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MOUNTING HEAD FOR ABRASIVE DISKS

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2 SHEETS—SHEET 1

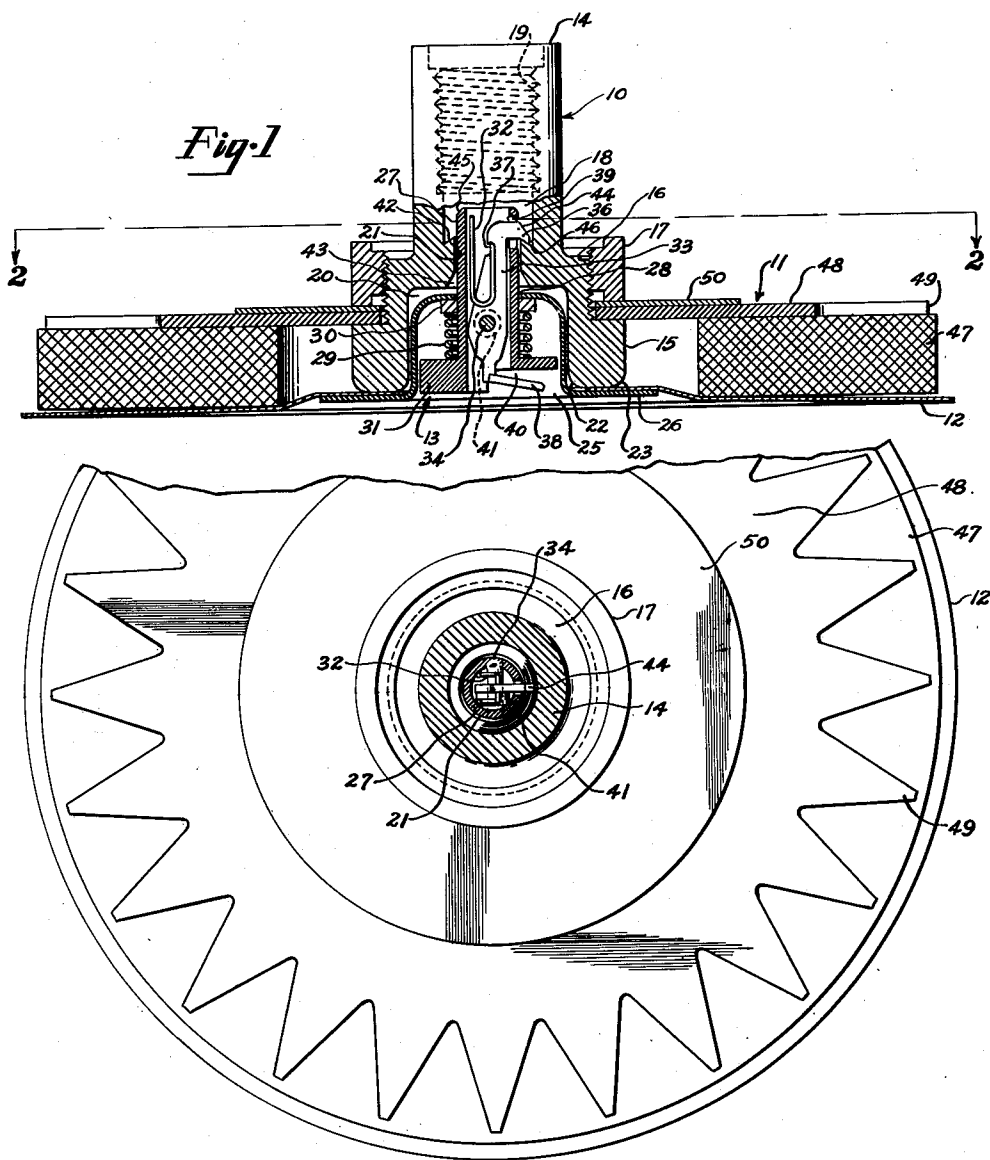


Fig. 2

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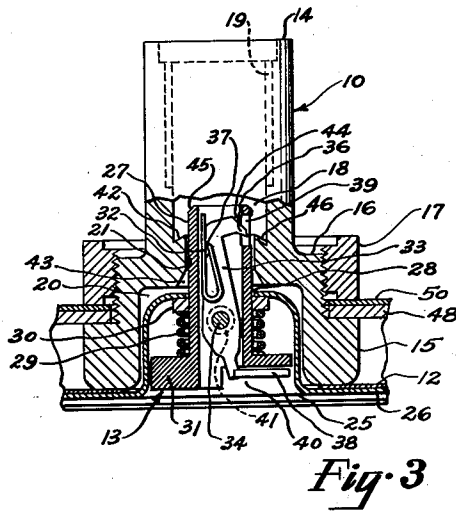
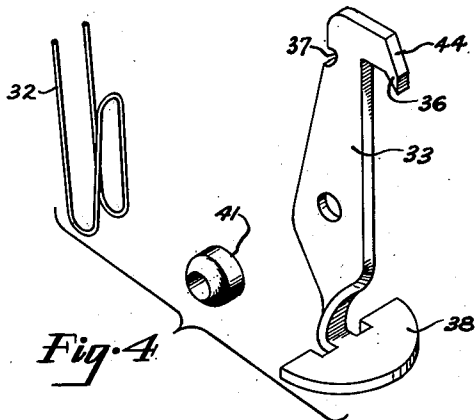
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MOUNTING HEAD FOR ABRASIVE DISKS

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7 Claims. (Cl. 51-197)

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The present invention relates to improvements in mounting heads for abrasive disks and more particularly to improvements in devices commonly known as feather edgers.

A great variety of mounting heads has been developed for abrasive disks, the common structure of which includes a resilient or yieldable pad to back the abrasive disk, a hub, and a supporting structure connecting the hub and pad. To hold the disk against the pad and in driven relation with the hub, there is rather generally used some form of washer bearing on the central area of the disk and secured by a screw or nut to the hub, whereby the central part of the abrasive disk is drawn inward into a central recess provided in the pad or the hub. To minimize tearing of the abrasive disks, sometimes incidental to cutting overloading, some structures have been proposed incorporating a slip connection at some place between the driving spindle for the disk mounting head and the disk, such that when the cutting resistance becomes too great, the whole driving torque available is not applied to the disk. Likewise, for holding the abrasive disk clamping washer against the hub, there have been proposed various structures intended to facilitate rapid changing of the disks. The present invention offers an improved disk clamping means or device which allows the necessary slippage of the disk relative to the mounting head, and which also permits of rapid manual changing of the abrasive disk without the use of tools such as wrenches or screw drivers.

An object of the invention is the provision of a mounting head which is adapted to quick changing of the abrasive disks.

Another object is the provision of an abrasive disk mounting structure resiliently supporting the disk and including a disk clamping mechanism which is quickly detachable and replaceable with respect to the hub and which will clamp replacement disks with a uniform and predetermined pressure.

A further object is the provision of a mounting head which will allow the abrasive disk to slip relative to the support when a predetermined cutting load is attained and which provides disk clamping means adapted to rapid replacement of the disk.

A further object is the provision of a feather edger of a design adapted to low cost manufacturing methods.

With the above and other objects in view, which will be apparent from the detailed de-

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scription which follows, the invention consists in certain novel features of construction and combination of parts which will be readily understood by those skilled in the art to which the invention appertains. In the drawing which illustrates an embodiment of the invention—

Fig. 1 is an elevational view of the mounting head with the lower portion represented in axial section to show the locked position of the locking latch;

Fig. 2 is a top plan view of the sanding disk head taken partly in section along the line 2—2 of Fig. 1;

Fig. 3 is fragmentary view, showing the hub portion of Fig. 1 with the locking latch in its unlocked position just prior to release of the abrasive disk; and

Fig. 4, for clarity, shows separately in perspective the latch, a latch spacer and latch spring used in the locking device of this invention.

The mounting head of this invention comprises in general a hub structure 10, a resilient backing or support structure 11 for an annular abrasive disk 12 and a removable disk retainer and retainer locking assembly 13 which clamps the central portion of the abrasive disk against an end of the hub structure, in a manner hereinafter explained, to allow slippage of the disk relative to the hub when a predetermined cutting load is attained by the abrasive disk and to allow rapid replacement of the disk.

The hub structure 10 comprises a hub sleeve 14, provided at one end with a flange 15 and an externally threaded portion 16 adjacent the flange, and a hub nut 17 on the threaded portion for clamping the hub portion of the disk backing or support structure 11 on the hub against the flange 15. The direction of threads on nut 17 and on the hub sleeve preferably are such as to tighten in use. The upper end of the hub sleeve is axially bored at 18 and provided with threads 19 or other suitable means for attachment to a drive-shaft. To receive the retainer and locking assembly 13 the flanged end of the hub sleeve has a co-axial cylindrical recess or counter-bore 20 and an axial bore 21 extending from the recess to the upper threaded bore 18 of the hub sleeve. Preferably the inner and outer end edges 22 and 23 of the flange 15 are rounded as in the drawings.

The disk retainer assembly 13 comprises a cup-shaped disk retainer 25 with an outwardly disposed circumferential flange 26 at its open end; a flanged tubular locking pin or plunger 27 extending through a central aperture 28 in the re-

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tainer 25 and through the bore 21 of the hub sleeve; a spiral compression spring 29 and retainer thrust washer 30 disposed about the locking pin 27 between the retainer 25 and the circumferentially extending flange 31 on the outer end of the locking pin; a latch spring 32; and a latch 33 within the locking pin pivoted intermediate its ends on latch pivot pin 34, extending transversely through the locking pin. Washer 30 may be formed of an impregnated bearing material. The latch and associated spring are shown more clearly in Fig. 4. The inner end of the latch 33 is provided with a detent tooth 36 on one side and a notch 37 on the opposite side to receive one end of the latch spring, while the other end is provided with a lateral projection 38, extending in the same direction as the tooth 36, for manual operation of the latch. By the action of the latch spring which is interposed between the latch and locking pin wall and which is retained in position by the notch 37, the latch is biased radially outwardly so that the latch tooth 36 normally projects through an aperture 39 in the locking pin wall. The end flange 31 of the locking pin is relieved at 40 to accommodate the latch operating projection 38. A latch spacer 41 may be placed on the latch pivot 34 between the latch and the inner side of the latching pin wall.

The shoulder 42 between the upper bore and bore 21 serves as a stop for the latch tooth to prevent outward axial movement of the locking pin when the latch is in locking position. Preferably this shoulder 42 is formed aslant with the inner diameter higher than the outer diameter, while the corresponding face of the latch tooth has a complementary shape to insure continued positive operation of the latch when the locking and retaining mechanism is set in place. To facilitate insertion of the retainer and locking assembly, an inside chamfer 43 is provided between recess 25 and bore 21 while the latch tooth is provided with a beveled face 44 and the latching pin end with a chamfer 45. To prevent the latching pin from spinning with the retainer 25 and disk 12 relative to the hub when slippage between disk 12 and the disk support occurs, a latch tooth receiving notch 46 is provided in shoulder 42.

The resilient backing or disk support structure 11, by means of which the abrasive disk 12 is supported, is mounted to the hub, and comprises a flexible annular pad or disk 47 secured by suitable means to a resilient disk 48 notched at its outer circumference with a series of radially extending fingers or projections 49, and a steel disk 50 interposed between the disk 48 and the hub nut 17. Preferably the disk 48 is formed of vulcanized, compressed fiber with the pad 47 of felt, and the two may be bonded together with a glue or cement. The thickness of the felt pad 47 should be sufficiently greater than the total thickness of flange 15, flange 26 and abrasive disk 12 to provide clearance between the latching assembly and the work. The steel disk 50 serves not only as a washer between hub nut 17 and the disk 48, but has the particular function of stiffening the hub region of the backing structure, and thus may be made to overlap the inner portion of felt disk 47 as required to give the extent of central stiffness desired. The use of the notched circumference also results in an increased flexibility of the support at the outer edge of the backing structure.

This notched circumference on the resilient

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disk 48 is of particular value since such a structure results in increased flexibility of the disk support toward the outer edge and in the application of a smaller normal force on the abrasive disk toward the edge. Hence there is a decreased abrasive action toward the outer edges in consequence whereof there is no sharp line of demarkation between the sanded and unsanded portions of the work surface. Further, the alternation of areas of high and low pressure applied to the rim of the abrasive disk by this notched structure results in faster cutting.

In changing disks, pressure is applied with a finger on the latch operating projection 38 to move the latching pin 27 axially inwardly against the loaded spiral compression spring 29, the latch tooth 36 being at the same time retracted to clear shoulder 42, as shown in Fig. 3. The force of latch spring 32 being lighter than that of loaded spiral spring 29, as finger pressure is released the latching pin 27 moves outwardly under the force of spring 29, while the latch remains retracted to clear shoulder 42, and thus the whole of assembly 13 is released from the hub. However, as the spiral spring has moved the latching pin outwardly far enough to let the latch tooth 36 pass through the disk retainer aperture 28, the spiral spring loading reacting on the latching pin—and hence the operator's finger—is decreased sufficiently to allow the latch spring 32 to move the latch tooth outwardly again to keep the disk retainer 25 on the latching pin 27. Thus the several parts of the latching and disk retainer structure are at all times maintained as an assembled unit.

After the above described release of the disk, the disks are changed and the disk retainer assembly is simply pushed back into the hub structure by pressure applied to latching pin head 31—the chamfers 43, 44 and 45, above described, guiding and facilitating the operation—until the latching tooth snaps over shoulder 42 to hold latching pin 27 in place. In this disk locking operation, the flange 26 of the disk retainer carries the abrasive disk 12 against the end of the hub and is there stopped, whereupon the latching pin 27 moves inwardly with respect to the retainer to load the spiral spring 27. Thus after the latch snaps over shoulder 42, the force of the load spring determines the clamping pressure exerted by the retainer flange 26 and the hub on the abrasive disk.

When this feather edger is overloaded in use, as by excessive pressure on the work or by excessive cutting resistance, the felt disk 47 slips over the abrasive disk to decrease or halt the abrading action of the abrasive disk. This slippage involves slippage of the disk 12 upon the hub end as well as on the felt disk. Hence the axial force exerted by the loaded spring, which determines the driving frictional force developed between hub and disk 12, serves as the controlling factor in determining the maximum abrading loading allowed. Thus in a given mounting head structure, the cutting load at which the disk slippage occurs is predetermined by the strength and dimensions of the spiral spring. Disk rupturing thus is avoidable by suitable choice of the spring, and a more sensitive control of cutting is obtainable.

As the retainer latching assembly might under some conditions tend to turn relative to the hub when the abrasive disk slips during overloading, the notch 46 in shoulder 42 catches the latch tooth to stop sliding of the tooth on the shoulder

whereby wear of the latching mechanism is prevented.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are, therefore, intended to be embraced therein.

I claim:

1. In an abrasive disk mounting structure having hub means provided with a hollow formation in the work-face end thereof, a quick-release disk clamping mechanism extending into said hollow formation in the hub means, said clamping mechanism comprising a manually manipulatable plunger, a spring urged disk-engaging member mounted rotatably on the plunger, a compressed spring operatively disposed between the disk clamping member and the plunger to bias said member toward the hub for clamping an abrasive disk with a predetermined biasing force, said plunger being provided with detent latching means manually operable from the work end of the hub adapted to engage the hub means.

2. In an abrasive disk mounting structure having hub means having a hollow work end, a disk clamping mechanism removable from the hub means and adapted to clamp a disk in driven engagement with the hub means until a predetermined abrading load is attained by the disk, said mechanism extending into a hollow formation in the work end of the hub means and comprising a manually manipulatable plunger, a spring urged disk-engaging member rotatably mounted on the plunger, a compressed spring operatively disposed between the disk clamping member and the plunger to bias said member toward the hub with a predetermined biasing force, and detent latching means on the plunger adapted to engage releasably the hub means, said latching means being manually operable from the external end of said plunger to release said plunger from the hub means for removal of said mechanism.

3. In a mounting head for an abrasive disk, a hub, a centrally apertured retaining member to hold the central portion of an abrasive disk against the hub end, a locking plunger with one end headed and the other end extending through said retaining member and adapted for releasably engaging said hub, said retaining member being free to rotate with respect to said plunger, said plunger including detent latching means to hold the plunger in engagement with said hub, said latching means being manually operable from the headed end of said plunger, and compression spring means interposed between said retaining member and the head of said locking plunger and urging said retaining member toward said hub to hold an abrasive disk in frictional engagement with said hub, the strength of said spring being chosen to predetermine the maximum torque which may be applied to the abrasive disk.

4. A mounting head for a centrally apertured abrasive disk including a backing structure for an abrasive disk, a hub carrying said backing structure, and means for holding the disk against said hub and in position relative to said backing structure; said means comprising a cup-shaped disk retainer having a radially extending end flange and a centrally positioned bottom aperture, a headed tubular locking pin extending through

said aperture and having the head thereof disposed movably within said disk retainer, a compression spring disposed between the bottom of said retainer and the head of said plunger, latching means carried in said locking plunger and operable from the head end of said locking plunger; and said hub having one end adapted for connection to a driving spindle and the other end adapted to receive said locking plunger and said disk retainer to hold an abrasive disk between the end face of the hub and the flange on said retainer.

5. In a mounting head for an annular abrasive disk including a hub adapted for attachment to a driving spindle, a disk retainer for holding a disk on the end of the hub and a disk backing structure carried by the hub, the combination of a hub having the work end thereof provided with an axial bore and counter-bore, the inner end of said bore being relieved to form a shoulder, with a disk retainer and retainer latching assembly, said retainer and latching assembly comprising a centrally apertured, cup-shaped radially flanged disk retainer, the flange of said retainer serving to hold an abrasive disk against the end of said hub and the cup portion of said retainer extending into said counter-bore, a headed locking plunger extending through the central aperture of said retainer into said bore, the head of said plunger being disposed within said cup-shaped portion, a compression spring interposed between the bottom of said retainer and said head, and a manually releasable detent lever mounted in a cavity of said plunger, said lever cooperating with said shoulder to hold said locking plunger in said bore against the bias of said compression spring, and said lever being operable from the headed end of said plunger.

6. A mounting head for a centrally apertured abrasive disk comprising a centrally bored hub having one end adapted for attachment to a driving spindle and the other end recessed, a removable retainer member to hold an abrasive disk against the hub, said retainer member having a concentrically perforated cup-like projection around which an abrasive disk may be disposed and a radial flange to overlap the central portion of the abrasive disk, said projection extending into the recess of the said hub, a headed locking plunger extending through the center of said retainer member into the central bore of the hub, latching means on the plunger for holding the plunger in the bore, and resilient biasing means interposed between the head of said locking plunger and the bottom of said projection to bias the retainer member toward the hub to hold an abrasive disk against said hub end.

7. A mounting head for an abrasive disk including in combination with the device of claim 6 a radially extended backing structure carried by said hub for backing an abrasive disk secured to the end of the hub, said backing structure including a flexible disk mounted on said hub, and an annular felt disk secured to said flexible disk to back the abrasive disk.

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