Aug. 30, 1932. P. D. BATES ET AL 1,874,855

ABRASIVE MOUNTING FOR GRINDING DEVICES

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Fig. 1.

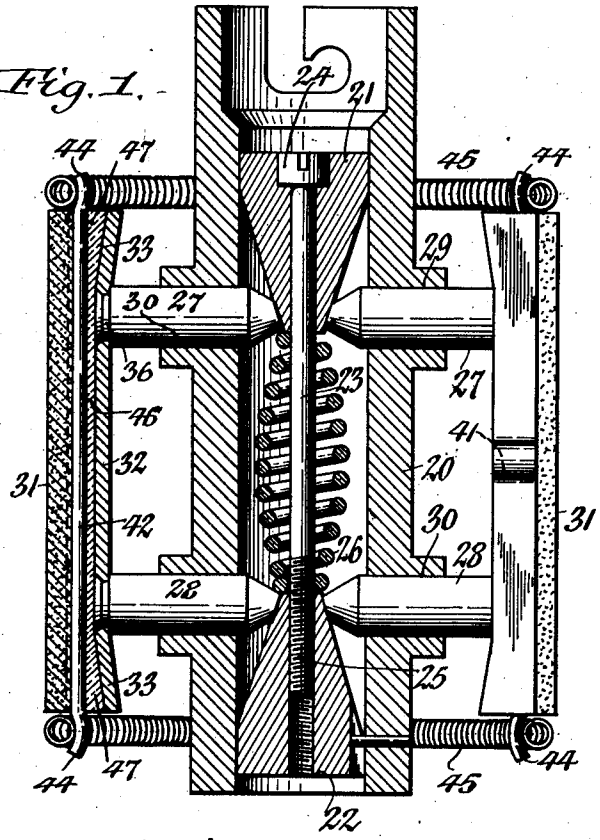


Fig. 2.

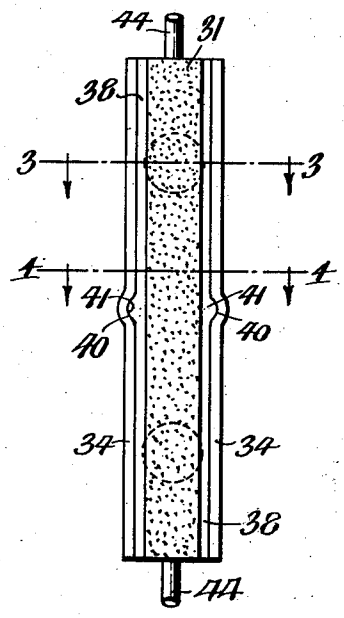


Fig. 6.

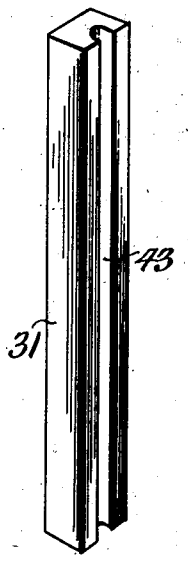


Fig. 7.

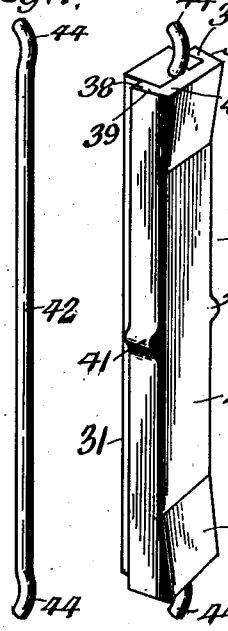


Fig. 3.

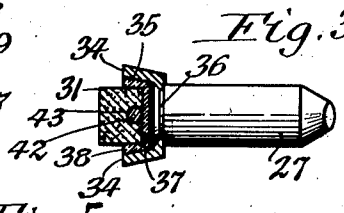
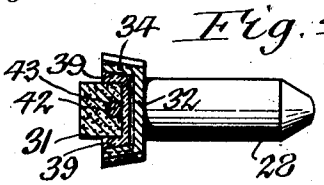


Fig. 5.

Fig. 4.



Inventors

Philo D. Bates
Marsden Buckley Hutto

By Popp & Powers

Attorneys

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Fig. 8.

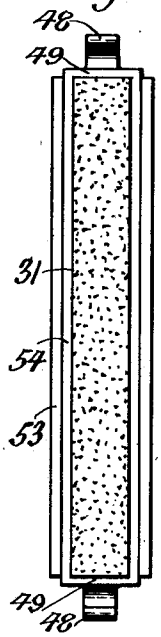


Fig. 9.

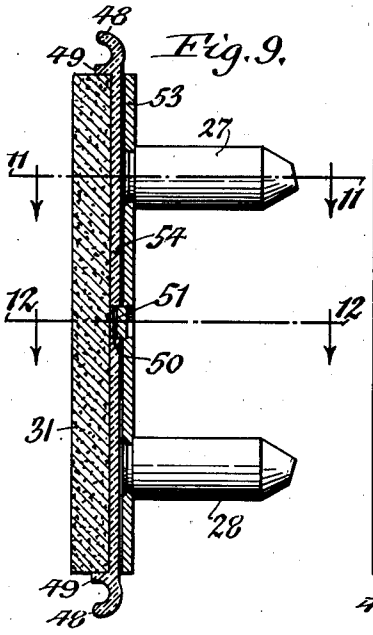
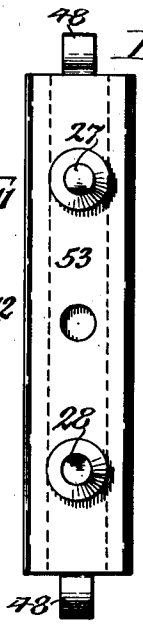


Fig. 10.



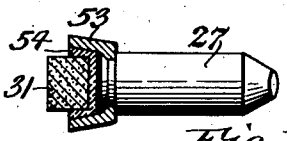


Fig. 11.

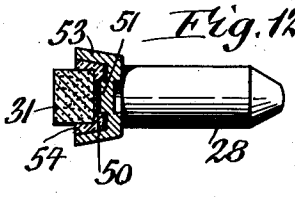


Fig. 12.

Fig. 13.

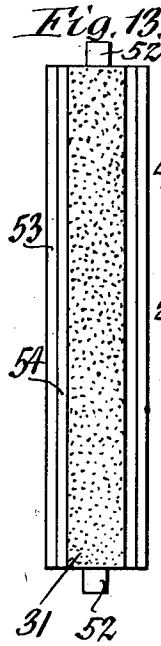


Fig. 14.

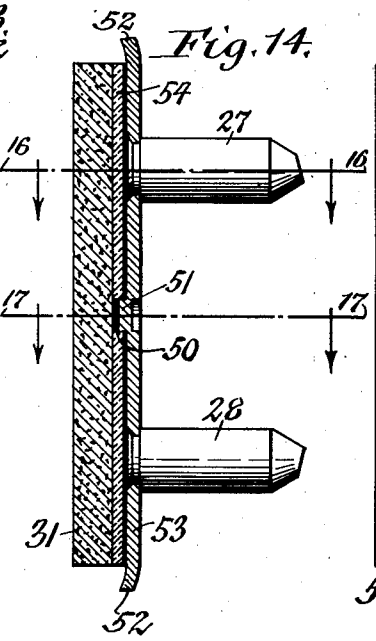
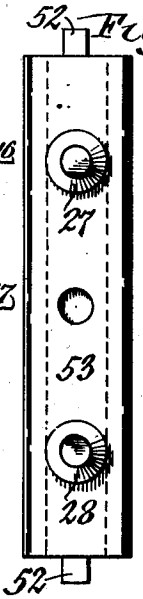


Fig. 15.



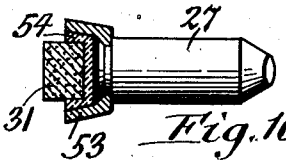


Fig. 16.

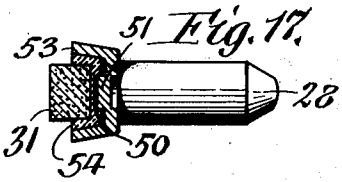


Fig. 17.

Inventors

Philo D. Bates

Marsden Cleckley Hutto

By Potter Powers

Attorneys

Patented Aug. 30, 1932 1,874,855

UNITED STATES PATENT OFFICE

PHILO D. BATES AND MARSDEN CLECKLEY HUTTO, OF DETROIT, MICHIGAN, ASSIGNORS TO HUTTO ENGINEERING COMPANY, INC., OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN

ABRASIVE MOUNTING FOR GRINDING DEVICES

Application filed June 19, 1928. Serial No. 286,580.

This invention relates to an abrasive mounting for use in grinding machines which are more particularly intended for grinding cylindrical surfaces such for example as the grinding device shown in U. S. patent application Ser. No. 180,159 filed Apr. 1st, 1927.

In servicing grinding devices of the character heretofore in use it has been customary for the manufacturer, dealer or distributor to carry in stock stones and abrasive members of various sizes, and of different grinding capacity suited for different kinds of work, which stones or abrasive members were rigidly and permanently mounted in metal holders which were so constructed that they cooperated with the adjusting and tensioning mechanism of the grinding tool of which they formed a part when completely assembled, so as to enable the user of this tool to replace worn stones or abrasive members with new or unworn stones, the frequency of such renewal depending upon the amount of use to which the tool is put.

This manner of mounting the abrasive members or stones on holders is objectionable, inasmuch as it requires the manufacturer, dealer or distributor to not only keep on hand a large variety of stones of different sizes and different grades of grit of which the stones are formed, but it also requires tying up an unnecessarily large amount of capital in holders to suit the various sizes and grades of abrasive stones or members which were permanently associated with such stones.

Moreover when effecting renewals of the stones which become worn to such an extent that replacement is necessary the holders containing these stones had to be removed from the tool and then replaced by other holders having new stones, and the worn stones were melted out of the holders and then replaced by new stones. In such a procedure the new holders would not always fit with absolute nicety in the tool from which the old holders were removed, and if the stones were melted out of the holders and replaced by new ones a loss of time in dismembering and assembling the tool occurred which materially cut down the work which otherwise could be obtained from the same.

It is the object of the present invention to provide a mounting for the abrasive members or stones of grinding devices which will avoid the necessity of removing the holders from the tool whenever the abrasive members become worn to such an extent that replacement of the same is required, and also to avoid the necessity of the manufacturer, dealer or distributor keeping in stock holders equipped with various sizes and grade of abrasive members or stones, and thereby reduce the investment in dead stock which otherwise would have to be carried, in order to meet the varying demands of the trade.

To that end this invention consists generally in mounting an abrasive member or grinding stone in a base which is preferably cast upon this member or stone so as to practically form an integral part thereof, which base is adapted to be removably seated on a holder or carrier of the tool in such manner that this holder or carrer can become a permanent part of the tool and does not necessarily have to be removed from the tool when replacement of the stone or abrasive member becomes necessary.

In the accompanying drawings:

Figure 1 is a longitudinal section of a suitable form of grinding device equipped with one form of mounting for abrasive members or stones embodying this invention.

Figure 2 is a front view of one of the abrasive members or stones mounted on a base and holder in accordance with this improvement.

Figures 3 and 4 are cross sections taken on the correspondingly numbered lines in Fig. 2.

Figure 5 is a perspective view of an

abrasive member mounted on a base and associated with a retaining rod forming part of the means whereby the stone is yieldingly held in its innermost position on the tool.

Figure 6 is a perspective view of the stone detached from the base.

Figure 7 is a similar view of the retaining rod.

Figure 8 is a face view of a stone or abrasive member mounted on the base and holder in accordance with my invention, but in a manner slightly different from that disclosed in Figs. 1–7.

Figure 9 is a longitudinal section of the abrasive mounting shown in Fig. 8.

Figure 10 is a rear elevation of the abrasive mounting shown in Figs. 8 and 9.

Figures 11 and 12 are cross sections taken on the correspondingly numbered lines in Fig. 9.

Figure 13 is a face view showing another form of my invention for mounting an abrasive member or stone on a carrier or holder.

Figure 14 is a longitudinal section of the construction shown in Fig. 13.

Figure 15 is a rear elevation of the constructions shown in Figs. 13 and 14.

Figures 16 and 17 are cross sections taken on the correspondingly numbered lines in Fig. 14.

In the following description, similar characters of reference indicate like parts in the several figures of the drawings.

Although this mounting for abrasive members or grinding stones may be used in connection with grinding tools or devices which vary as to details of construction, the same is shown in the present case in connection with a grinding tool or device which is constructed as follows:

The numeral 20 represents the central supporting member or body of the tool which is preferably of tubular form and adapted to be connected at its upper end in any approved manner with a driving device whereby a rotary and also a reciprocating motion may be imparted to this body.

Slidable lengthwise within this body are two opposed adjusting cones 21, 22 which are adjustably connected by means of a screw 23 engaging its head 24 with the outer end of the upper cone 21, while its threaded lower end 25 engages with an internal screw threaded opening in the lower cone 22. These cones are yieldingly held apart by means of a spring 26 surrounding the adjusting screw 23 and bearing at its opposite ends against the inner opposed small ends of the cones, as shown in Fig. 1. These cones and the connection between the same form a floating unitary adjusting device whereby the diameter of the working surface of the tool can be adjusted and whereby the grinding stones are rigidly held in their outermost or projected position and prevented from contracting while in operation, although the stones are free to tilt and automatically adjust themselves to any irregularities in the cylinder surface which is being ground.

The means whereby the abrasive members or grinding stones are adjustably mounted on the supporting head 20 so as to be capable of radial movement thereon, comprise a plurality of pairs of transverse or radial guide pins 27, 28, the members of each pair being arranged lengthwise in line and sliding in guideways or openings 29, 30 in the upper and lower parts of the body and engaging their inner ends with the tapering surfaces of the upper and lower cones 21 and 22, as shown in Fig. 1. Upon the outer ends of each pair of guide pins 27, 28 is mounted a carrier or holder upon which an abrasive member or grinding stone is supported in accordance with this invention.

Although this abrasive member or grinding stone may be variously constructed, the same as shown at 31, has generally the form of a longitudinal bar or stick which is substantially of rectangular form in cross section and made of carborundum or any other suitable grit or composition which has the required grinding, polishing or abrading capacity.

In the preferred form of the holder the same is generally of U-shaped form in cross section so as to provide a longitudinal channel on its front side. The bottom of this holder has a shallow, central or intermediate part 32 and comparatively deep parts 33 at opposite ends thereof, and its two longitudinal side walls 34 are provided with inclined surfaces 35 which converge rearwardly.

The outer ends of a pair of guide pins 27, 28 are secured to the bottom of one of the holders adjacent to opposite ends thereof by passing the reduced outer ends 36 of these pins through openings in this bottom and riveting the outer extremities of these pins over the inner side of this bottom, as shown in Figs. 1 and 3.

When thus assembled the guide pins 27, 28 of each holder are arranged at right angles to the length of the channel shaped holder and in order to properly assemble these pins with this holder in the manner shown so that the holder and pins will occupy a correct technical position with reference to the upper and lower cones of the adjusting unit with which these pins engage, it is preferable to utilize the longitudinal front edges of the holder walls 34 as gage surfaces relative to which the guide pins 27, 28 are arranged at right angles in the completed form of the holder unit.

In order to removably support the abrasive member or grinding stone in this holder in accordance with this invention, a base of babbitt, solder, lead or other rapidly self-

hardening material is cast upon the rear part of the stone so as to practically form an integral part thereof, and this base is adapted to fit the holder which is intended to remain permanently assembled with the body of the grinding device or tool. In the preferred construction the rear part of the abrasive member or stone is embedded in the base so that the latter has substantially the form of a longitudinal channel, the bottom 37 of which bears against the rear seat of the abrasive stone or member and the side walls 38 of which engage against the opposite lateral longitudinal sides of the stone. The outer surfaces 39 of the base walls are preferably inclined or tapered and converge rearwardly and are adapted to engage with the inclined inner sides 35 of the channel walls 34, as shown in Figs. 3, 4, and 5.

This base is cast upon the rear part of the stone or abrasive member so that when the material of which the base is made is hardened, the same and the stone embedded therein will be rigidly and firmly connected and practically form an integral structure which is incapable of separation in ordinary use. This stone and the base are preferably assembled in this manner by placing the stone in a mold having a cavity in which the rear part of the stone is exposed and then pouring the babbitt, solder, lead or other quick self-hardening material into the mold cavity so as to form the base therein in which the rear side of the stone is embedded.

Upon inserting a stone thus mounted on a base into the channel of a holder, the inclined or tapering sides of the base will engage with the correspondingly shaped inner sides of the channel walls with a wedging effect, whereby the stone will be tightened in said holder and centered relatively thereto so that the stone, base and holder form substantially a unitary rigid structure the several parts of which are reliably held against displacement relative to each other, in a lateral direction.

For the purpose of also preventing the stone and its base from moving lengthwise in the holder, locking means are provided which in the present instance consist of recesses 40 arranged on the central parts of the inner sides of the holder walls 34, and lugs or projections 41 arranged on the outer sides of the flanges of the base and engaging with said recesses, as shown in Figs. 1, 2, 4 and 5, thereby producing an interlocking effect between this base and the holder which positively prevents movement of these parts relatively to one another, lengthwise of the same.

Means are provided for retaining the abrasive member and its base in the companion holder which in the present case are preferably so organized that they also operate to press the holder inwardly and maintain the guide pins thereof in engagement with the adjusting cones 21 and 22.

As shown in Figs. 1–7 these means comprise a retaining rod 42 arranged lengthwise in a groove 43 on the rear side of the abrasive member or stone and secured therein by the bottom portion of the self-hardening fluid which forms the base, this being accomplished by placing this rod in the mold and pouring the molten fluid which forms the base into the mold cavity so as to embed the retaining rod in the fluid of this base, at the same time that this base is formed on the stone. The extremities of this retaining rod 42 project beyond opposite ends of the stone and the base and are preferably bent into the form of curved hooks 44 which receive resilient means whereby the stone and its base and holder are drawn inwardly toward the bottom of the tool.

In its preferred form these resilient means consist of two garter springs 45 which consist of coiled springs of annular form surrounding the body at opposite ends thereof and each of these springs engaging the corresponding ends 44 of the retaining rods 42 of the set of stone mountings associated with the tool around the body thereof. Upon tightening the adjusting screw 23 so that the cones 21 and 22 are drawn together the guide pins 27 and 28 of the several holders or carriers will be moved outwardly and upon loosening this screw so that the cones can be spread apart by the spring 26, the contracting springs 45 will draw the several stone mountings inwardly and reduce the diameter of the tool. By this means the diameter of the tool can be increased or decreased as desired, and the holders or carriers can be positioned as required for adapting them to a particular piece of work and also for readjusting the parts when replacing worn stones by new ones.

In order to effect replacement of worn stones it is only necessary to detach the springs 45 from the ends 44 of the retaining rods 42, thereby releasing the stones and their bases and permitting them to be easily removed from the channels of the holders. Thereafter new stones may be mounted by engaging the bases thereof with the channels of the holders and then restoring the retracting springs 45 into engagement with the hook 44. It will therefore be apparent that such replacement of the stones can be effected without detaching the holders or carriers from the body and that the same set of carriers or holders may therefore be used continuously with the same body, so that the same will always engage each other with the proper fit, thereby avoiding any refitting of the parts and possible inaccuracies in the working of the same in case different holders were to be used with the same body.

Obviously, therefore, extreme accuracy in

the manufacture of this tool is not absolutely necessary in order to secure proper mounting of the stone holder on the body, inasmuch as the holders when once fitted into the body will be permanently associated therewith and not subject to interchange with other parts as a general practice.

The cost of the tool as well as its maintenance can therefore be materially reduced and in addition thereto the liability of loss of the holder and consequent waste of material such as may occur when the holder and the stone permanently mounted thereon is removed from the body. In the present case removal of the stones of a grinding tool can be quickly and conveniently accomplished by simply taking out the supporting bases of the stones which are worn and replacing them with bases having new stones, without involving any substantial interruption in the use of the tool.

After the stone supporting bases are removed from the holder the small amount of metal or other self-hardening fluid can be readily recovered by melting the same off from the stones, leaving the metal in a condition for re-use if this is desired.

By making the opposite ends of the channel in the holder somewhat deeper than the intermediate part thereof, the central part 46 of the bottom portion of the base will be comparatively thin while the end portions 47 thereof will be comparatively thick, as shown in Fig. 1, thereby reinforcing the end portions of the respective stone and supporting the same more reliably and enabling the end portions thereof to stand greater strains while in use, without liability of the same breaking off or becoming chipped or cracked.

Instead of providing the base and stone of each unit with a retaining rod forming part of the means whereby the stone and its base are retained in the holder, the same effect can be produced by extending the opposite ends of the base beyond the ends of the stone so as to form hooks 48, as shown in Figs. 8, 9 and 10, which hooks are adapted to receive the garter springs 45 in substantially the same manner in which this is done in the construction shown in Figs. 1–7 for holding the stone and base in the holder and retaining the guide pins 27, 28 in engagement with the cones. In this modified form of stone mounting the stone is also held against longitudinal movement relative to the base by providing the latter adjacent to its opposite ends with lugs 49 which project forwardly and engage with opposite ends of the stone, as best shown in Fig. 9.

Longitudinal displacement of the base on the holder in this particular organization is prevented by providing the central part of the rear side of the base bottom with a recess 50 and providing the corresponding part of the bottom of the holder with a forwardly extending projection 51 which engages with the recess 50, as shown in Figs. 9 and 12.

If desired, the abrasive member or stone may be held in its assembled position on the base solely by the interlocking effect of the base with the roughened surface of the stone, due to the granular character of the latter, as shown in Figs. 13–17. In this last-mentioned construction the opposite ends of the holder are provided with lugs 52 which are adapted to receive the contracting spring 45 for drawing the holder or carrier inwardly together with the stone and base mounted in the channel thereof. When the spring 45 engages with the holder in the manner described with reference to Figs. 13, 14 and 15 the base of the abrasive member or stone is retained within the channel of the holder solely by the wedging or clamping effect produced by cooperation of the inclined wedge surfaces of the base and holder, as shown in Figs. 16 and 17.

When the tool is intended for work which will not place an undue strain upon the abrasive member and its base, the channel in the holder 53 may be made straight throughout its length and the base 54 may be of correspondingly straight formation, as shown in Figs. 9 and 14, thereby dispensing with the thickening effect of the base, which is shown at 47 in Figs. 1 and 5.

Each of the several forms of my invention can be produced expeditiously and economically and permits of furnishing replacements of abrasive members for use in grinding tools or devices at very low cost and without waste of material which would be occasioned by discarding holders as would be liable to occur in the method of mounting stones or abrasive members which are rigidly mounted in the holder.

We claim as our invention:—

1. An abrasive member provided on its rear side with a longitudinal groove, a retaining rod arranged in said groove and having its end projecting beyond the same, and a base of self-hardening material cast on the rear part of the abrasive member and securing said rod in said groove.

2. An abrasive member, a base of self-hardening material cast onto the rear part of said abrasive member and having thick end portions and a thin intermediate part, and a holder which has a channel adapted to receive said base and which has a shallow intermediate part and relatively deep end portions conforming to the thin intermediate and thick end parts of said base.

3. An abrasive member, a base of self-hardening material which is cast onto the abrasive member, and a holder which receives said base; said base being provided on the central part of its underside with a recess, and said holder being provided on the central part of its bottom with a projection engaging with said recess.

4. An abrasive member having a front face adapted to engage the surface to be ground, a base of self-hardening material of channel form in cross section cast upon said abrasive member and embedding the rear part of the latter and the lateral sides of said base being inclined and converging rearwardly, a holder having a channel which receives said base and from which said base and member are freely removable and the sides of which are inclined and converge rearwardly and are adapted to be engaged by the inclined sides of said base, and means for normally maintaining said base and member in said holder.

PHILO D. BATES.
MARSDEN CLECKLEY HUTTO.