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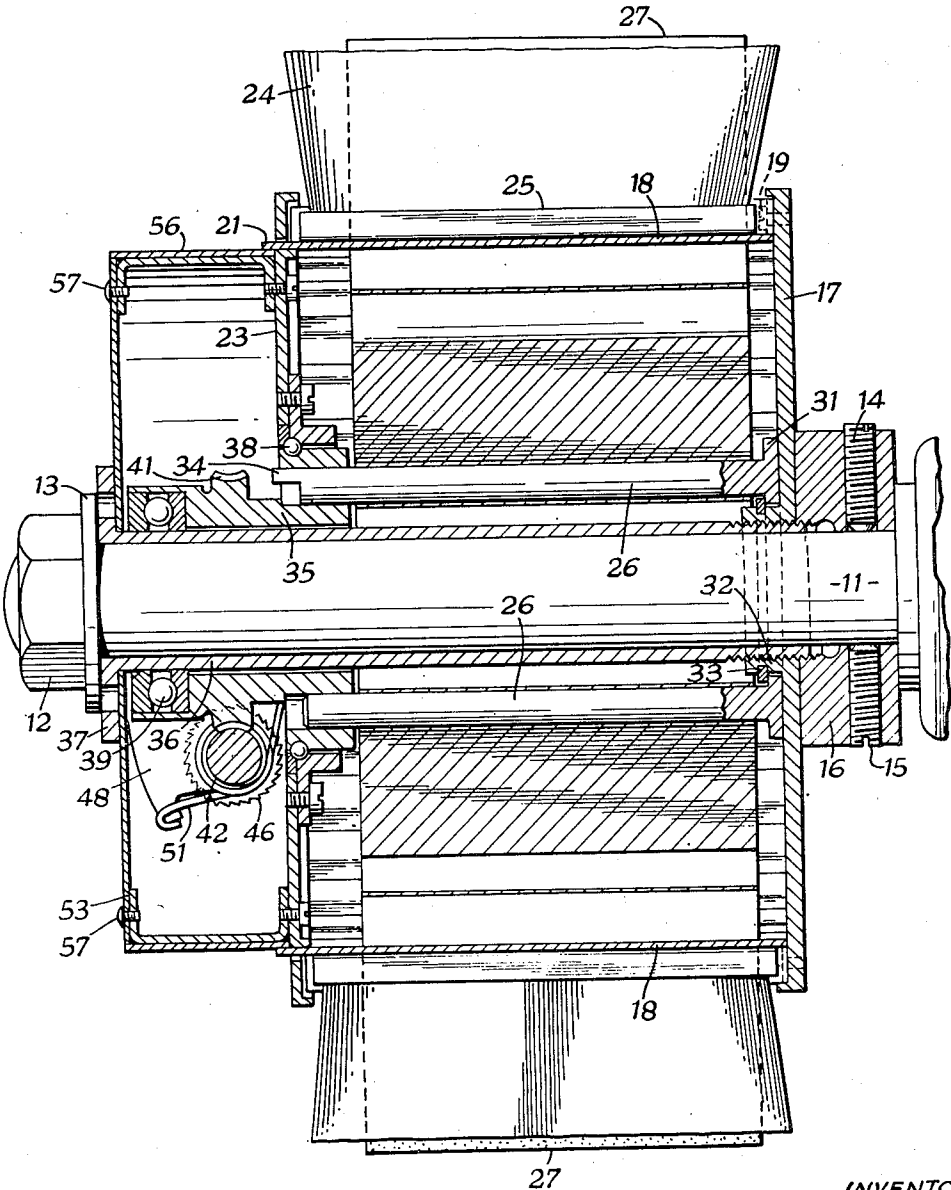
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ROTARY ABRASIVE TOOLS

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Fig. 1.



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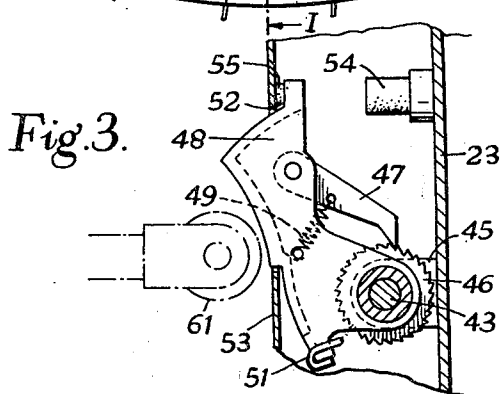
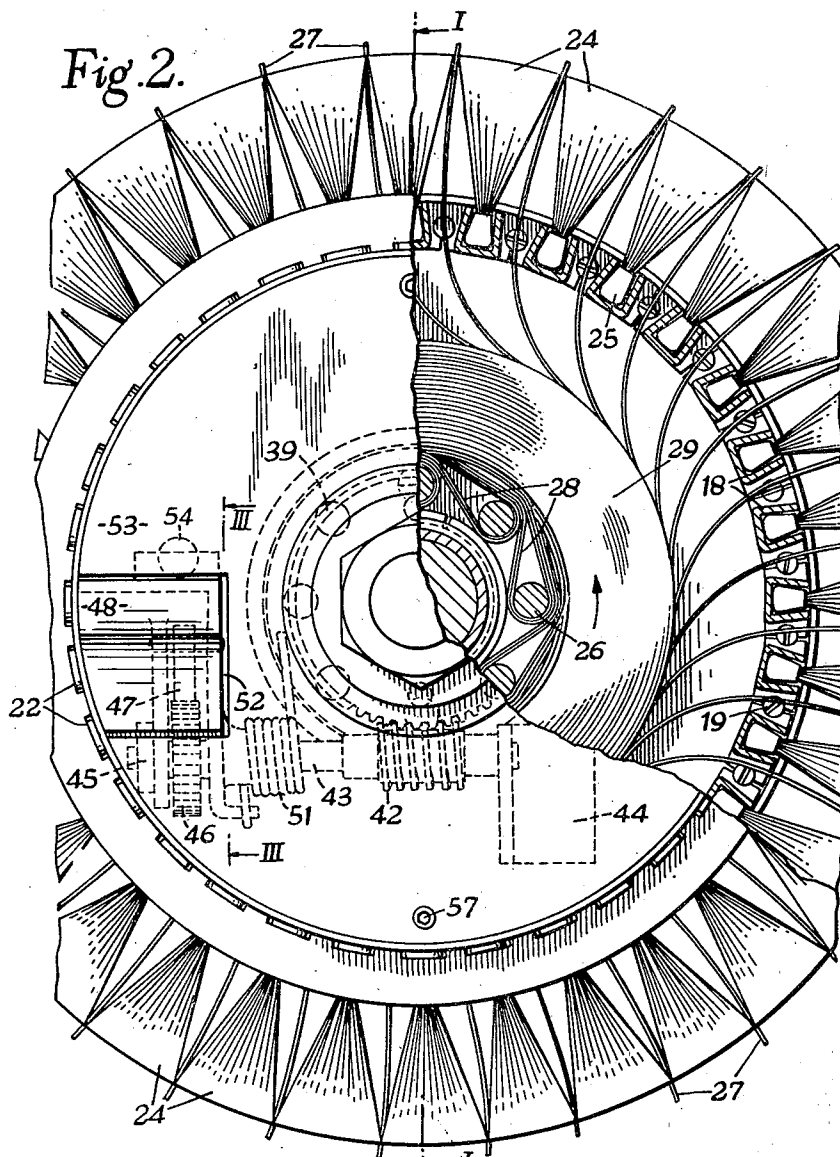
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ROTARY ABRASIVE TOOLS

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6 Claims. (Cl. 51—193.7)

This invention relates to rotary abrasive tools of the type used in smoothing products which have irregular surfaces, such as products of wood and other materials, including mouldings, carvings, die castings and the like, and provided with an annular brush assembly consisting of a relatively large number of closely spaced brushes, between which abrasive strips extend, the inner portions of said abrasive strips being secured to and coiled around anchorages arranged to form an annular series within the brush assembly, so as to form a single spool concentric with the axis of rotation of the said tool. In rotary abrasive tools of this type, when the abrasive strips become used, or worn, they are partially unrolled from the spool so as to bring a new portion into use, the used portion being clipped off. This adjustment of the strips however can only be carried out when the machine is at rest.

The object of the invention is to enable the strips to be unreel while the tool is revolving, and so obviate the necessity for stopping the machine.

In the improved rotary tool according to the present invention, the annular series of anchorages forms part of an assembly which is rotatable at any time with respect to the brush assembly by reduction gearing having driving means operable to drive or cease driving said gearing according to the setting or position of an external control member.

The said gearing preferably includes a pawl-and-ratchet gear having an operating lever the free end of which projects excentrically from the rotary tool and is adapted to be depressed once per revolution on movement of an externally mounted element controlled by the external control member into the path thereof.

The invention is illustrated by way of example with reference to the accompanying diagrammatic drawings, in which:

Figure 1 shows one typical construction of the abrasive tool according to the invention in axial section,

Figure 2 is an end view of the same tool partly in elevation and partly sectioned, parts of this figure on each side being cut away for convenience so as to enable the rest of the figure to be drawn on a correspondingly enlarged scale, and

Figure 3 is a fragmentary section on the line III—III in Figure 2, illustrating a detail.

Referring to the drawings, the abrasive tool is adapted to be secured to a driving spindle 11 by means of a nut 12 screwed on the end of the spindle 11 and provided with a washer 13 and also by means of grub screws 14, 15 engaged in screw-threaded bores in a hub portion 16 of the tool. The tool comprises a front plate 17 welded to the hub portion 16 and about the periphery of which there is an annular series of brush holders 18 slightly spaced from each other and secured by screws 19 perpendicularly to the front plate 17. The holders 18 are in the form of channels which are stamped from sheet metal, and open outwardly and radially with respect to the driving spindle 11. The side walls of the

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holders 18 are angled slightly toward each other to provide restricted dovetail slots for slidably receiving and retaining the respective brushes. Each of the rearwardly projecting ends of the holders is formed with a small lug 21, which is an extension of the base of the holder, and these lugs are adapted to fit into co-operating recesses 22 formed in a back plate 23, thus preventing relative rotation of the back and front plates 23, 17. The fibres 24 of the brushes are clamped in the usual manner near the anchor end of the brush, to form a compact base which is encased with a metal strip 25, said base being of a form and size such that it can slide endwise into its respective holder 18 and be anchored therein by the side walls forming the dovetail slot. By means of this construction, the brushes may be readily assembled and removed from the tool, and due to the holders being formed of a series of dovetail channels for the reception of the respective brushes, any desired number and spacing of such holders may be provided to accommodate the desired number of abrasive strips and brushes. Surrounding the spindle 11 there is an annular series of pins 26 for anchoring abrasive strips 27. Said pins 26 are spaced from and about the shaft 11 in parallel relation thereto, and to each other. The abrasive strips 27 are anchored to the corresponding pins by loops 28 of fabric fitted over the latter and are wound upon each other to form a roll 29 about the spool comprising said anchor pins. The anchor pins are mounted on a ring 31 which is rotatable on a boss 32 secured to the front plate 17, rearward movement of the ring 31 in an axial direction being prevented by a circlip 33 engaged in the boss 32. One of the said anchor pins has a small extension 34 formed upon its free end to facilitate the entry of the anchor pins into recesses in a rotatable sleeve 35 forming part of an adjusting unit carried by the back plate 23, upon assembly. The adjusting unit and back plate 23 are assembled with the boss 32 and hub portion 16 by means of a flanged tube 36, having a flange 37 at one end and an external screw-thread 40 at the other. The rotatable sleeve 35 is adapted to fit over the flanged tube 36 with a small clearance, and is rotatably carried at one end in the back plate 23 by means of a holding ball race having balls 38 and at the other end by a thrust ball race having balls 39. A worm wheel 41 formed integrally on the sleeve 35 is drivably engaged by a worm 42 carried on a spindle 43 which is mounted, for rotation, in lugs 44, 45 fixed to the back plate 23. Secured to an extension of the spindle 43 of the worm 42 is a ratchet wheel 46 adapted to co-operate with a pawl 47 (Fig. 3) pivoted on an operating member 48, the toe of the pawl 47 being pulled into engagement with the teeth of the ratchet wheel 46 by means of a light spring 49 secured between the pawl and the operating member. The said operating member 48 is pivotally mounted on the worm-carrying spindle 43 and is normally held outwards by means of a spring 51 attached to the back plate. The free end of the operating member, to which the pawl is pivoted, projects outwardly through an aperture 52 formed in the back cover plate 53 and, when operated, can pivot to a position in which the free end of the said operating member is flush with the surface of the back cover 53 and is prevented from further inward movement by a stop 54 secured to the back plate 23. Excessive outward movement of the operating member 48 is likewise prevented by a rubber pad 55 carried thereby engaging the inside surface of the back cover plate 53. The teeth of the ratchet wheel also engage with a retaining pawl (not shown) which is held in engagement therewith by a spring steel strip secured to the back plate and adapted to constrain the ratchet wheel to rotate in one direction only. A balance weight (not

shown) is secured to the back plate 23 and is designed to counterbalance the weights of the operating member and the associated worm gearing, and so eliminate vibrations of the tool when revolving at high speeds. The worm wheel 41, the worm 42, the operating member 48, and the balance weight are enclosed by an annular plate 56 attached near the periphery of the back plate 23 and by the back cover plate 53, the said back cover plate 53 being fixed by screws 57 to lugs 58 on the said annular plate 56 and held against a ball race located on the free end of the worm wheel boss.

The loading of the tool with abrasive strips is accomplished by sliding one anchor loop 28 over each of the anchor pins 26 and feeding the abrasive strips 27 through the openings between the brush holders 18, at least one strip 27 being inserted through each opening so that the brushes 24 are interleaved by abrasive strips as shown in Fig. 2. The front plate 17 is then positioned on the spindle 11 and rotated while holding the anchor pin assembly 26, 31 stationary so that the abrasive strips 27 are reeled up into a core 29 surrounding the anchor pins 26. After the flanged tube 36 has been inserted through the centre of the tool and screwed tight, the tool is secured on the driving spindle by means of the grub screws 14, 15 in the hub portion 16 of the front plate, and by means of the nut 12 screwed on the end of the tool-carrying spindle 11. When the rotary abrasive tool has been in use, and the abrasive strips 27 have become worn, it will be necessary to unreel the strips by an amount sufficient to replace the end portions of the strips projecting between the brushes 24. A hard rubber roller 61 (Fig. 3) will then be brought to bear upon the outer surface of the annular portion of the back cover plate 53 containing the opening 52 through which the free end of the operating member 48 projects. As the tool revolves, the roller 61, running against the back cover plate 53, engages and consequently depresses the operating member 48, once in every revolution. With each inward movement of the operating member 48, the pawl 47, the toe of which is in engagement with one of the teeth of the ratchet wheel 46, is depressed and consequently turns the ratchet wheel through one tooth. On the return of the operating member 48, under the action of its spring 51, the toe of the operating member pawl rides over and engages with the preceding adjacent tooth of the ratchet wheel 46. Rotation of said ratchet wheel 46 rotates the worm 42 and consequently rotates the worm gear 41 formed upon the sleeve 35, and the rotation of this sleeve unreels the abrasive strips 27 from the abrasive strip core 29. The rubber roller 61 is held into engagement with the back cover plate 53 until the operating member has, through the agency of the ratchet and worm gearing unreel lengths of abrasive strips sufficient to replace the worn or used portions projecting between the brushes 24.

I claim:

1. A rotary abrasive tool, comprising a hollow tool body adapted to be detachably mounted on a driving shaft, a plurality of closely spaced outwardly extending brushes carried by and distributed around the periphery of said tool body, a spool member mounted in said body for relative rotation with respect to said body about the rotary axis thereof, a plurality of abrasive strips wound upon each other on said spool member with the free ends thereof extending outwardly between adjacent brushes, means comprising gearing carried by said body and connecting said spool with said body to hold said spool against relative rotation with respect to said body, said gearing including a rotary gear element for varying the angular position of said spool with respect to said body, and actuating means for effecting operation of said rotary gear element while said tool body is being rotated.

2. A rotary abrasive tool as claimed in claim 1, wherein said gearing includes a pawl-and-ratchet gear controlled

by an operating member constituting said actuating means, said operating member projecting eccentrically from the rotary tool and being adapted to be depressed once per revolution when an external element is moved into its path.

3. A rotary abrasive tool as claimed in claim 1, wherein said gearing includes a worm and worm gear, said worm being drivably connected with the ratchet of the pawl-and-ratchet gear and said worm-gear with the said spool member.

4. A rotary abrasive tool, comprising a main end plate adapted to be detachably mounted on a driving shaft, a plurality of closely spaced outwardly extending brushes carried by and distributed around the periphery of said main end plate, a plurality of abrasive strips wound upon each other within said tool with the free end of at least one of them extending outwardly between adjacent brushes, a support mounted in said body for relative rotation about the rotary axis thereof, an annular series of anchorages carried by said support, said anchorages serving individually for anchoring the inner ends of at least one of said abrasive strips and together forming coaxially with the main end plate, a spool on which said abrasive strips are windable upon each other, a detachable end plate located opposite to and coaxially with said main end plate and cooperating therewith in fixedly supporting said brushes and rotatably carrying said support, rotation transferring means mounted on said detachable end plate and drivably connected with said support, actuating means drivably connected to the input side of said rotation transferring means, said actuating means being externally operable to cause said rotation transferring means to drive and cease driving said support, a casing enclosing said rotation transferring means, and a tubular member screw-threaded at one end for engagement with the main end plate and having a flange at the other end adapted to bear against the outer end surface of said casing.

5. A rotary abrasive tool according to claim 1 wherein said actuating means comprises means controlled by the rotary movement of said tool body for effecting rotation of said rotary gear element through a limited angular movement for each revolution of said tool body.

6. A rotary abrasive tool, comprising a main end plate adapted to be detachably mounted on a driving shaft, a plurality of closely spaced outwardly extending brushes carried by and distributed around the periphery of said main end plate, a spool mounted in said body for relative rotation with respect to said body about the rotary axis thereof, a plurality of abrasive strips wound upon each other on said spool with the free ends thereof extending outwardly between adjacent brushes, a detachable end plate located opposite to and coaxially with said main end plate and cooperating therewith in fixedly supporting said brushes and rotatably carrying said spool, reduction gearing mounted on said detachable end plate and drivably connected with said spool, actuating means drivably connected to said reduction gearing to vary the angular position of said spool with respect to said main end plate, a casing enclosing said reduction gearing, and a tubular member passing through central openings in said casing and in said detachable end plate and being screw-threaded at one end for engagement with the main end plate and having a flange at the other end adapted to bear against the outer end surface of said casing.

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