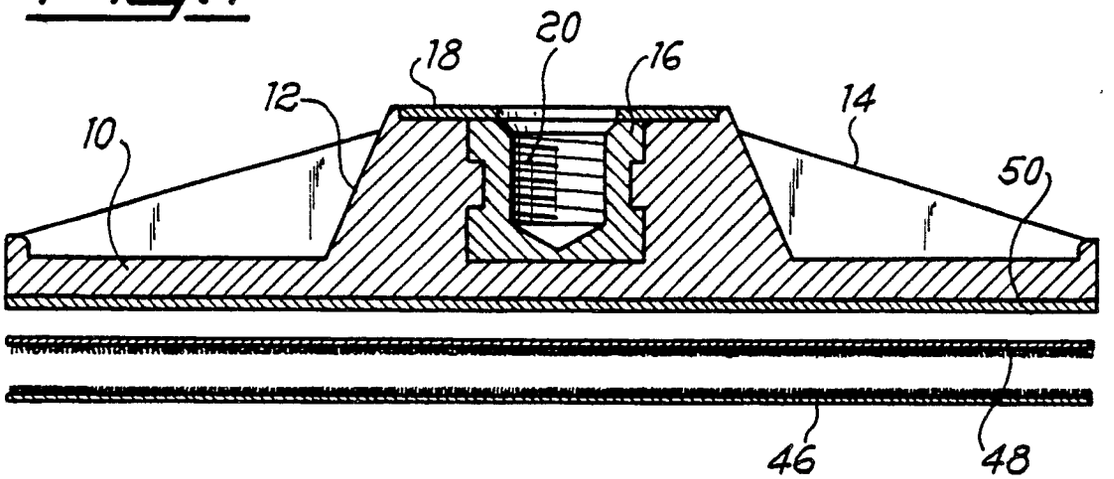
11. The tool of Claim 10, characterized in that shank portion (54) projecting from the back of the tool is unthreaded.

12. The tool of Claim 10, characterized in that shank portion (54) projecting from the back of the tool is threaded.

13. The tool of Claim 1, characterized in that it is made of rubber and it has radially directed ribs (14) on the rear face thereof.

14. The tool of Claim 13, characterized in that radially directed ribs (14) have a height tapering down from the tool center towards the outer edge thereof.

Fig.1



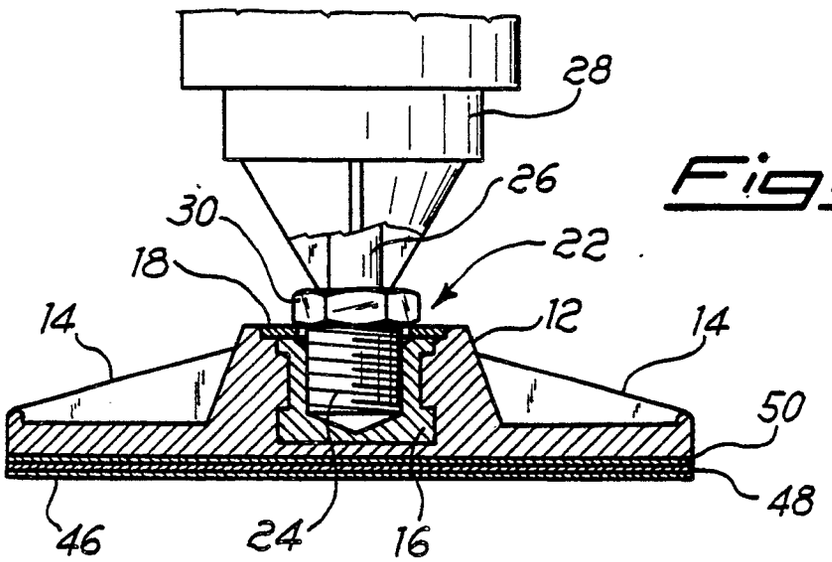


Fig.2

Fig.3

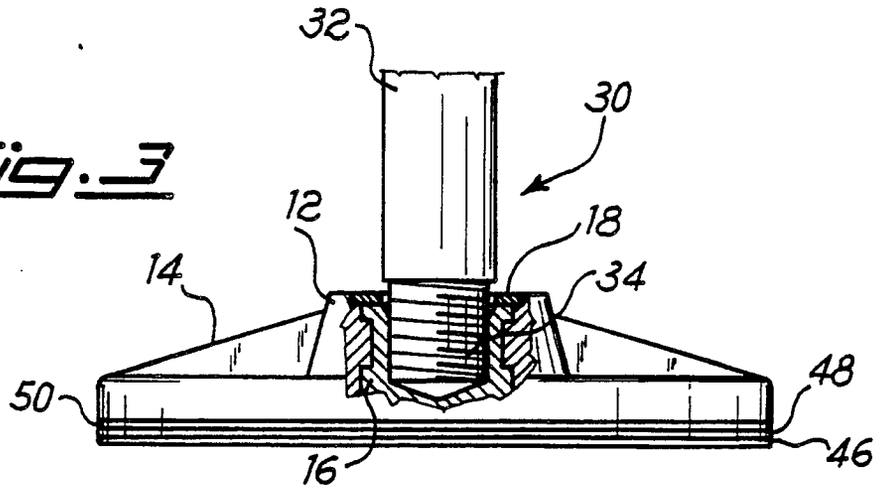


Fig.4

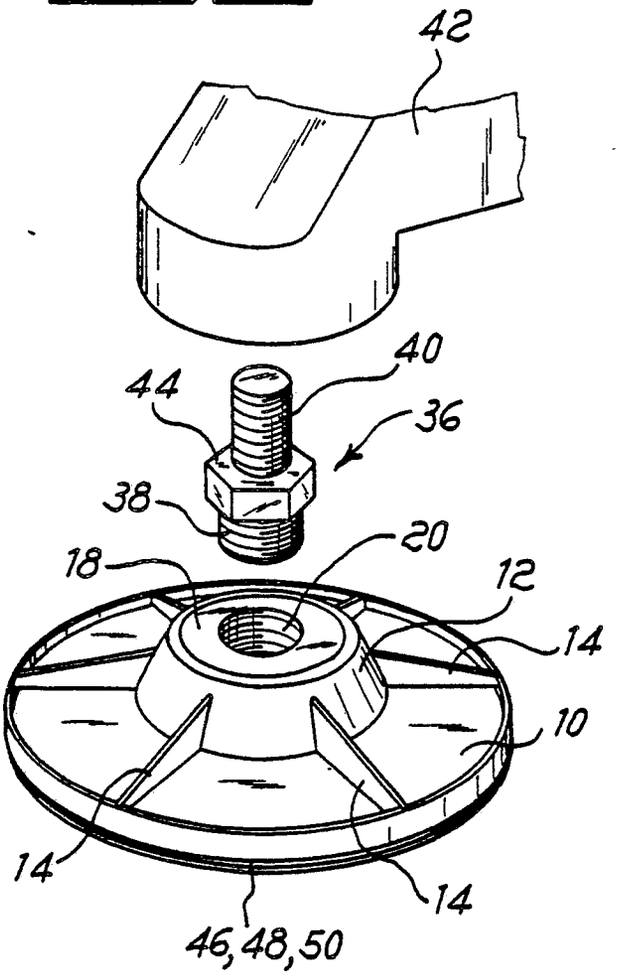


Fig.5

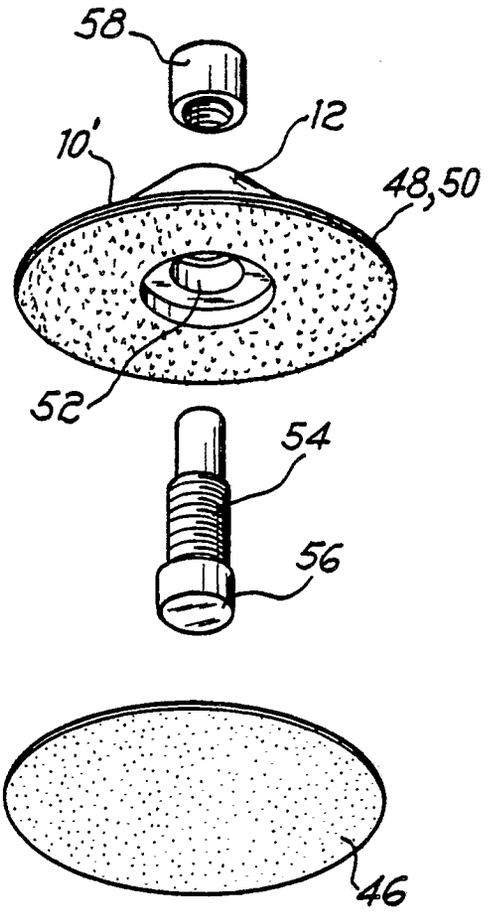


Fig.6