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ABRASIVE WHEEL AND METHOD OF MANUFACTURE

Filed Oct. 25, 1935

FIG. 2

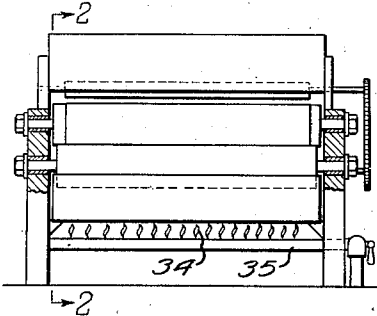
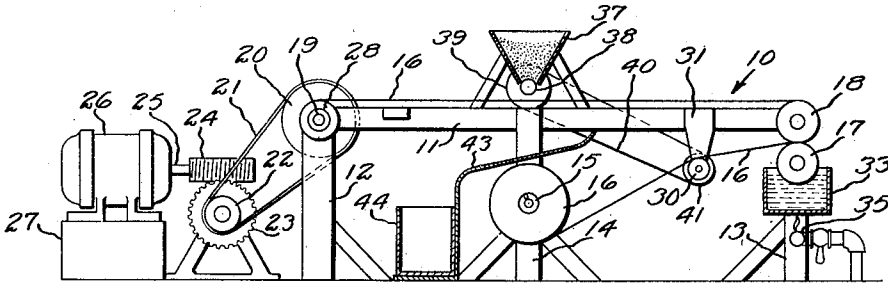


FIG. 1

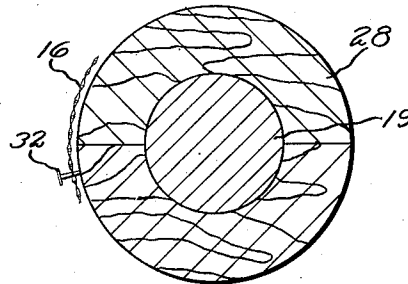


FIG. 3

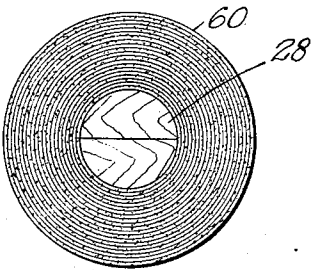


FIG. 4

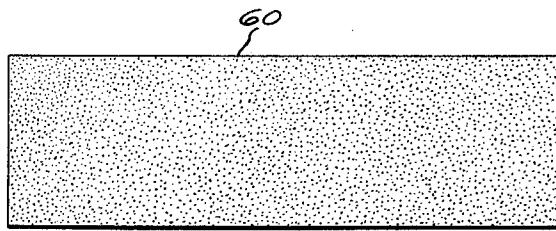


FIG. 5

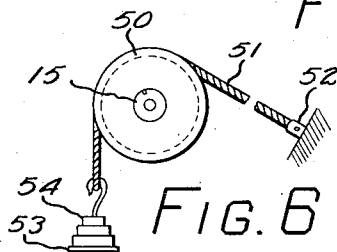


FIG. 6

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ABRASIVE WHEEL AND METHOD OF
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4 Claims. (Cl. 51—190)

The invention relates to abrasive wheels and with regard to its more specific features to a wheel which may be used where so-called "set-up" wheels have formerly been used.

5 One object of the invention is to provide a cylindrical grinding wheel adapted to grind on a peripheral face of large area. Another object of the invention is to provide an improved method of making a grinding wheel. Another
10 object of the invention is to provide a grinding wheel of layer construction. Another object of the invention is to provide a relatively porous grinding wheel of reinforced layer construction. Other objects will be in part obvious or in part
15 pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, arrangements of parts, and in the several steps and relation and order of each of said steps to one or more of the others thereof, all as will be
20 illustratively described herein, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing, in which is
25 shown one embodiment of the mechanical features of this invention,

Fig. 1 is an end elevation of apparatus for making a grinding wheel according to the invention,

30 Fig. 2 is a sectional view along the line 2—2 of Fig. 1, certain parts, however, being shown in elevation,

Fig. 3 is an enlarged sectional view illustrating the central supporting core and the drive shaft to
35 wind the material in the formation of the wheel,

Fig. 4 is an end elevation of a completed wheel,

Fig. 5 is a side elevation of the abrasive wheel of the invention,

40 Fig. 6 is a side elevation of a let-off brake which may be used.

Referring first to Figs. 1 and 2, I provide a winding apparatus generally indicated by the numeral 10 and which may have a frame comprising longitudinals 11, left-hand legs 12, right-hand legs 13 and central legs 14. Any suitable
45 framework will suffice, and as disclosed the frame of the apparatus supports a roll 15 on which is wound the material 16 which is to be drawn off to form the abrasive wheel. The frame also
50 journals a pair of cylindrical rolls 17 and 18 and it removably journals a shaft 19 to which is fastened a pulley 20 driven by a belt 21 from a pulley 22 which is fastened to a worm wheel 23 driven by a worm 24 on the armature shaft 25 of
55 a motor 26 which is mounted on a base 27.

The foregoing constitutes one form of winding mechanism for winding a sheet of material upon a hollow core 28 which is better shown in Fig. 3.

Considering now the material upon the delivery roll 15, I prefer to use a textile fabric such as leno cloth, and because of its good tensile strength, high absorptive qualities, and relative cheapness I prefer to use cotton leno cloth. The leno weave is a weave in which the warp ends are arranged in pairs and in its simplest form consists of a structure in which one-half of the warp is always down and the other half is always up. Of each pair of warp ends, one of them is in one of the foregoing divisions and the other is in the other division. This would not make a weave at all
15 except for the fact that at each shedding operation one set of ends are twisted over the other threads. Thus in the leno weave the weft is tightly gripped by the warp and thus an open mesh structure may be produced while maintain-
20 ing the proper and desired spacing.

The roll 15 is wound with a continuous sheet of leno cloth, this winding being done by any suitable textile machine, for example in a textile mill where the cloth is produced. The roll 15 has
25 trunnions and is removably mounted in any desired type of open bearing brackets, not shown. The leno is then drawn off, as illustrated, over a roll 30 which is supported by brackets 31, and then between the rolls 17 and 18, around the roll 30
30 18 and then the length of the machine to the wooden core 28, where it is secured as by means of ordinary carpet tacks 32, Fig. 3. The core 28 is mounted on and fastened to the shaft 19.

At the right-hand end of the machine, as
35 shown in Fig. 2, and underneath the roll 17, I provide a receptacle for liquid glue 33 which, as better shown in Fig. 1, is heated by gas flames 34 from a gas pipe 35. The roll 17 is immersed in the glue, and consequently the leno material
40 16 will be given a coat of liquid glue which, because of the open nature of the material and the absorptive qualities thereof, covers the material on both sides. I provide a bin 37 for abrasive material. This may have slanting sides as shown
45 and an open narrow bottom which is, however, almost completely blocked by a roll 38. The roll 38 is connected to a pulley 39 which is driven by a belt 40 connected to pulley 41 which is fastened
50 to the roll 30. Thus each inch of movement of the material 16 involves a definite angular movement of the roll 38. As the roll 38 is as wide as the material 16, abrasive grains are delivered to the material which is still wet with glue. Many
55 grains will fall through and be caught by a pan

43 and delivered to a removable box 44 to be used over again.

The foregoing apparatus constitutes means for coating the material 16 with glue and abrasive material. In starting the machine, the operator may draw the material across the machine frame after threading between the rolls 17 and 18 and thus cause a deposit of glue and abrasive material upon the fabric, or a leader may be employed which may be thrown away after mechanically treated material reaches the core 28 upon which it is to be wound. In either event, after the machine is once started it may be operated almost continuously by supplying new rolls 15 wound with leno cloth as fast as the old ones are exhausted, and piecing on by a hand sewing operation which will only occupy about two minutes of time. The cores 28 are wound to the desired depth with the fabric covered with glue and abrasive and then removed from the shaft 19 and the glue allowed to set, and as each core 28 is removed from the shaft 19 it may be replaced with a fresh one for the manufacture of a new abrasive wheel or cylinder.

Considering now the nature of the bond hereinbefore referred to as the glue, I do not wish to be limited to glue as other adhesives or binding substances might be employed. So far as glue is concerned, almost any type thereof may be used. Certain advantages inhere in the use of glue, for example it does not require any special treatment to harden. If glue is used as a binding medium the abrasive cylinder is one which preferably should be used for dry grinding or abrading operations. Other liquid bonds which may be used include vinyl acetate solution; cellulose acetate solution, air drying glyptols and casein. These require no heat treatment to set.

I may also use heat settable bonds in liquid form, or in form partly liquid and partly solid. For example, I may sprinkle powdered bond upon the material as it travels over the frame of the winding apparatus 10. The receptacle 33 may contain a liquid resin such as liquid phenolic resin.

In case I desire to apply a certain amount of pressure to obtain a dense structure I may secure a brake drum to the roll 15 and apply a brake with variable pressure, according to the same system that is used for controlling the let-off tension in a loom. That is to say, the pressure between layers on the finished material may be maintained constant by varying the braking power on the roll 15, as by means of removable weights, in accordance with the ratios of the diameters of the built-up wheel and the supply roll 16. A simple apparatus to effect this result is shown in Fig. 6 and comprises a grooved disk 50, secured, permanently or otherwise, to the roll 15, with a rope 51 anchored at 52 to the machine frame passing over the groove in the disk 50 having a scale pan 53 upon which are weights 54.

The abrasive material which is used to make the wheel may be of any suitable type, such as aluminum oxide, silicon carbide, garnet, including also diamond, boron carbide, and other carbides, also emery, flint, quartz, in fact any desired abrasive may be used. In order to entrap a substantial amount of abrasive into the leno cloth I preferably use fine mesh grain, such as 100 mesh or finer. The particular abrasive grain which will be chosen, however, will depend upon

the use to which the abrasive wheel or cylinder is put.

To a certain extent the abrasive wheel or cylinder 60, disclosed in Figs. 4 and 5, may be used where so-called "set-up" wheels are used today. The wheel of the invention will outlast a "set-up" wheel, because it has abrasive all through it. The wheel or abrasive cylinder of the invention is not, however, limited to such uses and may be applied to any purpose where grinding wheels are now used. Having an open structure it is free cutting. While the illustration shows a wheel 60 of a thickness greatly exceeding its diameter, it should be understood that a leno tape may be employed to make a wheel whose thickness is only a fraction of its diameter. In other words, according to the invention, practically any desired dimensions in a grinding wheel which is a true right circular cylinder may be achieved. The central core 28, herein shown as of wood, may be replaced by a steel bushing if desired.

On account of the open nature of the fabric, abrasive grain is to be found at all layers or depths in the completed wheel. Thus as the wheel wears down it will nevertheless at all times grind satisfactorily. In the following claims the expression "open mesh" is to be taken to mean a textile fabric in which the warp is spaced, the several ends thereof being not in contact and the weft is not beaten up tight so that open substantially rectangular spaces exist in the material which one sees through even at a distance, and the size of the openings is such that not only can the abrasive grains pass therethrough but the abrasive grains can cling to the warp and weft in the openings, such that many abrasive grains may be located with their centers in the central plane of the fabric, a condition which cannot exist when abrasive grains are stuck to a fabric or other sheet of material which is impervious to such abrasive grains.

It will thus be seen that there has been provided by this invention a method and an article in which the various objects hereinabove set forth together with many thoroughly practical advantages are successfully achieved. As various possible embodiments might be made of the mechanical features of the above invention and as the art herein described might be varied in various parts, all without departing from the scope of the invention, it is to be understood that all matter hereinbefore set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

I claim:—

1. An abrasive wheel comprising a spirally wound web of open mesh leno impregnated with bond and abrasive grain, the wheel being cylindrical in shape, some abrasive grain existing in the plane of the leno.

2. An abrasive wheel comprising cotton leno open mesh cloth saturated with glue and abrasive grains stuck thereto, the leno cloth being spirally wound into a cylinder, some abrasive grain existing in the plane of the leno cloth.

3. An abrasive wheel according to claim 2 with a central core upon which the winding is started.

4. An abrasive wheel according to claim 2 with a central wooden core.

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