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(54) ROTARY BRUSH WITH BI-DIRECTIONAL MOUNTING ARRANGEMENT

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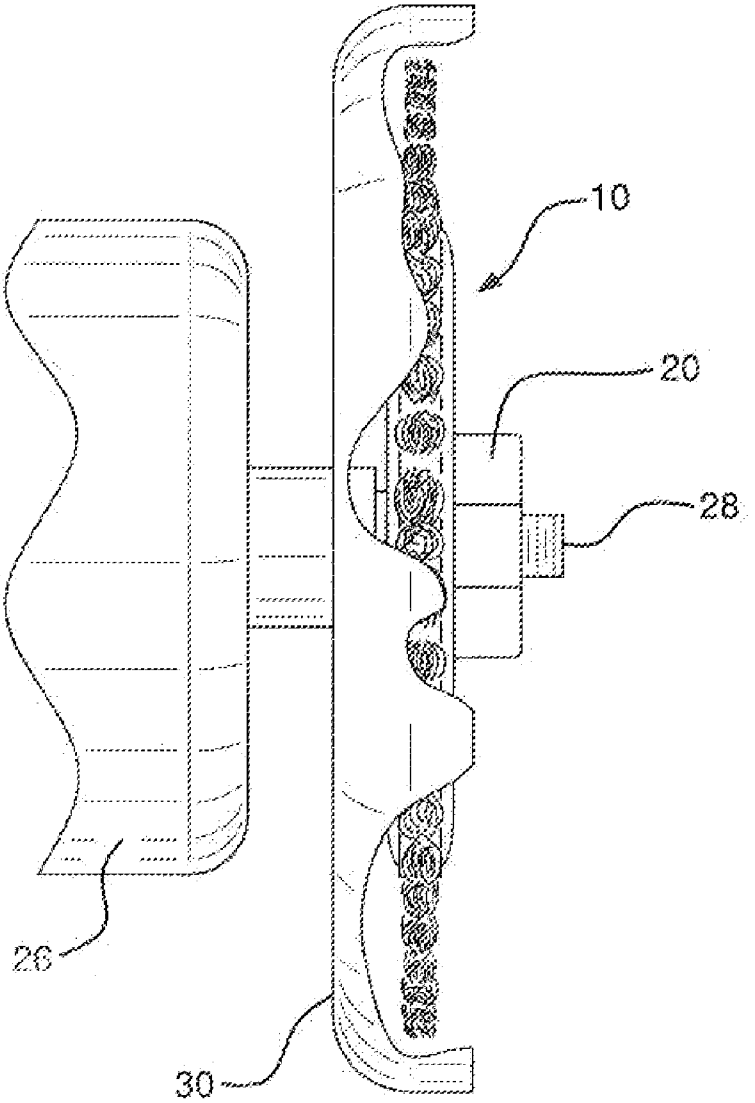
(57) **ABSTRACT**

A rotary brush for use with a surface finishing tool with a drive shaft for transmitting rotary motion to the brush. The brush is in the form of a circular disc that supports circumferentially disposed brushing elements, and includes a nut having internal threads for engagement with the drive shaft. The nut extends axially outward from each face of the disc an approximately equal distance to facilitate bi-directional mounting of the brush on the drive shaft.



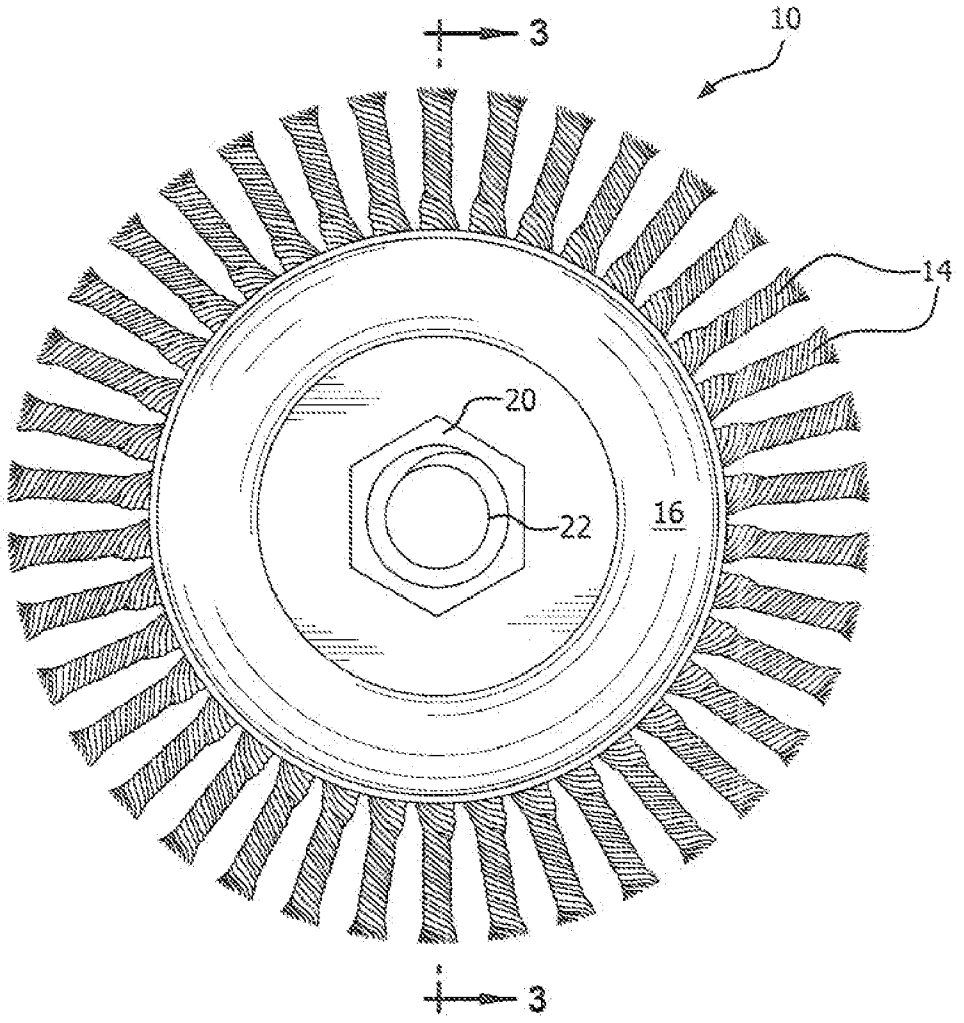


FIG. 1
(Prior Art)

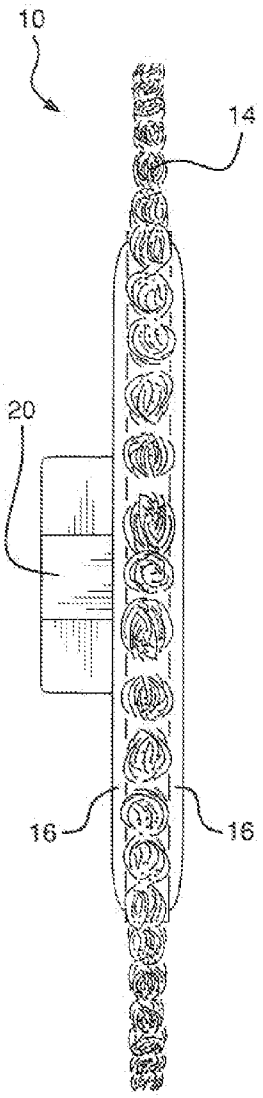


FIG. 2
(Prior Art)

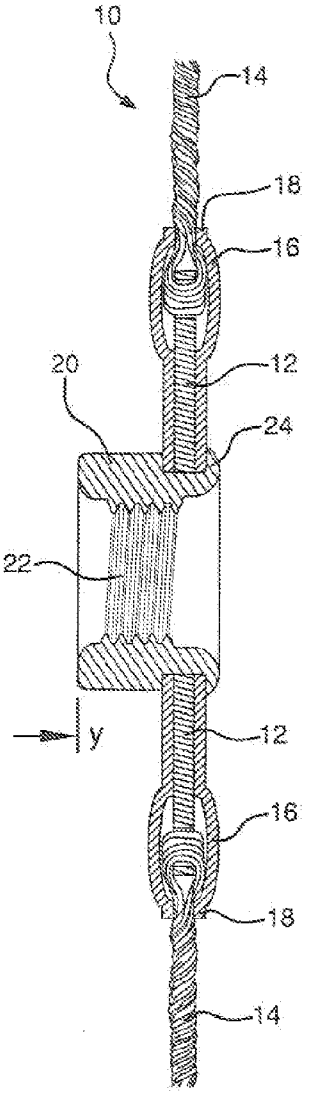


FIG. 3
(Prior Art)

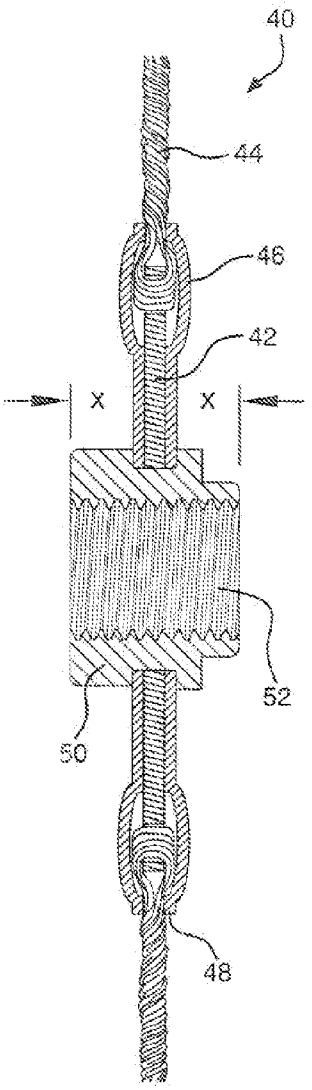


FIG. 6

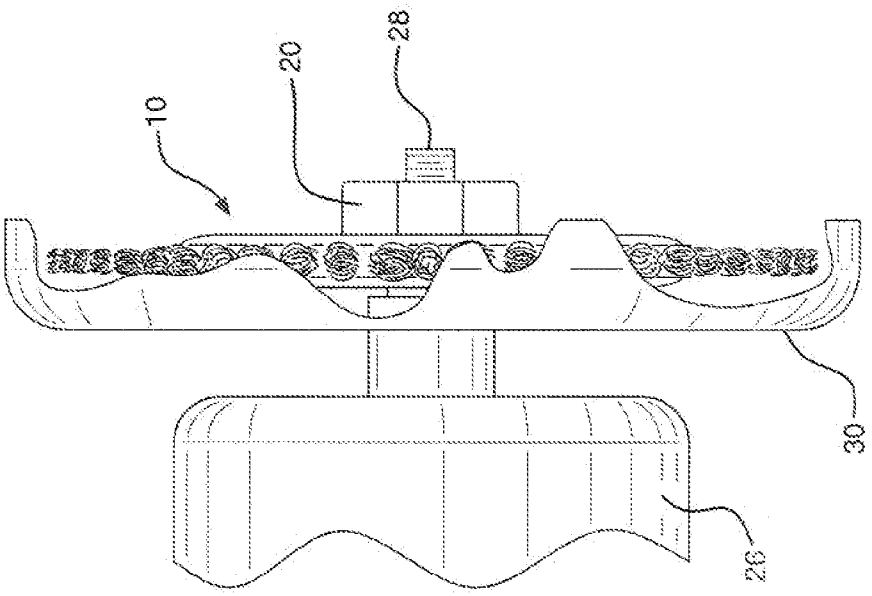


FIG. 5

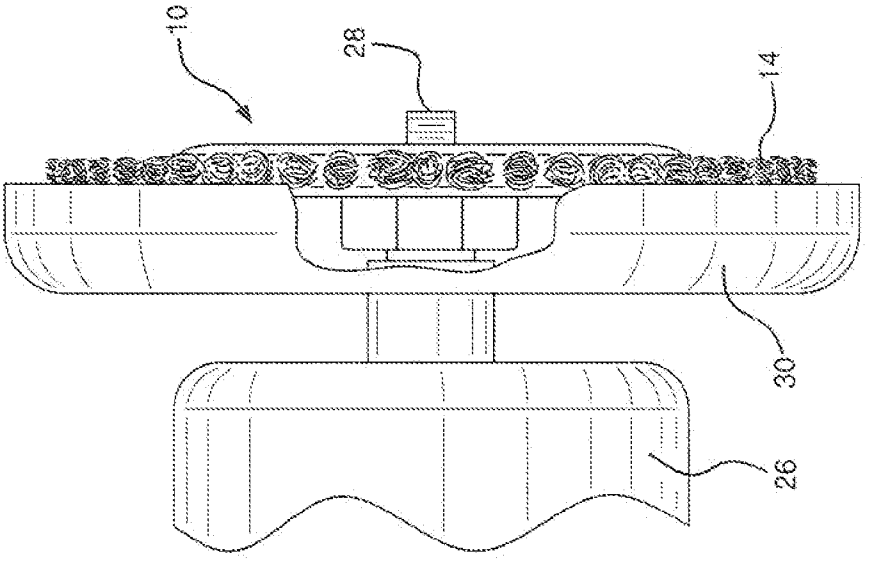


FIG. 4

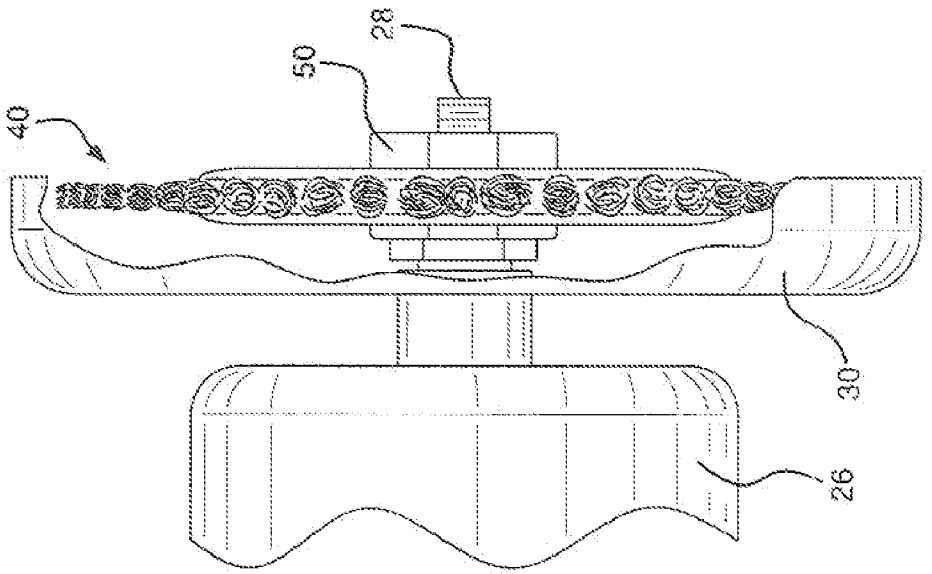


FIG. 8

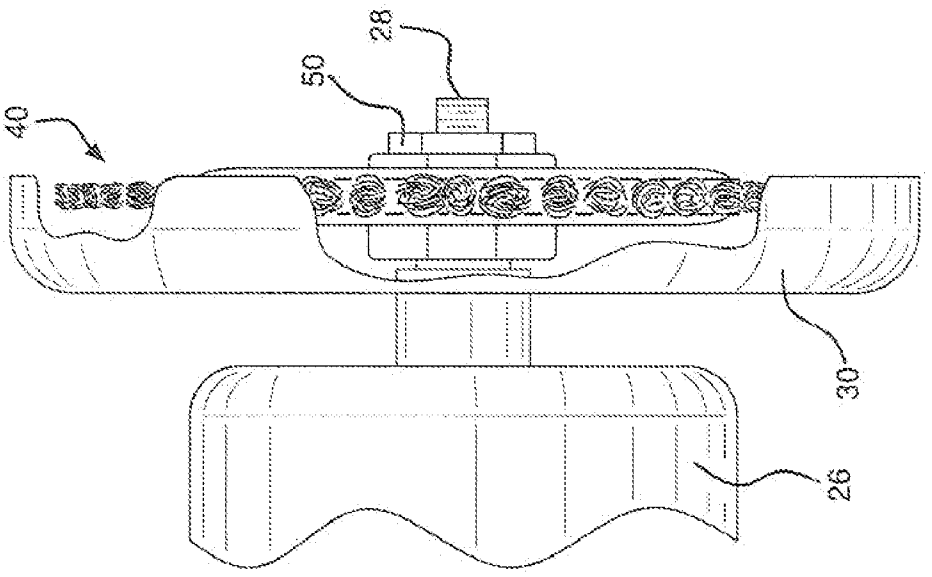


FIG. 7

ROTARY BRUSH WITH BI-DIRECTIONAL MOUNTING ARRANGEMENT

BACKGROUND

[0001] This disclosure relates to a method of manufacturing wire brush tools for metal working and other finishing operations.

[0002] It is an object to provide a brushing tool which enables the brushing tool to be mounted bi-directionally, greatly extending the service life of the brush.

SUMMARY

[0003] A rotary brush for use with a surface finishing tool is disclosed. The tool has a drive shaft for transmitting rotary motion to the brush. The brush is in the form of a circular disc that supports circumferentially disposed brushing elements, and comprises a nut including internal threads for engagement with the drive shaft. The nut extends axially outward from each face of the disc an approximately equal amount to facilitate bi-directional mounting of the brush on the tool.

[0004] In a further embodiment, also disclosed is a rotary brush, comprising a circular disc defining a plane, a plurality of brushing elements extending radially from the disc around the circumference of the disc and lying substantially in the plane defined by the disc, and a mounting nut located coaxial with the axis of the disc and extending symmetrically on both sides of the disc relative to the plane of the disc for mounting the disc to a drive shaft The brushing elements may comprise wire knots, abrasive bristles, or other suitable brushing elements.

[0005] Also disclosed is a mounting nut for a rotary brush, comprising a body portion having a central bore therethrough, the bore being threaded to engage a correspondingly threaded drive shaft, and a disc-engaging portion located in substantially the center of the body portion for attaching the circular disc to the nut to transmit rotary motion of the drive shaft to the disc through the nut. When the nut is attached to the disc he body portion extends outward from each face of the disc an approximately equal distance. The body portion of the mounting nut may include hex flats on the exterior of the body portion. Also disclosed is a bidirectional mounting system for a rotary disc brush in the form of a circular disc supporting circumferentially disposed brushing elements, comprising an externally threaded drive shaft for producing rotary motion, a nut mountable to the center of the circular disc, the nut having a body portion with first and second ends and a central bore threaded to engage the threaded drive shaft for rotary movement therewith, the nut having a disc-engaging portion in substantially the center of the body portion between the first and second ends for attachment to the disc, the body portion extending outward from the disc-engaging portion an approximately equal distance.

DESCRIPTION OF THE DRAWINGS

[0006] For the purpose of illustration, the drawings show a form of rotary brush that is presently preferred. However, it should be understood that the brush is not limited to the precise arrangements and instrumentalities shown in the drawings.

[0007] FIG. **1** is a front view of a rotary brush according to the prior art.

[0008] FIG. **2** is a side view of the rotary brush of FIG. **1**.

[0009] FIG. **3** is a sectional view of the rotary brush of FIG. **1**, taken along the line **3-3** in FIG. **1**.

[0010] FIG. **4** and FIG. **5** are simplified illustrations of the manner in which the rotary brush according, to the prior art may be mounted to a surface finishing tool.

[0011] FIG. **6** is a sectional view similar to FIG. **3** of a rotary brush as disclosed and claimed herein.

[0012] FIG. **7** and FIG. **8** are simplified illustrations of the manner in which the rotary brush as disclosed and claimed herein may be mounted to the surface finishing tool.

DETAILED DESCRIPTION

[0013] Referring to the drawings, wherein like numerals indicate like elements, there is shown in FIGS. **1**, **2**, and **3** a rotary brush **10** according to the prior art. The prior art brush **10** has a disc **12** that supports a plurality radially extending wire knots **14**. Wire knots are formed by passing wire bundles through circumferential perforations located along the edge of disc **12**. Wire knots **14** are formed by looping and twisting the wire bundles around the edge of the disc **12**.

[0014] Disc **12** is sandwiched between side plates **16**. Side plates **16** are formed near the rim to define a bulbous cavity **16** to surround and hold wire knots **14** in place. The extreme ends **18** of side plates **16** are tightly crimped against wire knots **14** in order to restrict pivotal movement of wire knots **14** in the plane of disc **12**. Side plates **16** may be welded to disc **12**. A mounting nut **20** is provided for mounting rotary brush **10** to a drive shaft of a surface finishing tool or other means of imparting rotary motion to the brush. Mounting nut **20** typically has internal threads **22** to enable rotary brush **10** to threadingly engage a correspondingly threaded drive shaft.

[0015] As best seen in FIGS. **2** and **3**, mounting nut **20** has one side **24** that is swaged or rolled over to help anchor mounting nut **20** to disc **12**. By forming side **24** in that manner, mounting nut **20** can be firmly attached to disc **12** without the need for additional elements such as adhesives, rivets, and the like. Although prior art mounting nut **20** facilitates attachment to disc **12**, it can be seen that mounting nut **20** extends for a distance y on the side of the disc **12** opposite the swaged side **24**. As a result, the rotary brush is asymmetric when viewed from the side as in FIG. **3**.

[0016] Rotary brush **10** is intended to be mounted to a finishing tool so that the mounting nut **20** faces outward relative to finishing tool **26**, as best seen in FIG. **4**. That is brush **10** is intended to be mounted on the drive shaft **28** in such a manner that brush **10** rotates within safety guard **30** so that a user's hands and fingers are shielded from the brush **10** when it is being rotated by finishing tool **26**. Thus, the prior art brush **10** uses the asymmetric mounting nut **20** to encourage the brush **10** to be mounted only one way on the drive shaft **28**, for safety reasons.

[0017] However, mounting brush **10** as shown in FIG. **4** means that the brush **10** rotates always in the same direction. As the brush **10** is used, the wire knots **14** tend to wear down and become dull, so that the brush **10** becomes less "aggressive" in removing material from a surface to be finished by the brush **10**. To extend the life of a brush **10**, users in the field often remove the brush **10** after it has become worn, turn it over, and remount it to the drive shaft **20** with mounting nut **20** facing inward, as best seen in FIG. **5**. This effectively causes the brush **10** to rotate in the opposite direction, and presents an unworn, more aggressive face of the wire knows **14** to the surface to be finished.

[0018] Mounting the brush **10** in that manner, however, leads to safety problems. Because of the safety guard, it is

sometimes difficult to insert a wrench or other tool to tighten mounting nut **20** to securely attached brush **10** to drive shaft **28**. Failure to adequately tighten mounting nut **20** and securely attach brush **10** to drive shaft **20** can result in the brush becoming loose and flying off the tool at high speed, posing a clear risk of injury to the user, to bystanders, and to property. In addition, because the mounting nut **20** is asymmetric relative to disc **12**, by mounting brush **10** so that mounting nut **20** faces inward, the plane of disc **12**, and consequently wire knots **14**, extend past the safety guard **30**. A rapidly rotating brush **10** extending beyond safety guard **30** poses a clear risk of hand and finger injury, or worse, to the user.

[0019] The brush disclosed and claimed herein overcomes the problems with the prior art brush and enables a rotary brush to be mounted with either surface of the brush disc facing inward relative to the finishing tool. Referring first. to FIG. **6**, rotary brush **40** has substantially the same structure as brush **10**. Thus, rotary brush **40** includes a disc **42** that supports a plurality of radially extending wire knots **44**. Disc **42** is sandwiched between side plates **46**, and the extreme ends **48** of side plates **46** are tightly crimped against wire knots **44**, all as with brush **10**.

[0020] Rotary brush **40** also includes a mounting nut **50** for mounting rotary brush **40** to a drive shaft **28** of a surface finishing tool **26** or other means of imparting rotary motion to the brush. Mounting nut **50** has internal threads **22** to enable rotary brush **40** to threadingly engage drive shaft **28**.

[0021] Mounting nut **50** extends axially outward from the plane of disc **42** for a distance x on each side of disc **42**. The distance x on one side of disc **42** is approximately equal to the distance x on the opposite side of disc **42**, but exact equality is not necessary. The actual distances may vary slightly, as long as they are approximately the same on both sides of disc **42**. Preferably, distance x is less than the distance y by which mounting nut **20** extends from on one side of prior art brush disc **12** (sec FIG. **3**).

[0022] By making extent x of mounting nut **50** less than the extent y of mounting nut **20**, there is greater assurance that, if brush **40** is turned over and mounted on drive shaft **28** the opposite way, safety guard **30** will be able to fully shield wire knots **44** of brush **40**. As best seen in FIGS. **7** and **8**, when mounted with either surface of disc **42** facing outward, the plane of disc **42** is at approximately the same distance from the finishing tool **26**. That way, brush **40** is fully shielded by safety guard **30** and there are no wire knots **44** that extend an unsafe distance beyond the edge of safety guard **30**. In addition, mounting nut **50** has hexagonal flats on both sides of disc **42**, so that a user can easily reach the hexagonal flats with a wrench or other tool to securely tighten mounting nut **50** to drive shaft **48**.

[0023] It is presently preferred that mounting nut **50** be a single piece. However, mounting nut may comprises two separate halves, one half being attached to one face of the disc **42** and the other half being attached to the other face of the disc **42**.

[0024] The disclosed brush may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification, as indicating the scope of protection claimed.

1. A rotary brush for use with a surface finishing tool having a drive shaft for transmitting rotary motion to the brush, the brush being in the form of a circular disc supporting circumferentially disposed brushing elements and comprising a nut including internal threads for engagement with the drive shaft, the nut extending axially outward from each face of the disc an approximately equal distance to facilitate bi-directional mounting of the brush on the tool.

2. A mounting nut for a rotary brush being in the form of a circular disc supporting circumferentially disposed brushing elements, comprising

a. a body portion having a central bore therethrough, the bore being threaded to engage a correspondingly threaded drive shaft,

b. a disc-engaging portion located in substantially the center of the body portion for attaching the circular disc to the nut to transmit rotary motion of the drive shaft to the disc through the nut,

the body portion extending outward from each face of the disc when the nut is attached to the disc an approximately equal distance

3. The mounting nut of claim **2**, the body portion including hex flats on the exterior of the body portion.

4. A mounting nut for a rotary disc brush, comprising a hexagonal body having an axial length L, a threaded bore extending axially through the body for the length L, and a disc-engaging portion located exteriorly of the body approximately half-way along the length L for engaging a rotary disc brush.

5. A bidirectional mounting system for a rotary disc brush in the form of a circular disc supporting circumferentially disposed brushing elements, comprising an externally threaded drive shaft for producing rotary motion, a nut mountable to the center of the circular disc, the nut having a body portion with first and second ends and a central bore threaded to engage the threaded drive shaft for rotary movement therewith, the nut having a disc-engaging portion in substantially the center of the body portion between the first and second ends for attachment to the disc, the body portion extending outward from the disc-engaging portion an approximately equal distance.

6. A rotary brush for use with a surface finishing tool having a drive shaft for transmitting rotary motion to the brush, the brush comprising a circular disc supporting circumferentially disposed brushing elements, and a nut including internal threads for engagement with the drive shaft located on each face of the disc, each nut extending axially outward from the face of the disc, on which it is located an approximately equal distance to facilitate bi-directional mounting of the brush on the tool.

7. A rotary brush, comprising

a. a circular disc defining a plane,

b. a plurality of brushing elements extending radially from the disc around the circumference of the disc and lying substantially in the plane defined by the disc,

c. a mounting nut located coaxial with the axis of the disc and extending symmetrically on both sides of the disc relative to the plane of the disc for mounting the disc to a drive shaft.

8. The rotary brush according to claim **7**, wherein the brushing elements comprise wire knots.

9. The rotary brush according to claim **7**, wherein the brushing elements comprise abrasive bristles.

10. The rotary brush according to claim **7**, wherein the mounting nut has a threaded axial bore.

11. The rotary brush according to claim **7**, wherein the mounting nut has a threaded axial bore and hex flats on the outer surface thereof.

* * * * *