July 14, 1942. A. FIELD 2,290,098

ABRASIVE TOOL

Filed July 22, 1940

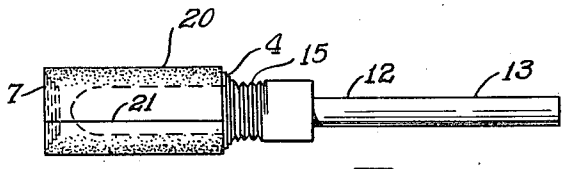


Fig. 1.

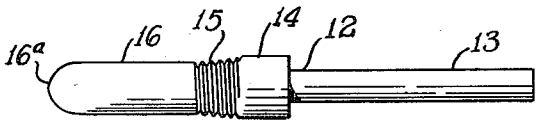


Fig. 2.

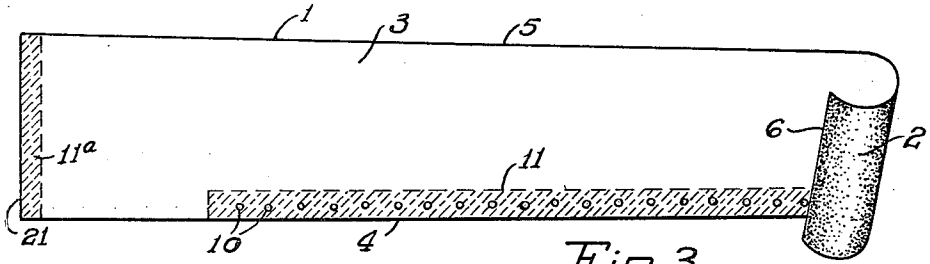


Fig. 3.

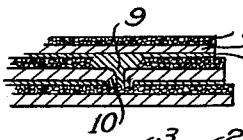


Fig. 4.

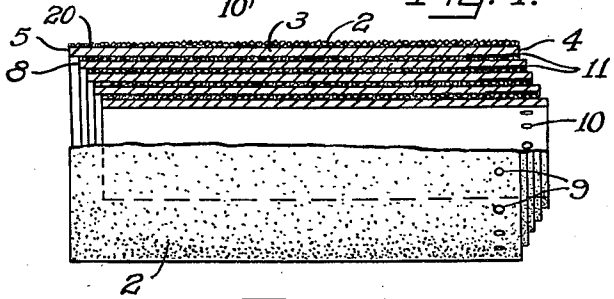


Fig. 5.

INVENTOR
ALBERT FIELD

BY

Robb & Robb
ATTORNEYS.

Patented July 14, 1942 2,290,098

UNITED STATES PATENT OFFICE

2,290,098

ABRASIVE TOOL

Albert Field, Dayton, Ohio

Application July 22, 1940, Serial No. 346,826

3 Claims. (Cl. 51—297)

The present invention relates to abrasive tools employed for polishing or finishing metal, rubber and plastic materials and particularly dental plates and the like, composed of such materials; and an abrasive element for use in connection with such tools, as well as a method and apparatus for making such elements.

It is an object of the present invention to provide an abrasive cone as a part of the tool of the type described, which is adaptable to use with a mandrel for attachment either to a lathe or drill chuck depending upon the desired use to which the device is to be put.

Another object of the invention is to provide an abrasive cone composed of a single rolled strip of flexible abrasive material, provided with a central bore, wherein one end of said cone is comparatively unyielding to provide a firm bearing for attachment to a mandrel or the like, and wherein the opposite or working end of said cone has a certain flexibility or resiliency whereby abrading contact of said working end of the cone with material to be finished thereby will not cause gouging thereof.

Another object of the invention is to provide an abrasive tool of simple construction comprising mandrel and abrasive cone elements in which the cones may be easily and quickly attached to the mandrel for firm inter-locking connection therewith so as to enable quick replacement of the cones as necessary in the use of the tool, and in which the mandrel and cone elements are so formed that their cooperative relation produces an abrasive tool, the working end of which may be firmly, though yieldingly, engaged with articles to be abradingly finished thereby.

In the employment of the invention herein disclosed, the abrasive tool comprises a mandrel having a tapered portion provided with a tapered thread for inter-locking connection with the non-yielding end of the abrasive cone, said mandrel also having a bearing portion so formed as to extend a considerable distance into the abrasive cone to stiffen the same while permitting yieldability of the working end of the cone.

One of the problems involved in providing an abrasive cone having the attributes aforementioned, and composed of a single strip of abrasive material, is that of rolling said material into a tight cone in which the rolled layers of the same are adhesively secured together with sufficient adhesiveness to permanently maintain the strip in such tightly rolled conical condition.

One factor entering into this problem is that the abrasive material, such as emery cloth, of which said cones may conveniently be made, comprises a smooth surface to which glue does not readily adhere, and a rough abrasive surface which does not readily cohesively engage said smooth surface, so that when glue or other adhesive material is applied to the smooth surface of the strip as it is being rolled into the cone, the superimposed layers of the strip are not caused to adhere together with sufficient tightness to positively prevent the cones from becoming unrolled in use.

To overcome this problem the present invention contemplates the novel expedient consisting of so treating one edge of the abrasive strip as to break down a portion of the abrasive surface thereat, while at the same time roughening the inner smooth surface of such strip in the same region.

In accordance with the disclosure herein, the foregoing result may be accomplished by the use of a perforating device which is caused to operate on the abrasive strips by first engaging the rough or abrasive surface of the strips to break down said surface in the region of contact, and then passing through the strip to break outwardly the material thereof from the smooth surface to provide slightly ragged protrusions of said material from said smooth surface.

The method of making the abrasive element contemplates not only the breaking down of portions of the abrasive surface of the strip and the roughening of portions of the non-abrasive surface, but, as well, the application of adhesive to the strip while it is being rolled tightly into its final cylindrical form.

Other objects, advantages and features of novelty of the invention will appear more fully as the description thereof progresses in conjunction with the drawing, in which:

Figure 1 is a view showing the embodiment of my invention with the abrasive cone assembled upon the mandrel.

Figure 2 is a view showing the mandrel alone.

Figure 3 is a view showing the abrasive strip before it is rolled into the cone.

Figure 4 is an enlarged sectional view through a portion of the cone.

Figure 5 is a broken view of a completed cone, partially in section.

Now referring to the drawing for a detailed

description of the invention, the numeral 1 indicates generally a strip of abrasive material such as sandpaper, emery cloth, or the like, emery cloth being preferred for the purposes hereof. The abrasive strip 1 has an abrasive surface 2 provided by the sand, emery, or like abrasive material applied thereto, and its opposite surface 3 is that of the cloth, paper, fabric, or other material composing the body of the strip, constituting a comparatively smooth surface.

It will be noted that the opposing edges 4 and 5 of the abrasive strip 1 are not parallel, the edge 5 being cut at somewhat of an angle to the edge 4 to permit the strip when rolled, starting with the narrow end, as indicated by the curl at 6, to assume a final conical form, such as the cone generally indicated at 20 in Figure 1, in which the overlapped portions of the strip at the working end 7 of the cone are inwardly stepped, as indicated at 8 in Figure 4. This is to enable the cone as it becomes worn in use to continually present a protruding narrow edge at its working end.

The term cone as used herein refers to an abrasive strip rolled to form an abrasive element of the nature disclosed herein. As shown in the drawing it is more or less cylindrical in general configuration and somewhat conical at its ends.

Before the strips 1 are rolled into their final conical formation, indicated in Figure 1, the area adjacent the edge 4 is operated upon to break down the abrasive material at spaced points, such as indicated at 9 in Figure 4, in the length of the strip 1, adjacent the edge 4. At such time, preferably, also the strips 1 are operated upon to roughen the comparatively smooth surface 3 at such spaced points in the length of the strip adjacent the edge 4.

To accomplish the foregoing object, a perforating device of any suitable construction may be caused to act upon the strips 1, adjacent the edge 4 thereof, in such a manner that the perforating device enters the strip by first engaging the abrasive surface 2 thereof, and then passing through the fabric, or other material of the strip to cause said material to break out from the surface 3 to leave protrusions 10, comprising the broken ends of said material extending from the surface 3 to roughen said surface in the region of such protrusions.

The operation upon the strips in the manner just described results in breaking down the abrasive surface 2 in the region of the points 9 so as to provide an area of said abrasive surface 2 which can be brought into more close adhesive engagement with the surface 3 as the strips 1 are rolled into their conical formation.

The foregoing operation upon the strips 1 also provides a roughened area of the surface 3 of the strips adjacent their edges 4 to which glue or other adhesive will better adhere.

As the strips 1 are rolled to their conical formation, glue or other adhesive is applied to the surface 3 over an area lengthwise of the strip adjacent the edge 4, as indicated at 11. Some of the glue, or other adhesive, so applied passes through the perforations, previously provided at the points 9, to insure that a sufficient amount of glue is applied between adjacent layers of the strip 1 comprising the conical roll. This produces a tight bonding of such adjacent layers at the inner end of the cone provided by the edge 4 of the strip 1. By reason of the tight bonding of the respective layers of the strip at this inner end of the cone, there is provided a comparatively unyielding bearing end thereat which is enabled to be securely attached to the mandrel 12 in a manner hereinafter described.

When the strip 1 has been formed to its cone shape 20, indicated in Figure 1, in the manner just described, adhesive is applied to the surface 3 adjacent the free edge 21 of the strip 1 to secure the same to the underlying layer of said strip along said edge, the adhesive so applied being indicated at 11a.

The mandrel, generally indicated at 12, comprises a shank portion 13 by which the same is secured to a lathe or drill chuck in the usual manner; a thickened collar portion 14 provided with a tapered screw thread 15; and a cylindrical bearing portion 16 having a rounded nose 16a. In assembling the cone 20 upon the mandrel 12, the cylindrical bearing portion 16 of the mandrel is inserted into the bore of the cone from the end 4, which end, because of its comparatively unyielding condition provided by the bonding method above described, is enabled to be screwed upon the tapered thread 15 to provide a firm interlocking connection between the cone 20 and the mandrel 12.

The working end 7 of the cone 20 extends slightly beyond the nose 16a of the mandrel, and this fact together with the fact that the strip comprising the cone 20 is somewhat loosely coiled, and the layers thereof are not adhesively secured together at said working end 7, makes said end somewhat yieldable or resilient while at the same time the length of the cylindrical bearing portion 16 of the mandrel is such as to provide a desirably sufficient bearing for the major portion of the length of the cone.

The foregoing provision, of a bearing portion of the mandrel of substantial length, together with a certain flexibility of the working end of the cone, provide the composite tool with desirable characteristics of capability to be engaged firmly, though yieldably, with the work. Thus, the highest efficiency of the abrading capacity of the tool is obtained while the yieldability of the working end enables the same to be flexibly maneuvered, and eliminates a tendency to gouge or mar the work under certain conditions which is a characteristic of less flexible abrading tools.

Having thus described my invention, which I claim as new and desire to secure by Letters Patent of the United States is:

1. An abrasive element of the class described, comprising a rolled strip of material, having abrasive applied to one surface thereof, a portion of said abrasive surface being broken adjacent one edge of said strip, the opposite surface of said strip being roughened adjacent the same edge thereof, and adhesive applied to said latter surface of said strip adjacent said edge, the overlying layers of said strip being tightly engaged one upon the other adjacent the edge to which the adhesive is applied when said strip is rolled to form the abrasive element.

2. An abrasive element of the class described, comprising a rolled strip of material, having an abrasive surface and a non-abrasive surface, said strip being perforated adjacent one edge thereof, whereby to provide broken areas in the abrasive surface adjacent the points of said perforations, and roughened areas in the non-abrasive surface adjacent the points of said perforations, said strip having an adhesive applied to its non-abrasive surface adjacent the area of said perforations, and said strip being tightly rolled to form a cylinder with adjacent surfaces of overlying portions

of said strip at the adhesively treated edge thereof being tightly engaged together to provide a firm bond at one end of said element adjacent said edge.

3. In an abrasive tool of thec lass described, in combination, a mandrel having a tapered threaded portion, and an abrasive element comprising a rolled strip of material having abrasive applied to one surface thereof, a portion of said abrasive surface being broken adjacent one edge of said strip, the opposite surface of said strip being roughened adjacent the same edge thereof, and adhesive applied to said latter surface of said strip adjacent said edge, the overlying layers of said strip being tightly engaged together one upon the other adjacent said edge when said strip is rolled to form the abrasive element, said element having a central bore of slightly less diameter than said threaded portion and into which said portion is screwed for inter-locking connection of said element with said mandrel.

ALBERT FIELD.