Oct. 8, 1963 N. H. STINGLEY 3,106,426

BRUSHING TOOL MANUFACTURE

Original Filed Feb. 28, 1955

FIG. 1.

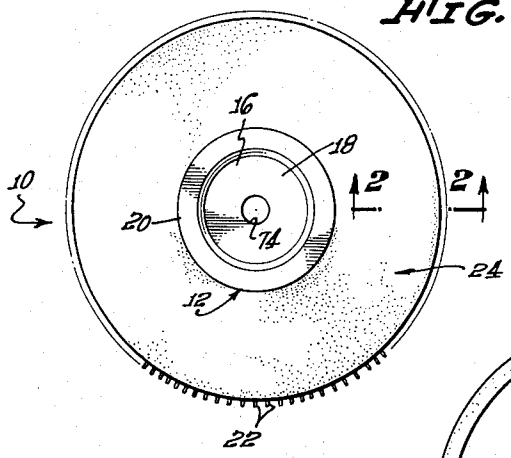


FIG. 3.

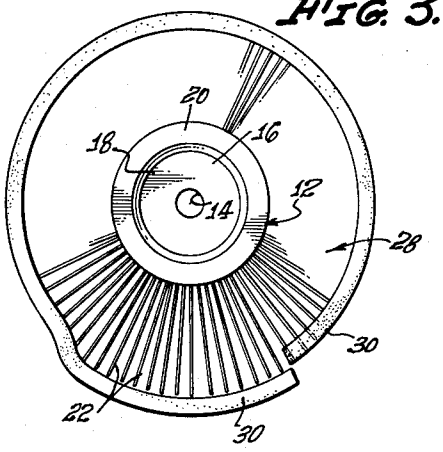


FIG. 2.

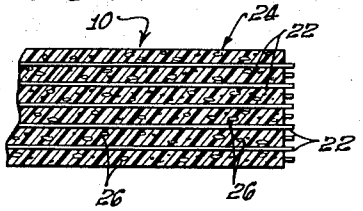
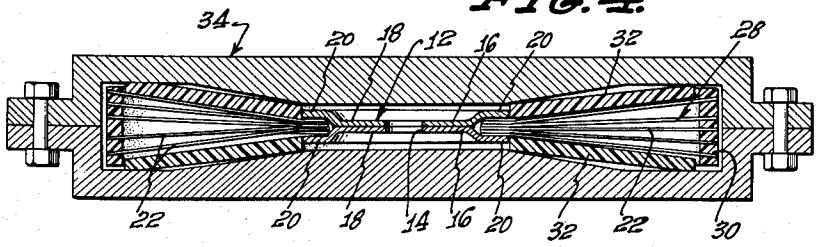


FIG. 4.



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United States Patent Office 3,106,426 Patented Oct. 8, 1963

3,106,426

BRUSHING TOOL MANUFACTURE

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Original application Feb. 28, 1955, Ser. No. 491,057, now Patent No. 2,950,495, dated Aug. 30, 1960. Divided and this application Aug. 7, 1959, Ser. No. 832,185

5 Claims. (Cl. 300—21)

The present invention relates to the method of manufacturing new improved polishing and deburring wheels.

For cleaning castings and various like objects, it has been established practice in many industrial organizations to remove unwanted material from the castings through the use of rotary brushes. Usually these brushes take the form of a wheel on the periphery of which are attached a large number of radially extending wire bristles. For many purposes such wheels are satisfactory. However, they are subject to several distinct disadvantages. Occasionally, one or more of the wire bristles will become broken due to use and will fly off of the wheel as it rotates. Also, such brushes are disadvantageous inasmuch as they are essentially incapable of providing a polishing surface upon metal members.

It has previously been suggested that wire deburring wheels of the class indicated in the preceding paragraph could be manufactured by embedding the bristles in various solid condensation polymers. Unfortunately, such structures are not considered to be advantageous for many purposes inasmuch as the solid nature of the polymers prevents these polymers from bending or flexing during the operation of the wheel. This is very disadvantageous when such deburring wheels are used on exceedingly irregular surfaces. Further, with such prior art wheels employing a solid resinous material to hold the individual wires, the resinous material does not in and of itself aid in the operation of the rotary brushes. In these prior constructions the polymers employed are merely designed so that they are broken away from the grinding wheel during the operation thereof without interfering with the operation or the effectiveness of the bristles employed.

It is a broad object of this invention to provide a method for producing new and improved circular polishing and deburring wheels which constitute an improvement over various prior constructions such as are briefly indicated in the preceding discussion. A related object of this invention is to provide wheels of the class described which are very efficient for both deburring and polishing irregular surfaces, which are comparatively easy to manfacture, and which are satisfactory in operation.

Other objects of the invention will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, said invention then comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawings:

FIG. 1 is a side view of a polishing and deburring wheel of this invention;

FIG. 2 is a cross-sectional view taken on line 2—2 of FIG. 1;

FIG. 3 is a side view illustrating a step in the formation of a polishing and deburring wheel as herein described; and

FIG. 4 is a cross-sectional view illustrating another step

in the formation of polishing and deburring wheels of the invention.

In all figures of the drawing, like numbers have been used to designate like parts wherever convenient for purpose of illustration and explanation. Further, it is to be understood that the inevntion is not to be limited to polishing and deburring wheels in which the parts are of the proportional sizes shown in the drawing inasmuch as the sizes of certain of these parts have been altered for convenience of explanation and illustration.

The present invention, is of course, fully summarized or defined by the appended claims forming a part of this disclosure. The invention is concerned with a wheel of the class described which comprises a central hub; a plurality of bristles attached to said hub so as to project radially outward therefrom, said bristles being capable of exercising a deburring action when said wheel is employed for the purpose intended; and a flexible elastomeric material positioned around said bristles so as to hold these bristles with respect to one another, said resinous material being capable of exerting a polishing action when said wheel is employed for the purpose intended. Another aspect of the invention is a method which comprises forming a wheel having a central hub with a plurality of bristles projecting radially therefrom; attaching the periphery of said bristles to one another so as to hold said bristles in a relatively fixed location; placing uncured discs of elastomeric material on both sides of said bristles; and curing said elastomeric material in a mold whereby said elastomeric material is caused to flow between said bristles to position said bristles with respect to one another.

In FIG. 1 of the drawing there is shown a combined polishing and deburring wheel **10** of the invention which comprises a central hub **12** having a center opening **14** formed therein, this opening being designed to be engaged by an appropriate arbor during the operation of this wheel. The precise structure of the central hub **12** is best shown in FIG. 4 of the drawing, where this hub is illustrated as being composed of two bilaterally symmetrical discs **16**, each of which has a flat center section **18** and an offset periphery **20**. The two center sections **18** are attached to one another by appropriate means such as, for example, welding. Between the two peripheries **20**, the inner ends of bristles **22** are secured through conventional means such as, for example, welding. If desired, a plurality of lugs may be formed upon or secured to the peripheries **20** and the bristles **22** may take the form of wires bent around such lugs.

The bristles **22** of the invention are preferably formed of relatively stiff material capable of exercising a very definite cutting or abrading action so that the wheel **10** is very efficient in deburring metal castings and the like. Exceedingly suitable wheels in accordance with this invention have been manufactured employing wire bristles. Other materials such as glass fibers may, however, be employed with the instant invention.

In accordance with the teachings of this disclosuse, the bristles **22** are secured together by a disc-like mass **24** of an elastomeric material. The properties of this elastomeric material are very important with respect to the functioning of wheels constructed as herein described. Particularly suitable wheels have been formed using chloroprene polymers and co-polymers of chloroprene with such vinyl compositions as isoprene and styrene. Various other elastomers such as are sold under the trade name "Hycar" (butadiene-styrene polymers and butadiene-acrylonitrile polymers) and are manufactured by Goodrich Chemical Corporation of Cleveland, Ohio, can also be employed with this invention. All of the elastomeric materials capable of being employed with this invention are com-

paratively flexible, and do not excessively smear the work or emit highly offensive odors under the normal operating conditions encountered during use of polishing and deburring wheels as herein described. Further, these elastomeric resins are substantially incapable of melting at the temperatures encountered during the use of such wheels of the invention.

All of these elastomeric materials are of less strength than the bristles **22** previously described so that during the operation of the wheels of the invention the elastomeric material tends to be broken off a short distance below the outer ends of these bristles, leaving a small length, usually on the order of 1/16 to 1/8 of an inch, exposed for use in deburring. In order to increase the insulation value of these elastomeric materials and in order that these elastomeric materials may be of such character that they are readily broken away from the extreme end portions of the bristles, it is preferred that they be manufactured so as to contain a plurality of small gas pockets such as pockets **26** illustrated in FIG. 2 of the drawing. The cellular structure of such elastomeric material which is thus substantially uniformly intruded and interposed between the brush bristle wires or filaments facilitates limited controlled movement of such filaments relative to each other when engaging the work and also enhances erosion of the elastomeric material in the region of the working face of the tool. Furthermore, such cellular structure reduces the specific gravity of the elastomeric composition, thereby reducing the weight of the tool as well as rendering it more resiliently responsive.

The formation of polishing and deburring wheels such as wheel **10** is relatively simple. First, a basic wheel **28** consisting of the central hub **12** and bristles **22** projecting radially from this hub is manufactured in accordance with conventional procedures. Next, a strip of uncured elastomer capable of being used with the invention is placed about the outer periphery of such a basic wheel and the bristles are mechanically forced into this strip of elastomer so that relaive positions of all the bristles will be maintained throughout subsequent treatment. This step utilizing the basic wheel **28** and a strip **30** is illustrated in FIG. 3 of the drawing.

After the strip **30** has been placed in position, discs **32** of uncured sheets of elastomer are placed in position on both sides of the wheel **28** and this wheel is placed in a suitable mold **34** of a type known to the prior art where it is subjected to heat tending to intrude and cure the elastomeric material. After the curing has been completed, the complete wheel **10** is removed from the mold **34**.

The uncured strips or sheets employed in these two steps are formed by rollers in accordance with conventional procedures well known to the rubber industry. They usually contain comparatively small amounts of curing agents, activators, accelerators, anti-oxidants, plasticizers, reinforcing agents, coloring agents, and blowing agents, such as are commonly employed in the rubber industry. All of these agents function either in curing, or in the final product produced in the expected manner. Thus, for example, the blower agents serve to produce the gas pockets **26** previously mentioned, and the coloring agent employed tends to color the cured elastomer.

Frequently, with the invention it is advisable to treat the bristles **22** employed prior to the application of elastomeric resin with a composition which serves to aid in bonding the elastomer utilized to these bristles in order that in the event the bristles should tend to break either during use or during the manufacture of the wheel **10**, the segments of the bristles resulting from such breakage will be securely held so that they cannot fly off of the wheel **10**. Suitable compositions for this purpose are well known to the art. With metal fibers, virtually any resinous bonding agent known to bond well to metal and to elastomeric polymers as herein described can be employed. Included in such agents are compositions based upon epoxy resins and/or phenolic derivatives. When the bristles employed with the invention are composed of glass fibers, any of the various agents used with glass fibers in the formation of re-enforced articles containing glass fibers and polyester-styrene or like resins can be employed.

Very satisfactory results in producing wheels of the instant invention have been achieved by treating wire bristles attached to a hub with "Typly-S" (a black viscous rubber cement marketed as a bonding agent for vulcanizing synthetic elastomers to metal) produced by Marbon Corporation of Gary, Indiana, by dipping these bristles in this composition and heating them at a temperature of 85° F. for a period of 30 minutes.

Next, in forming a wheel of the invention, an uncured strip containing:

	Parts by weight
Neoprene GN–A Polymerized chloroprene produced by the Du Pont Corp., Wilmington, Delaware	100.0
Magnesium oxide	4.0
Neozone "D" (phenyl-beta-naphthyl amine) An anti-oxidant produced by the Du Pont Corp., Wilmington, Delaware	2.0
Permalux (di-o-tolyl guanidine salt of dicatechol borate) An activator produced by the Du Pont Corp., Wilmington, Delaware	0.5
Sodium acetate	0.5
Dutrex 30 (unsaturated hydrocarbons derived from acid petroleum sludge) A plasticizer produced by the Shell Oil Co. of Emeryville, California	35.0
Stearic acid	1.0
Zinc oxide	5.0
Red iron oxide	1.0
Celogen (ammonium carbonate) A blowing agent sold by the Naugatuck Chemical Division of U.S. Rubber Co., Naugatuck, Connecticut	3.0

approximately 5/16 inch thick and 1 inch wide was pushed onto the outer end portions of the bristles treated as above in the manner indicated in FIG. 3 of the drawing. Then two discs of the same composition and thickness were placed on both sides of these bristles and the entire assembly was placed within a mold approximately one inch thick at the outer end having the approximate shape indicated in FIG. 4 of the drawing and heated for a period of 30 minutes at 285° F. As a result of this operation, a complete wheel such as the wheel **10** is produced in which all of the individual wire bristles were securely bonded to one another throughout by cured neoprene containing uniformly dispersed gas pockets. This structure is very efficient when used for the purpose indicated.

Those skilled in the art will realize what a large number of modifications can be made in this invention without departing from the essential basic character of this invention. All such modifications are considered as part of the inventive concept insofar as they are defined with the appended claims.

This application is a division of my co-pending application Serial No. 491,057, filed February 28, 1955, now Patent No. 2,950,495.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

I therefore particularly point out and distinctly claim as my invention:

1. A process for producing a combined polishing and deburring wheel which comprises: forming a basic wheel having a central hub and a plurality of individual bristles projecting radially therefrom; securing the ends of said individual bristles remote from said hub spaced apart with respect to one another by a penetrated spacing member; placing uncured discs of an elastomeric material on both sides of said bristles; and curing said elastomeric discs in a mold at an elevated temperature whereby said elastomer is caused to flow around said bristles.

2. A process as defined in claim 1 wherein said elastomer is a polymerized chloroprene base composition containing sponging material activated by such curing operation.

3. A process for producing a wheel of the class described from a basic wheel having a central hub and a plurality of bristles projecting therefrom, which process comprises: forcing a strip of an uncured elastomeric material onto the ends of said bristles remote from said hub so as to secure said ends of said bristles with respect to one another; placing discs of said uncured elastomeric material on both sides of said bristles; and curing said elastomeric discs in a mold at an elevated temperature whereby said elastomeric material is caused to flow around said bristles.

4. A process as defined in claim 3 wherein a blowing agent is disposed within said uncured elastomeric material, said blowing agent serving to cause the formation of gas pockets during the curing of said elastomeric material.

5. A process for producing a rotary brush having a hub portion and a plurality of bristles projecting free ends therefrom, including the steps of impaling an uncured strip of a resiliently deformable elastomer on said free ends of the bristles, placing a sheet of said uncured resiliently deformable elastomer aside of the bristles, and

heating within a closely fitting mold to cure said strip and sheet elastomers while flowing at least the sheet elastomer between the bristles to encase each bristle and space it substantially free of contact from other bristles, thereby forming an integral elastomeric body supporting the bristles and adapted to cooperate therewith.

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