Dec. 3, 1935. J. L. BALLASH ET AL 2,023,041

ABRASIVE DEVICE

Filed April 16, 1935

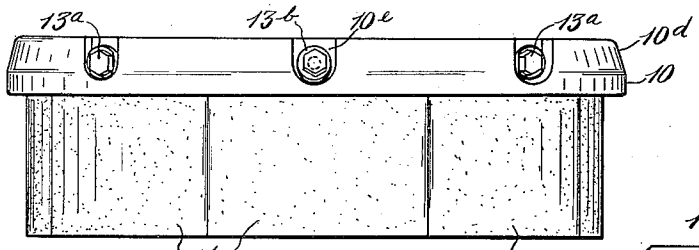


FIG. 1

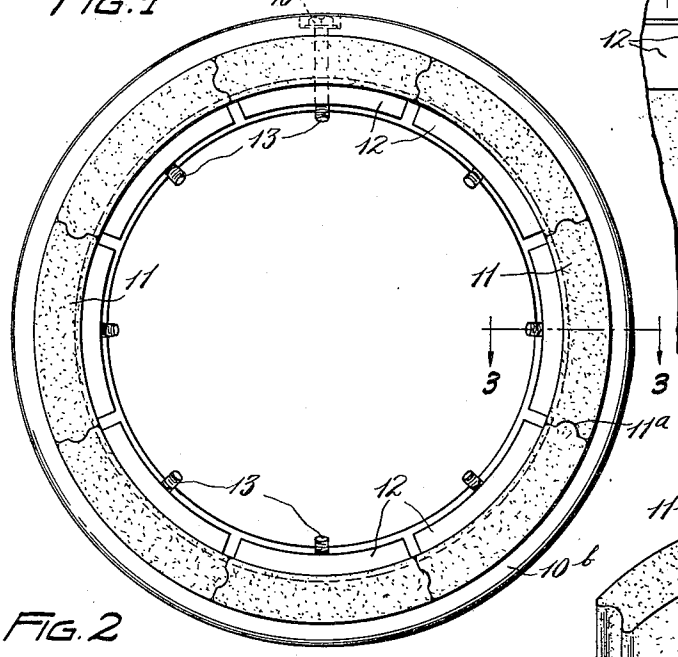


FIG. 2

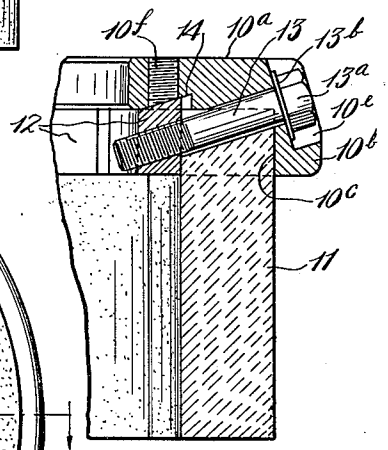


FIG. 3

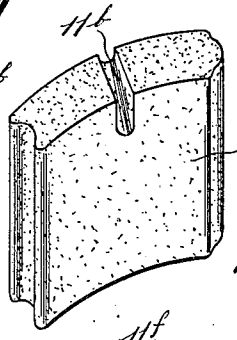


FIG. 4

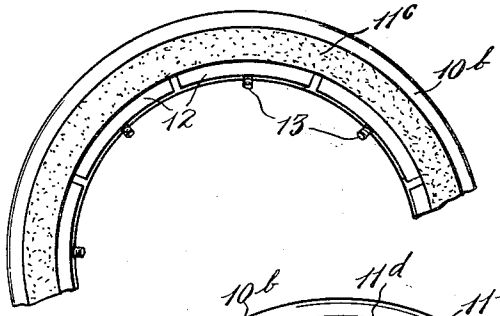


FIG. 5

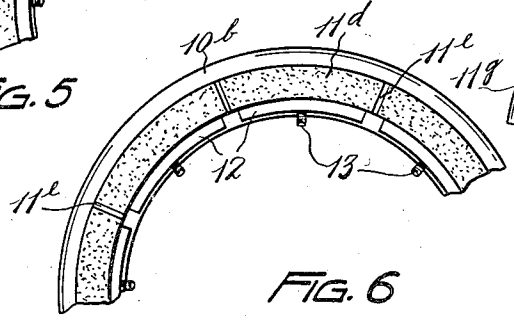


FIG. 6

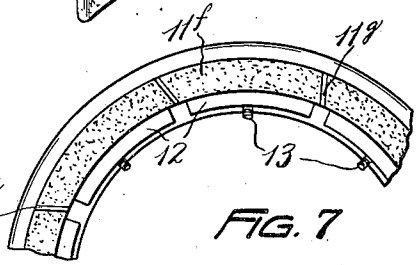


FIG. 7

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ABRASIVE DEVICE

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Application April 16, 1935, Serial No. 16,637

9 Claims. (Cl. 51—209)

This invention relates to an abrasive device and particularly to improved means for securing the abrasive member or members in a chuck or other holder.

In another aspect, the invention relates to the abrasive member per se which has a novel construction to permit the use and function of the holding or securing means for the abrasive member.

The principal object of the present invention is to provide an abrasive device which in general is less expensive than prior devices of this kind and more practical and satisfactory in operation.

More particularly it is the aim of the invention to provide an abrasive device, including a chuck and the abrasive member or members such as segments arranged end to end, which can be readily mounted on the rotary member of a grinding machine, wherein the removal and replacement of the abrasive members or segments can be quickly accomplished, wherein the abrasive members are so held in place that they will not accidentally come loose, wherein the chuck or holder is lighter in weight than heretofore, and wherein the chuck has a relatively small overhang or lateral projection beyond the outer face or surface of the abrasive members.

Still further the invention aims to provide a holding means such that a greater percentage of the abrasive member can be used than heretofore.

The invention may be here briefly summarized as consisting in certain novel combinations and arrangements of parts which will be described in the specification and set forth in the appended claims.

In the accompanying sheet of drawings.

Fig. 1 is a side view of my improved grinding device;

Fig. 2 is a bottom view of the same;

Fig. 3 is an enlarged sectional view substantially along the line 3—3 of Fig. 2;

Fig. 4 is a perspective view of one of the segments removed from the chuck; and

Figs. 5, 6, and 7 are fragmentary views of the device as viewed in Fig. 2, showing different forms of abrasive members which may be employed to advantage.

Referring now to the drawing, the abrasive device includes a holder which in this instance (though not necessarily) is in the form of an annular chuck 10 having an inwardly extending body portion 10*a* and a lateral segment-holding wall 10*b*. The wall 10*b* is in the form of a flange which in this instance extends downwardly from the body portion 10*a* and has an inner clamping face 10*c* which is at right angles to the inner or under face of the body 10*a*. Generally an abrasive device of this character is rotated about a vertical axis, and, in Figs. 1 and 2, it is shown in the position it occupies when so mounted, but it will be understood, of course, that it may be mounted to rotate about an axis which extends in some other direction. The chuck may be secured to the rotary element of the grinding machine in any suitable manner, but generally it is bolted thereto, in which case the chuck will be provided with a suitable number of circumferentially spaced tapped bolt openings one of which is shown at 10*f* in Fig. 3.

The abrasive member is in this instance annular or cylindrical in form and is generally composed of segments 11 the vertical edges of which may be interlocked as shown at 11*a* in Fig. 2, although, as will be pointed out subsequently, this is not an essential feature. The abrasive member or the segments composing it are fitted into and initially held in the holder in the manner clearly shown in Fig. 3, with the upper edges of the segments engaging the under face of the body 10*a* of the chuck and with a portion of the outer cylindrically curved surfaces of the segments engaging the clamping face 10*c* of the lateral wall or flange 10*b* of the chuck. They are held in this position by a segmental clamp 12 which engages a portion of the inner cylindrical surfaces of the segments 11 and by clamping bolts 13 the arrangement of which will be described below.

By reference to Fig. 3 it is to be noted that the upper edges of the clamping segments 12 are on a taper and that they engage a similarly tapered or inclined surface 14 formed on the under side of the chuck body 10*a*. Likewise, it will be observed that the bolts 13 are diagonally arranged with respect to the chuck, clamping segments 12, and abrasive segments 11, these bolts having the same angle of inclination as the angle of the engaging tapered or inclined faces 14 of the clamp segments and chuck body 10*a*. This will be obvious from an inspection of Fig. 3. Likewise it will be observed that the outer annular face of the chuck, as viewed in Fig. 1, has an upper portion which is beveled inwardly as shown at 10*d*, and that the outer upper portion of the chuck has formed in it, largely in the beveled portion 10*d*, upwardly facing U-shaped notches 10*e* the inner faces of which are flat and are at right angles to the axis of the clamping bolts 13. From this same figure it will be seen that the clamping bolts 13 have their heads 13*a* seated in these

notches 10e with washers 13b between the bolt heads and the flat inner faces or bases of the notches, and that the shanks of the bolts extend through openings formed in the bases of these notches and through the clamping segments 12 in which they have threaded engagement.

To provide clearance in the abrasive segments for the clamping bolts 13, each of the segments is provided at its upper or clamping end with an open transverse slot extending from one side of the segment to the other and of increasing depth from the outer to the inner surface of the segment, the bottom of the slot being inclined downwardly and inwardly at an angle corresponding to the angle of inclination of the bolt and of the engaging tapered faces of the clamp segments and the under side of the chuck body. This angle can be varied as found desirable, but we find that an angle of about 17° gives excellent results.

In practice, when a segmental abrasive member is employed, there will generally be one clamping segment for each abrasive segment and one clamping bolt for each pair of abrasive and clamping segments, in which event the clamping bolt for each clamping segment will engage the segment midway between its ends and the open slot 11b in each abrasive segment will be midway between the upright edges. However, we do not regard this arrangement as being vital to the invention for, in some instances, the abrasive member may be in one solid piece, as will be subsequently pointed out, but even when the segmental abrasive member is employed we do not regard it essential that there be the same number of abrasive segments as clamping segments, although that arrangement is preferred. If the abrasive member is in one piece instead of segmental, or if the segments are of considerable length circumferentially considered, a plurality of bolts 13 will pass through it, in which event it will obviously have a plurality of the tapered transverse slots 11b, i. e., one for each bolt.

When the abrasive member is placed in the chuck or holder, as shown, and when the clamping bolts 13 are tightened, the action of the inclined bolts and of the inclined engaging faces of the clamps with the under side of the chuck body is to cause the clamps to be moved not only outwardly but also upwardly along the tapered surfaces 14, with the result that the clamps not only clamp the segments against the inner surface 10c of the flange 10b of the chuck but the clamping force or pressure transmitted from the clamps to the segments has an upward component the effect of which is to securely hold the segments in position and prevent their dropping out or becoming loose.

A very important advantage of this construction resides in the fact that a deep clamping surface on the chuck and clamps is not necessary, with the result that all but a small portion of the segments can be used for grinding purposes, in fact we find in practice that after a substantial portion of the segments has been worn away by the abrasive action so that the working faces or edges of the segments approach the chuck, the clamping bolts can be loosened slightly and the segments lowered so that finally the actual amount of the segments which extends into the segment receiving channel of the chuck or holding means, and therefore the portion which cannot be used, is very small indeed. This downward adjustment of the segments in the manner just explained is made possible by reason of the fact that neither side of the holding portions of the segments is beveled, but, on the other hand, the inner and outer surfaces which engage the chuck flange and clamps, respectively, are a uniform distance apart.

We have previously mentioned that the abrasive member may be in one piece instead of segmental. This we have illustrated at 11c in Fig. 5. We have also mentioned the fact that the upright adjacent edges of the segments need not be interlocked. If the upright edges engage, the engaging edges may be flat. Furthermore, it is not necessary that the edges engage each other. The gaps between the segments may be radial, as shown in Fig. 6, where the segments are designated 11d and the radial gaps between them 11e, or they may be other than radial or somewhat tangential, as shown in Fig. 7, where the segments are designated 11f and the non-radial gaps between them are designated 11g. In the two latter cases where the segments are spaced apart, the clamping bolts and the tapered slots in the segments locate or position the segments so as to maintain them a substantially uniform distance apart and thus keep the wheel in balance.

We might state also that while at the present time we believe our invention has its principal utility in connection with an annular chuck or holder employing an annular solid or segmental abrasive member, the invention or certain phases of it may have utility in a non-circular holder with a correspondingly shaped abrasive member.

It will be seen without further detailed explanation that all the objects and advantages set forth in the early part of the specification are attained by an abrasive device embodying the present invention. Likewise, it will be apparent that the invention is susceptible of various modifications, and we therefore do not wish to be confined to the precise details or embodiments shown, but aim in our claims to cover all modifications and changes which do not involve a departure from the spirit and scope of the invention.

Having thus described our invention, we claim:

1. An abrasive device comprising a holding member and an abrasive member, the holding member having a base and a fixed wall adapted to be engaged respectively by the inner edge and one side of the abrasive member, a clamp engaging the other side of said abrasive member, and a clamping bolt extending between the clamp and the holding member and arranged diagonally with respect to the clamping walls so that the pressure exerted on the abrasive member by the clamp will have a component inwardly toward the base of the holding member, the portion of the abrasive member which is adapted to be engaged by the fixed wall and the clamp being of uniform thickness whereby the abrasive member is adjustable between the fixed wall and the clamp in a direction away from the base.

2. An abrasive device comprising a chuck having a base and a wall fixed relative thereto, a clamp mounted for movement toward said base as well as toward said fixed wall, an abrasive member arranged between said fixed wall and said clamp, and means for drawing said clamp toward the abrasive member and toward the base so that the pressure exerted by the clamp on the abrasive member has a component inwardly toward the base, the portion of the abrasive member which is adapted to be engaged by the fixed wall and the clamp being of uniform thickness and the abrasive member being adjustable be-

tween the fixed wall and the clamp in a direction away from the base.

3. An abrasive device comprising a chuck having a base or body portion and a flange constituting a clamping wall, a clamp spaced from and arranged opposite said clamping wall and mounted for movement diagonally toward the base and toward said clamping wall of the chuck body, an abrasive member between the clamping wall and the clamp, and a diagonally disposed bolt extending between the chuck and the clamp so that the pressure exerted on the abrasive member by the clamp has a component inwardly toward the base of the chuck, the portion of the abrasive member which is received between the flange and the clamp being of uniform thickness and the abrasive member being adjustable between the clamping wall and the clamp in a direction away from the base.

4. An abrasive device comprising a chuck having a base and a lateral wall, a clamp arranged opposite said lateral wall, an abrasive member between the clamp and said wall, said base having an inclined bearing surface for the clamp, and means for drawing the clamp toward the lateral wall and toward the base along said inclined surface.

5. An abrasive device comprising a holder having a base portion and a lateral wall disposed angularly thereto, a clamp, an abrasive member adapted to be received between said lateral wall and said clamp, the base and inner portion of the clamp having engaging inclined surfaces, and means for moving the clamp toward the abrasive device and toward the base in the direction of said inclined surfaces.

6. An abrasive device comprising a holder with a base and a lateral wall, a clamp arranged opposite the lateral wall, there being adapted to be received between the lateral wall and the clamp an abrasive member, the base and clamp having engaging surfaces on a given inclination, and a clamping bolt carried by the holder and engaging the clamp and having the same inclination as said surfaces.

7. An abrasive device comprising a chuck body having a base and an outer clamping wall, an inner clamp movable with respect to said wall, an abrasive member between said wall and clamp, the inner portion of the abrasive member having an open slot, and a diagonally disposed clamping bolt extending between said chuck body and clamp through said slot so that the pressure exerted by the clamp on the abrasive member has a component inwardly toward the base, the portion of the abrasive member between the said wall and the clamp being of uniform thickness and the abrasive member being adjustable between said wall and clamp away from the base.

8. An abrasive member for a segmental grinding wheel having two opposite arcuate side surfaces and an edge portion adapted to be received in a suitable holder, and an open slot extending transversely across said edge portion between said opposite arcuate surfaces.

9. An abrasive member for a segmental grinding wheel having two opposite arcuate side surfaces and an edge portion adapted to be received in a suitable holder and a diagonal slot extending transversely across said edge portion between said opposite arcuate surfaces.

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