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Metz

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[54] ROTARY DISC CUTTING DEVICE

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[52] **U.S. Cl.** ..... **15/93,** 29/81 J, 144/118

[51] **Int. Cl.** **B44d 3/16**

[58] **Field of Search** ..... 15/93, 236; 29/78, 95 B, 29/96, 97.5, 102, 105, 81 J, 81 G; 30/347; 83/837; 144/118, 119, 150, 219, 234, 235

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[57] **ABSTRACT**

A device for removing paint or other surface layers from woods, metal, bricks, cement and the like, has a resiliently flexible disc of a moldable material in which a length of a blade of a band saw type is embedded and anchored with its teeth exposed on one face and in which means are also embedded that has an axial member exposed on its other face for use in the attachment of a driver thereto. The embedded blade length is such that is completely encircles the axial means and includes a plurality of loop portions of substantial radial extent with both their leading and trailing courses shown as outwardly inclined in a trailing direction with respect to the direction in which the device is to be rotated by its driver.

15 Claims, 5 Drawing Figures

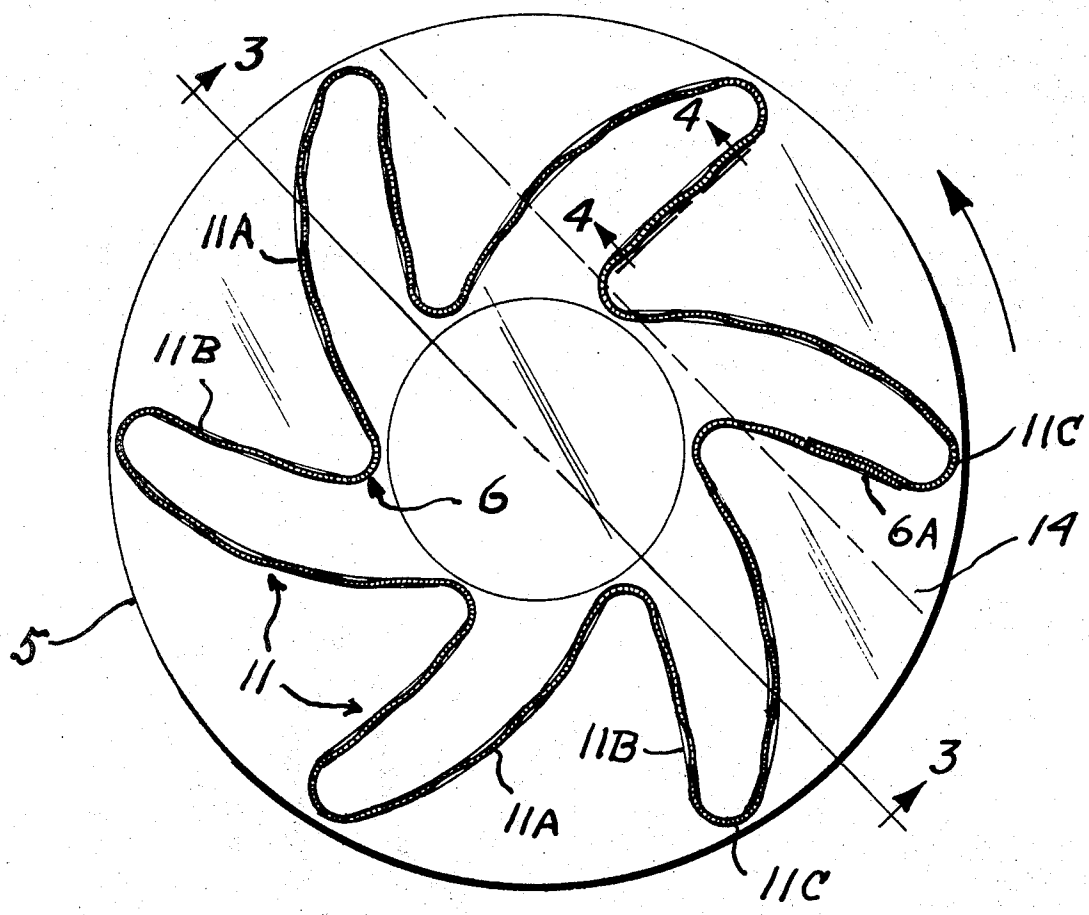


FIG. 1

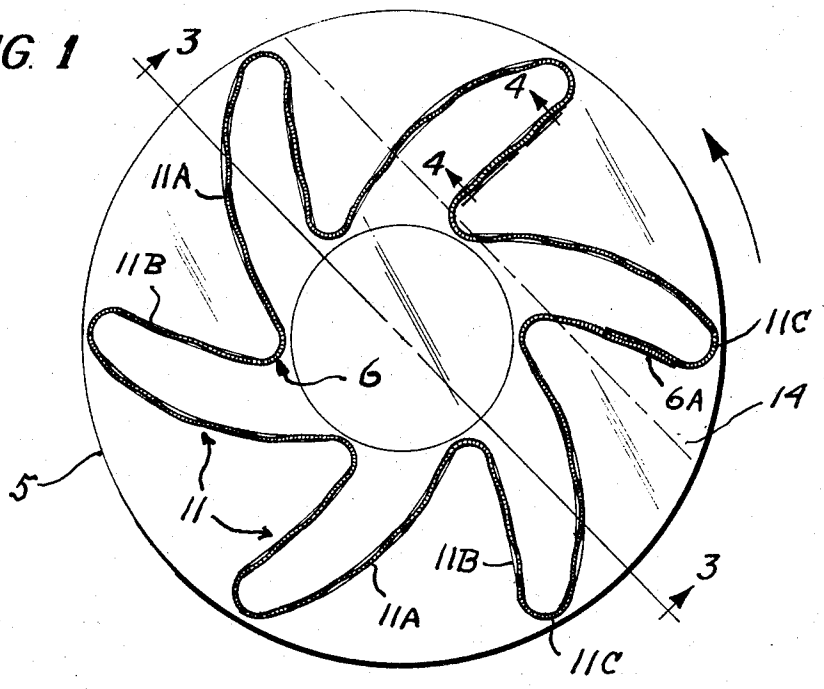


FIG. 2

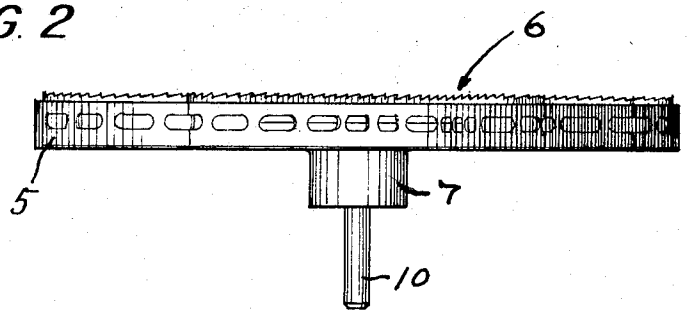


FIG. 3

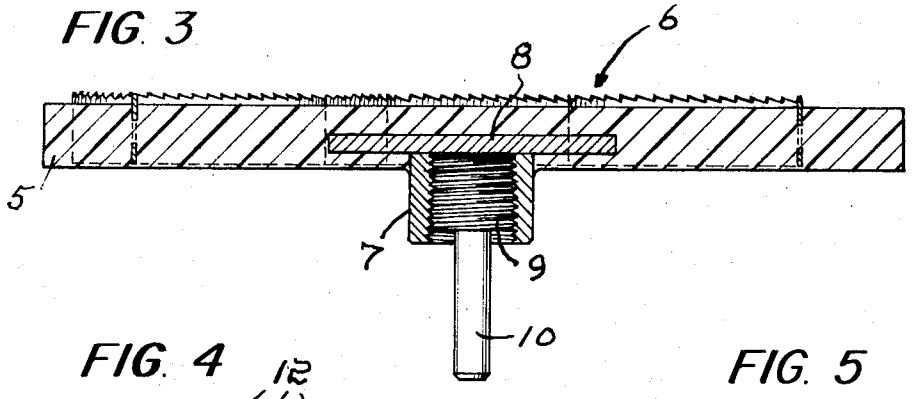


FIG. 4

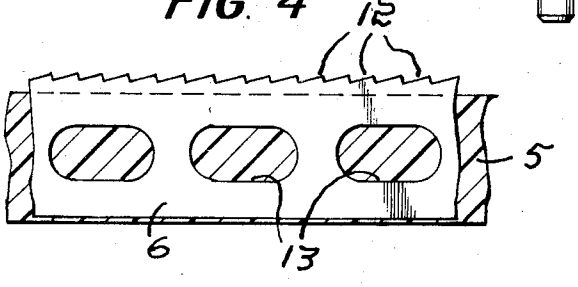
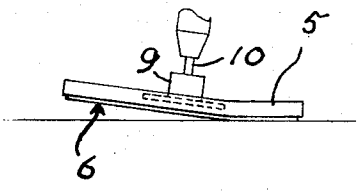


FIG. 5



ROTARY DISC CUTTING DEVICE

BACKGROUND OF THE INVENTION

The removal of surface layers from such materials as wood, metals, bricks, cement, and the like presents problems, particularly when such materials are incorporated in structures.

In my co-pending application Ser. No. 234,248, filed March 13, 1972, now U.S. Pat. No. 3,754,297, a continuation-in-part of now abandoned application Ser. No. 107,328, filed Jan. 18, 1971, there are disclosed molded discs of a flexible material attachable to a device with each such device having a length of a blade of a band saw type embedded therein, the length being sufficient to extend around the axially located means and in the form of a coil establishing a plurality of closely spaced turns.

Such discs have proved effective in the treatment of surfaces of materials of the types above referred to but problems remain in their production, particularly in the assembly of the devices with the blade coils substantially concentric with the disc.

THE PRESENT INVENTION

The objective of the present invention is to provide a device for use in treating various surfaces, particularly the removal of paint from wood surfaces, the device having a flexible resilient disc with a blade of the band saw type embedded and anchored therein with the embedded blade length in a form that requires a minimum blade length yet is capable of being accurately located in the molded disc and providing a sufficient number of teeth uniformly distributed through a surface-treating zone of adequate radial extent to ensure an effective, uniform attack on the surface.

This objective is attained by providing a blade length as a preform that is easily handled and that, when embedded and anchored in the flexible plastic disc to form the device extends completely around the axially located means by which it is secured to a driver and has a plurality of outwardly disposed loop portions with at least the leading and preferably both the leading and trailing courses outwardly inclined in a trailing direction with respect to the direction in which the device is to be rotated and with the closed outer ends of the loop portions adjacent the periphery of the disc.

Another objective is to provide that the closed, outer ends of the loop portions provide such a curve that the disc has a plurality of teeth adjacent its periphery, preferably substantially at the periphery, an arrangement possible because the secure anchorage of the leading and trailing courses would even permit such closed ends to protrude slightly from the periphery of the disc.

With the looped arrangement of the embedded blade, and with the blade of the type having its teeth with cutting edges disposed in the same direction, the teeth in one course of each loop portion have their cutting edges faced oppositely to those of the other course, preferably those of the leading course disposed so that at least at and relatively near the closed outer end of each loop portion are in cutting direction. As a consequence, the action of the teeth in one course of each loop portion, preferably the trailing course, is an abrading one. With this arrangement, an adequate cutting action is combined with a substantial abrading action that, in practice, results in the rapid removal of the surface layer, the bared surfaces in prime condition to receive and hold paint.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment of the invention is illustrated by the drawings of which

FIG. **1** is a plan view of the work contacting face of a device in accordance with the invention;

FIG. **2** is a side view thereof;

FIG. **3** is a section, on an increase in scale, taken approximately along the indicated lines **3—3** of FIG. **1**;

FIG. **4** is a fragmentary section taken, on a further increase in scale, approximately along the indicated lines **4—4** of FIG. **1**; and

FIG. **5** is a somewhat schematic side elevation of the device in a typical work-contacting position.

THE PREFERRED EMBODIMENT

The preferred embodiment of the invention consists of a resiliently flexible disc **5** of rubber or plastic having a length of a blade **6** of the band saw type embedded therein with its teeth exposed on one face. In order that the device may be secured to a suitable portable power operated tool, not shown, capable of rapidly rotating the device when held against the work, a socket **7** having a flange **8** is also molded in the disc **5** with the socket **7** exposed on the other face thereof.

The socket **7** is threaded either to enable it to be directly secured to a threaded driver with which some such tools, typically commercial types, are provided, or to receive the threaded head **9** of a stem **10** thus to enable the device to be attached to a driving tool having a chuck.

While the disc **5** may be formed from any elastomeric material that has a sufficient degree of resilient flexibility, a solid cast or slightly expanded cast polyurethane elastomeric material using either the polyester or the polyether types are most satisfactory. Polyester vinyl chloride plastisol may also be used. Desirably a disc 6 inches in diameter is in the approximate thickness range of 3 to ⅝ inch range and has a hardness factor in the approximate range of 75 – 85 as determined with a durometer.

The blade **6** is a preform with the ends of the blade length overlapped and welded together at **6A** and shaped and dimensioned to encircle the socket **7** with a series of outwardly disposed loop portions, generally indicated at **11**, and providing leading courses **11A**, trailing courses **11B** and closed outer ends **11C**. The leading and trailing courses are both outwardly inclined in a trailing direction with respect to the direction in which the device is rotated by its driver, the direction indicated by the arrow in FIG. **1**. The overlapped junction **6A** of the blade ends is shown as located in a trailing course **11B**. Best results are attained when the courses are curved in said trailing direction and in any event, the closed outer ends are close to the periphery of the disc **5**, the distance between them and said periphery being desirably in the order of one-eighth inch or less.

For best results in treating wood surfaces, the number of teeth per inch of blade length is 14 as commercially available blade stock with either fewer or more teeth per inch is either too coarse or too fine for most uses.

The loop portions **11** must be spaced at least 90° apart but the use of six, equally spaced such portions

is preferred as ensuring the provision of a sufficient number of teeth for the effective attack of the surface layer to be removed. In practice, the blade length required to form such a preform is in the neighborhood of 29 inches in the case of a 6 inch disc.

It is preferred that the blade stock used be of a type in which its teeth **12** are all disposed to cut when the blade is linearly advanced in one direction and the preferred arrangement of the preform is to have the teeth in the closed outer ends of the loop portions **11** disposed in a cutting direction when the device is rotated by its driver. With this arrangement, the teeth in the leading courses **11A** have an appreciable cutting effect while those in the trailing courses **11B** are reversed relative thereto and have primarily an abrasive action and usually the points of the teeth of the two courses are slightly offset radially. In practice, each blade length is formed with a series of longitudinally spaced slots **13** ensuring its thorough anchorage in the disc **5**. Desirably, see FIG. **4**, the base of the teeth **12** are positioned slightly above the proximate face of the disc **5** to facilitate the discharge of particles from under the disc **5** and the disposition of heat. With one-half inch blade stock, the preferred disc thickness is approximately three-eighths inch with about one-sixteenth of an inch of the blade exposed to space, the base of the teeth from the proximate face of the disc, the height of the teeth being about one-sixteenth of an inch. The other edge of the blade is just within the other face of the disc, see FIG. **4**.

It will be appreciated that, more often than not, the devices are held against the work with their axes tilted slightly from the normal relative thereto, typically with, if the device were not rotating, the segment defined by the chord **14** and its subtended minor arc in contact with the work. While the embedded blade **6** stiffens the disc **5**, its disposition permits a sufficient degree of flexibility to ensure that the loop portions successively lay flat against the work with the drive axis thus tilted with the result that the unwanted surface is effectively attacked and removed leaving the wood or other surface in ideal condition to be repainted or stained.

Devices in accordance with the present invention combine ease of assembly, a unique combination of cutting and abrading actions, and an adequate degree of flexibility.

I claim:

1. A device for use in removing paint or other surface layers from wood, metal, bricks, and the like and to be rotated by a power driver, said device comprising a resiliently flexible disc of a moldable material, a length of a blade of the band saw type embedded and anchored in the disc in such a manner that its teeth are exposed on a face thereof, and axial means exposed on the other face for attaching the disc to the driver, said embedded blade length extending completely around said axial means and including a plurality of outwardly disposed loop portions providing leading and trailing courses and closed outer ends, at least the leading course of each loop portion being outwardly inclined in a trailing direction with respect to the direction the device is to be rotated, said loop portions being of substantial and radial extent and uniformly spaced circumferentially.

2. The device of claim **1** in which the arcuate space between the outer ends of the loop portions is less than 90°.

3. The device of claim **1** in which the arcuate space between the outer ends of the loop portion is 60°.

4. The device of claim **1** in which the junctions of the loop portions are close to the axial means.

5. The device of claim **1** in which the outer ends of the projections are substantially at the periphery of the disc.

6. The device of claim **1** in which the trailing course of each loop portion is also outwardly inclined in a trailing direction.

7. The device of claim **1** in which the leading course of each loop portion is outwardly curved towards its closed end in a trailing direction.

8. The device of claim **7** in which the trailing courses are curved in the same manner as the leading courses.

9. The device of claim **1** in which the courses of each loop portion are of the same length.

10. The device of claim **1** in which the blade is of the type having teeth disposed to cut to the maximum extent when moved linearly in one direction and to the minimum extent when moved linearly in the opposite direction and the blade is disposed so that the teeth in the closed ends of the loop portions are in their cutting direction with at least the outer portions of the leading courses operative to provide a cutting attack on the surface with action of the teeth of the trailing course being primarily an abrading one.

11. The device of claim **10** in which the number of teeth per inch of blade length being in the neighborhood of fourteen.

12. The device of claim **10** in which each course is curved outwardly in a trailing direction.

13. The device of claim **1** in which the closed outer end of each loop portion is rounded with a portion located so closely to the periphery of the disc that the maximum distance separating said closed end and said periphery is in the neighborhood of one-eighth inch.

14. The device of claim **1** in which the hardness of the disc material as measured by a durometer is in the approximate range of 75 – 85, the disc thickness is about three-eighths inch and the blade stock is one-half inch and the embedded blade length positions the base of the teeth above the proximate face of the disc.

15. The device of claim **14** in which the distance between the base of the teeth and said proximate face is about one-sixteenth of an inch.

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