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2,805,530

FINISHING APPARATUS

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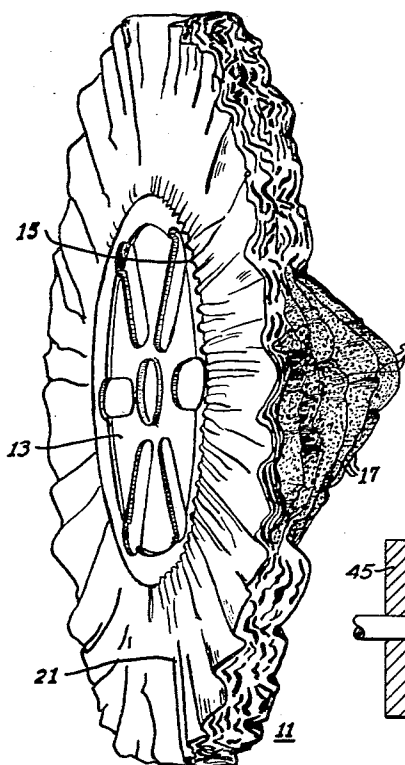


FIG. 1.

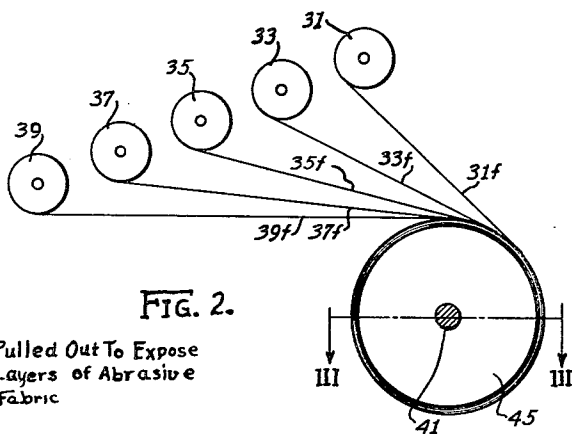


FIG. 2.

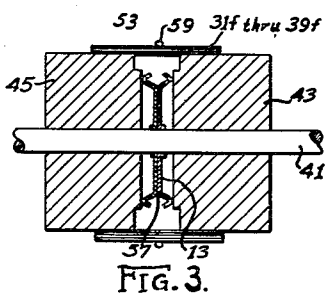


FIG. 3.

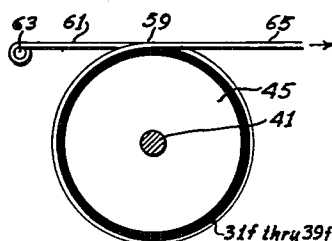


FIG. 4.

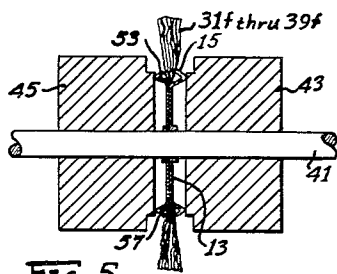


FIG. 5.

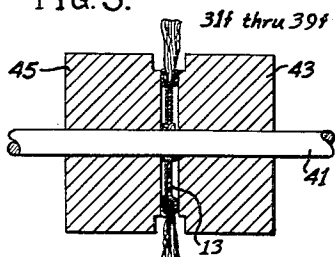


FIG. 6.

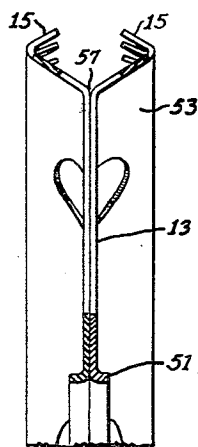


FIG. 7.

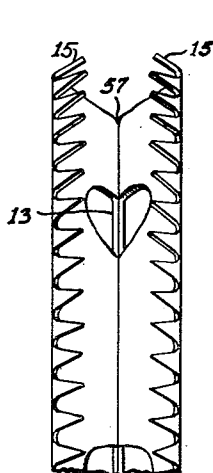


FIG. 8.

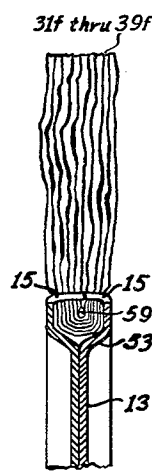


FIG. 9.

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FINISHING APPARATUS

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1 Claim. (Cl. 51—193)

This application relates to metal finishing apparatus and has particular relation to polishing apparatus.

In the finishing art, the word polishing means an operation by which surface imperfections such as tool and die marks, parting lines, pits or deep scratches are removed from the surface of metal, wood, plastic (phenolic condensation products) or the like and the surface is caused to acquire a smooth, uniform finish. In polishing, the finishing of smooth surfaces must be considered in a different category from the treatment of surfaces which have ridges or are otherwise of irregular contours. In the polishing of the former, it is only necessary to remove the surface imperfections which project from the surfaces and to achieve this object it is only necessary to apply the polishing operation directly to the surface. Where the surface has irregularities, it is necessary to remove the surface imperfections without removing the ridges or irregularities which are essential for the purpose for which the work has been produced.

In accordance with the teachings of the prior art, polishing is carried out by rotating a polishing wheel in contact with the surface of the work being polished. A polishing wheel typical of the prior art is disclosed in Patent 2,355,667 to Melton and Ball. This wheel is made up of a plurality of superimposed rings of abrasive fabric. Wheels of this type are not suitable for the polishing of irregular surfaces. The difficulty arises from the fact that the abrasive wheel disclosed in the Melton patent removes stock from the surface being finished at a substantial rate which cannot be readily controlled and there is a tendency to remove or flatten and distort the normal ridges and irregularities of such a surface.

It is accordingly an object of this invention to provide a polishing wheel for polishing irregular or ridged surfaces without distorting the irregularities or ridges of such a surface.

This invention arises from the realization that the Melton wheel is not satisfactory for polishing irregular surfaces because it does not dovetail itself into such surfaces and for this reason removes the stock from the irregularities as if they were imperfections, thus distorting the irregularities.

In accordance with this invention, a polishing wheel is provided which includes a number of plies of pleated abrasive fabric. The fabric is held together by a central hub, the diameter of which is substantially smaller than the outer diameter of the fabric so that the fabric extends loosely from the hub. The abrasive fabric may be abrasive cloth, abrasive paper or abrasive screen. Thus, the abrasive fabric may be of the material disclosed in the Melton and Ball patent. While the use of fabric abrasive on both surfaces has important advantages in the practice of this invention, in accordance with the broader aspect of this invention, the abrasive fabric may be abrasive on only one of its surfaces.

The novel features considered characteristic of this invention are set forth above. This invention itself both as to its organization and its method of operation, to-

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gether with additional objects and advantages thereof, will be understood from the following description of a specific embodiment when read in connection with the accompanying drawings, in which:

5 Figure 1 is a view in perspective of a polishing wheel in accordance with this invention;

Figure 2 is a diagrammatic view showing apparatus for making the wheel shown in Fig. 1;

10 Figure 3 is a view in section taken along line III—III of Fig. 2;

Figure 4 is a diagrammatic view illustrating an advanced step in the making of the wheel in accordance with this invention;

15 Figure 5 is a view similar to Fig. 3 but in an advanced stage of the making of the wheel;

Figure 6 is a view in section similar to Figs. 3 and 5 but in a further advanced stage of the making of the wheel;

Figure 7 is a view in fragmentary cross section of the hub as it is before it is combined in a wheel;

20 Figure 8 is a view in fragmentary elevation of the hub; and

Figure 9 is a fragmentary view showing a portion of the hub of the wheel and the plies extending from it.

The wheel shown in Fig. 1 includes a plurality of plies 11 of fabric 11 secured to a central hub 13. This hub 13 is usually composed of a metal such as aluminum or steel and is provided with teeth 15 (or staples) which engage the fabric 11 firmly. The fabric consists of a number of plies 17 of abrasive fabric. The plies 17 are made up from fabric strips which may or may not be cut on a bias. The plies 17 have pleats 21, the number of pleats per unit area of fabric being determined by the purpose which the wheel is to serve.

25 Within the described framework, the wheel, according to this invention, may vary in structure over a reasonable range to meet the various finishing problems which confront the industry.

The wheel may have any reasonable number of pleats 21. The pleats lend resiliency to the wheel and where the wheel is to be very soft, for example, for use in polishing and buffing, highly complex irregular surfaces, the fabric should have a large number of pleats. For simpler surfaces there may be less pleats for unit area. The quality of the fabric should be governed by the purpose for which the wheel is to be served. For example, where the wheel is to be used for the preliminary roughing out step of a polishing operation the fabrics may be coarse. Where the wheel is to perform the final polishing operation, the fabric need be fine. Coarse and fine abrasive fabric may be combined in one wheel.

30 Apparatus for making a wheel, in accordance with this invention, is shown in Figs. 2 through 9. A plurality of spools 31, 33, 35, 37 and 39 of abrasive fabric are mounted on rotatable pay-off pins or shafts. The apparatus for making the wheel, in accordance with this invention, also includes a mandrel mounted on a rotatable shaft 41. The mandrel is made up of a pair of drums 43 and 45 between which the hub 13 of the wheel is mounted. Prior to being combined in the wheel, the hub 13 comprises a flanged ring having a bearing 51 at the center. The flange 53 is of claw-shaped cross section, the claws terminating in the teeth 15, and being open so that the fabric may be inserted between the teeth 15.

35 In the making of the wheel, the end of the fabric 31f through 39f from each of the spools 31 through 39, respectively, is attached to the mandrel in a position corresponding to the position in the array of the spool. The fabrics are attached on the mandrel in a position such that the central plane 57 of the hub 13 passes through the center of the fabric. Once the fabric is attached the shaft 41 is rotated and the fabric is built up in a helix on the mandrel. The number of layers of each fabric and the

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number of fabrics determine the number of plies. Thus the number of plies is equal to the product of the number of layers of fabric by two by the number of fabrics.

Once the required number of layers have been wound onto the mandrel, each of the fabrics is cut or otherwise disconnected. A single loop 59 of wire is then wound about the fabric at its center. One end 61 of this wire is held at a fixed point 63 and the other end 65 is pulled until the fabric has been tightly engaged with the central plane 57 of the hub 13. After the wire 59 has been tightened, it is secured at a point on the hub and the remaining wire is detached. The wire thus forms a holding means for the fabric as shown in Fig. 9. The drums 43 and 45 are then urged against each other under pressure, collapsing the teeth 15 on the fabric and forming the wheel.

The diameter of the drums 43 and 45 determines the number of pleats 21 per unit area in the fabric 11. The greater the diameter of the drums 43 and 45 the more pleated the wheel is. The width of the fabric determines the diameter of the wheel. The diameter of the wheel is equal to the diameter of the central plane 57 around which the fabric is secured plus half the width of the fabric.

In accordance with this invention, a polishing wheel has been provided which is suitable for polishing and buffing surfaces of any type and particularly irregular or

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ridged surfaces. In wheels, in accordance with this invention, used for polishing irregular surfaces, the fabric may be so pleated that the operating surface of the wheel dovetails into the surface being polished.

5 I claim as my invention:

As an abrasive article of manufacture particularly for polishing irregular surface, a wheel comprising a plurality of helically wound plies of flexible abrasive coated fabric in the nature of emery cloth which are folded along a median line and constricted along said line to form an annulus of pleated plies extending loosely from the inner to outer periphery, said inner periphery being mounted on a pair of disks which cooperate to clamp and support said annulus upon a power driven arbor, all of said plies being coated with abrasive.

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