Oct. 29, 1968 G. E. RICHMOND 3,407,502

TOOTH CLEANING APPARATUS

Filed Nov. 19, 1965

Fig. 1.

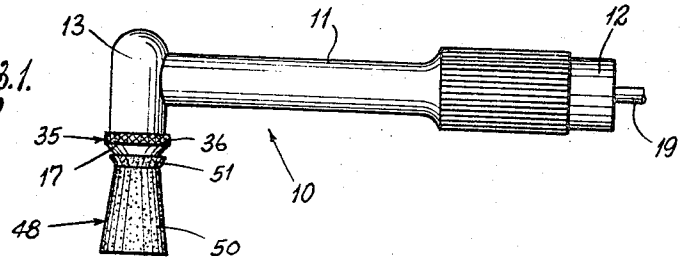


Fig. 2.

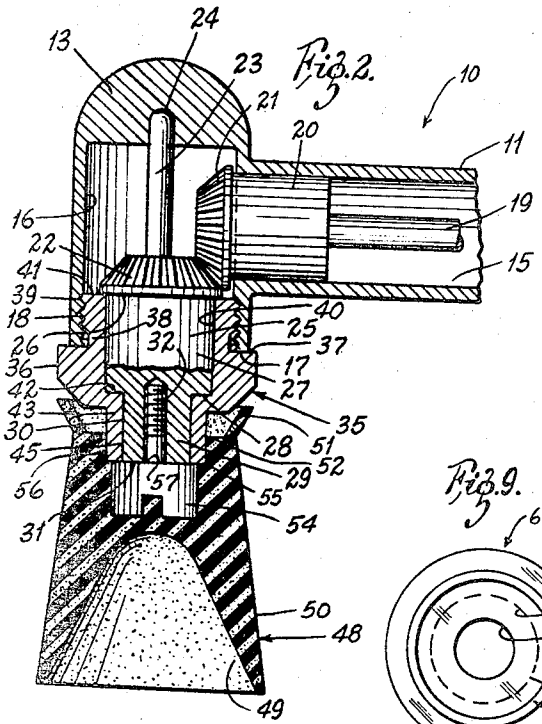


Fig. 3.

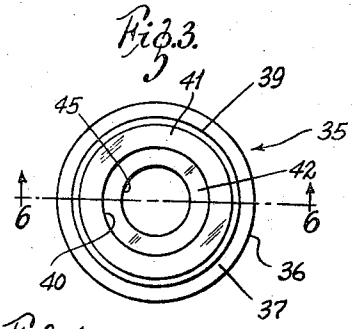


Fig. 4.

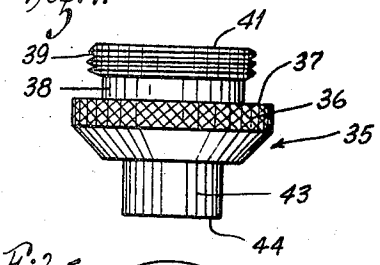


Fig. 9.

Fig. 5.

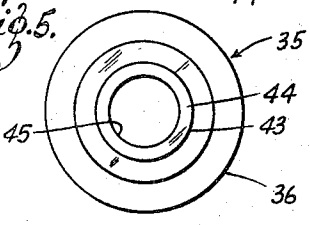


Fig. 7.

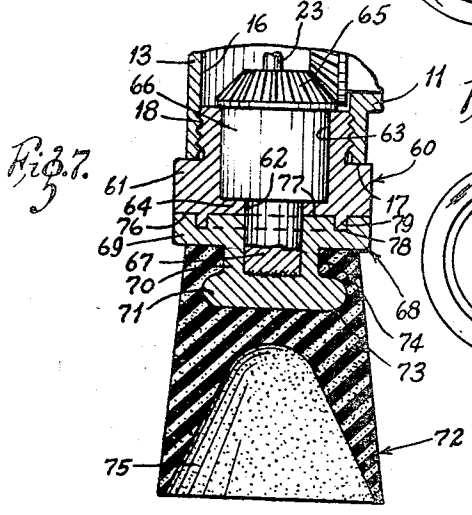


Fig. 8.

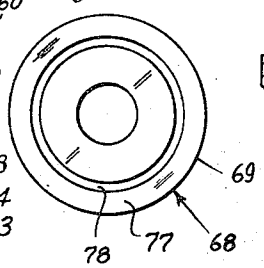
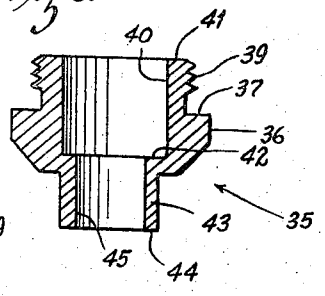


Fig. 6.



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TOOTH CLEANING APPARATUS

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ABSTRACT OF THE DISCLOSURE

Tooth cleaning apparatus having interfitting relatively rotating parts for preventing pumice from entering the space containing moving parts in the angle member of a tooth polishing machine. A bearing cap nut is provided with an extension or sleeve which extends into a recess formed in the base of the polisher. The sleeve provides such added tortuous passageways as to eliminate entry of pumice into the working parts of the polishing machine.

The tooth polishing machine has an angle that has communicating right angle recesses in it for housing meshed gears, one of which is driven by a power mechanism which is not part of this invention, and the other of which is connected to a polisher. A bearing cap nut fits over the end of the opening through which the latter gear extends. The gear to which the polisher is connected has a mandrel extension in the form of a hub or sleeve extending through the bearing cap nut. The polisher is molded about a screw that is threaded into the mandrel extension or molded to snap over a hub.

While the fit between the mandrel extension and the bearing cap nut is close, nevertheless, the bearing cap nut is stationary with the angle, whereas the mandrel extension rotates with the gears, and this relative movement requires that there be light space between the mandrel extension and the bearing cap nut. In conventional polishing machines, it is through this space that pumice has entered and ultimately caused excessive wear, cloggings, and failures in the rotation transmitting mechanisms.

In the present invention, the bearing cap nut is provided with an extension or sleeve that extends to the end or beyond the mandrel extension into a recess formed in the base of the polisher. Close tolerances are maintained between the outer diameter of the cap nut sleeve and the inner diameter of the recess in the polisher. The sleeve provides such added tortuous passageways for the pumice and the end of the sleeve rubbing on the screw head has been found to eliminate any entry of pumice into the working mechanism of the polishing machine.

The principal object of this machine is to provide the foregoing apparatus.

In general, therefore, the object of this invention is to provide means and apparatus for preventing the entrance of pumice into the area of moving parts in a tooth polishing machine.

Another object of the invention is to provide inexpensive and easily constructed means for preventing pumice from entering the working mechanism of a tooth cleaning machine, which means does not require extensive alterations of other parts of the machine.

Another object of the invention is to provide apparatus as described wherein existing tooth cleaning machines can be readily converted to incorporate the invention.

Other objects and advantages will be apparent to those skilled in the art.

In the drawing:

FIGURE 1 is a side elevation view of an angle showing the bearing cap nut and polisher in operating positions;

FIGURE 2 is an enlarged fragmentary view in longitudinal medial section through the angle, the bearing cap nut, and the polisher;

FIGURE 3 is a top plan view of the bearing cap nut;

FIGURE 4 is a side elevation view of the bearing cap nut;

FIGURE 5 is a bottom plan view of the bearing cap nut;

FIGURE 6 is a view in section taken along the line 6—6 of FIGURE 3;

FIGURE 7 is a view in section similar to FIGURE 2, but showing modified form of the invention;

FIGURE 8 is a top plan view of the hub used in the modification of FIGURE 7; and

FIGURE 9 is a bottom plan view of the bearing cap nut used in the FIGURE 7 modification.

Referring now to the drawing, FIGURE 1 illustrates the operating end **10** of a tooth polishing machine. This machine comprises an angle member **11** having an end **12** adapted to be threaded to or otherwise connected to an extension arm which transmits driving power to parts connected to the angle member. The angle member **11** has a head **13** at its other end.

There is a passage **15** through the angle member **11** which communicates at right angles with a recess **16** in the head **13**. The recess **16** opens to the lower end **17** of the head **13** and there are internal threads **18** adjacent the end **17**. A shaft **19** extends through the angle member **11** and is connected to the base **20** of a beveled gear **21** that is positioned just beyond the end of the recess **16**.

There is another beveled gear **22** that meshes with the gear **21**. It has a central pin extension **23** that fits within a recess **24** to position the gear **22**. There is a mandrel **25** extending from the base **26** of the gear **22**. The mandrel **25** has a cylindrical side wall **27** the diameter of which is slightly less than the diameter of the base **26** so that the base **26** provides an annular shoulder beyond the cylindrical side **27**. At the base of the mandrel **25**, there is an annular shoulder **28** extending radially inwardly and leading to a mandrel extension **29** of smaller diameter than the diameter of the mandrel **25**. The mandrel extension **29** also has a cylindrical outer surface **30** between the annular shoulder **28** and the lower end **31** of the mandrel extension. A hole **32** is tapped into the mandrel extension **29**.

There is a bearing cap nut **35** having a knurled or hexagonal outer surface **36** and an annular shoulder **37** that bears against the end **17** of the head **13**. An extension **38** has external threads **39** that engage the threads **18**.

There is a recess **40** in the bearing cap nut **35** that extends from the upper end **41** to a radially inwardly extending annular shoulder **42**. A sleeve or tubular extension **43** projects below the body of the nut **35** to the lower end **44** of the sleeve **43**. There is a bore **45** through the sleeve **43** from the shoulder **42** to the lower end **44**.

The bearing cap nut **35** threads into the head **13** as shown in FIGURE 2 until the shoulder **37** bears tightly against the lower end **17**. In this position, the recess **40** receives the mandrel **25** in a very close fit with a close fit between the shoulders **28** and **42**, and the bore **45** receives the mandrel extension **29** with a very close fit.

A polisher **48** is standard to the extent that it is made

of conventional rubber and has a pocket **49** at its working end, a tapered side wall **50**, and an annular skirt **51** above a base portion **52**. A screw **53** has a head **54** bonded to the polisher **48** during molding. There is a circular recess **55** formed in the base portion **52**, concentric with the shank of screw **53**. The sleeve **43** and mandrel extension **29** project into the recess **55** with a very close fit between the side wall **56** of the recess **55** and the external side wall of the tubular extension **43**. The diameter of the screw head **54** is greater than the outside diameter of the mandrel extension **29**. This makes the face **57** of the screw head **54** act as a block against the passage of pumice between the mandrel extension **29** and the sleeve **43**. Preferably, the screw head is made of brass or bronze and the mandrel extension **29** and sleeve **43** are ground together to even ends against the face **57** of the screw head **54**.

In operation, the shaft **19** is connected to a driving mechanism (not shown) to drive the gears **21** and **22**. Rotation of the gear **22** rotates the mandrel **25** and the mandrel extension **29** and rotates the polisher **48**. The mandrel **25** rotates within the recess **40** and the mandrel extension **29** rotates within the recess **45** of the stationary bearing cap nut **35**. The polisher **48** rotates about the stationary bearing cap nut **35** with the side wall **55** very close to the sleeve **43**.

Because of the design of the bearing cap nut **35** with the sleeve **43**, and the complementary design of the polisher **48** with the recess or well **55**, together with the mandrel extension **29**, pumice cannot gather; within the skirt **51** and enter the area of the gears **21** and **22**. The passage such pumice would have to travel includes the narrow space between the side **56** of the well **55** and the outer surface of the sleeve **43** and the narrow space between the inner wall **45** of the sleeve **43** and the outer wall **30** of the mandrel extension **29**. The pumice is also blocked by the sliding contact between the screw head **54** and the mandrel extension **29** and sleeve **43**. It has been found that this design effectively prevents such entry of pumice into the working parts of the apparatus.

Dimensions of the bearing cap nut **35** may be varied and still maintain the concept of this invention, but for illustrative purposes, the bearing cap nut **35** is made with a sleeve **43** having an external length of about 0.0525 inch, an external diameter of about 0.110 inch, and an internal diameter of about 0.094 inch. The length of the recess **40** from the upper end **41** to the shoulder **42** is about 0.143 inch, and its diameter is about 0.1495. The depth of the recess or well **55** in the polisher **48** is about 0.025 inch and the diameter of the inner side wall **56** of the well **54** is such as to effect a slight contact between the rubber and the sleeve **43**.

In FIGURE 7, another form of bearing cap nut **60** is threaded into the angle **11**. The cap nut **60** has an annular shoulder **61** that overlies and is tightened against the lower end **17** of the angle **11**. The nut **60** has a hole **62** through its lower end communicating with a larger diameter recess **63** to which it is joined by a horizontal annular shoulder **64**.

A gear **65** corresponds to the gear **22** of FIGURE 2, but has a downwardly depending mandrel **66** sized to fit in the recess **63**. A shaft or mandrel extension **67** projects below the mandrel **66** and through the opening **62**.

A hub **68** is welded or bonded (it may be threaded) onto the end of the shaft **67**. The hub **68** has a base **69**, a narrow neck **70**, and a larger head **71**. A rubber polisher **72** has a recess **73** for receiving the head **71** with an annular inwardly extending head **74** for snapping into the neck portion **70**. The polisher also has the usual polishing well **75**.

To block pumice from flowing between the cap **60** and the hub **68**, the cap nut and hub are provided with mutually opposing faces **76** and **77**, respectively. There is an annular groove **78** in the hub **68** and an annular bead **79** on the cap **60** which fits into the groove **78**. Preferably, the faces **76** and **77** are in contact as the hub **63** rotates. Also, the hub is preferably made of bronze or brass to provide better bearing against the steel cap nut **60**.

Various changes and modifications may be made within the purview of this invention as will be readily apparent to those skilled in the art. Such changes and modifications are within the scope and teaching of this invention defined by the claims appended hereto.

What is claimed is:

1. Tooth cleaning apparatus comprising an angle member having internal recess means for housing rotatable driving parts, a bearing cap nut adapted to be mounted over the end of one of the recess means, a sleeve projecting from the bearing cap nut, a mandrel extension extending through the bearing cap nut and into the sleeve, a polisher attached to the mandrel extension, and interfitting relatively rotatable means between the bearing cap nut and the polisher for preventing the passage of foreign matter into the internal recess means of the angle member, the interfitting means comprising a well in the polisher, the sleeve in the bearing cap nut fitting into the well, the sleeve and mandrel extension having coplanar faces, and a metal face bonded to the polisher and in constant contact with the said coplanar faces of the sleeve and mandrel extension.

2. The apparatus of claim **1** wherein the metal face compresses the face of the head of a screw by which the polisher is fastened to the mandrel extension, the screw head being brass or bronze and the sleeve being steel.

3. Tooth cleaning apparatus comprising an angle member having internal recess means for housing rotatable driving parts, a bearing cap nut adapted to be mounted over the end of one of the recess means, a mandrel extension extending through the bearing cap nut, a polisher attached to the mandrel extension, and interfitting relatively rotatable means between the bearing cap nut and the polisher for preventing the passage of foreign matter into the internal recess means of the angle member, the interfitting means comprising a hub fixed to the mandrel extension and annular tongue and groove parts between the hub and the bearing cap nut.

4. Tooth cleaning apparatus comprising an angle member having internal recess means for housing rotatable driving parts, a bearing cap nut adapted to be mounted over the end of one of the recess means, a sleeve projecting from the bearing cap nut, a mandrel extension extending through the bearing cap nut and into the sleeve, a polisher attached to the mandrel extension, and interfitting relatively rotatable means between the bearing cap nut and the polisher for preventing the passage of foreign matter into the internal recess means of the angle member, a well in the polisher, the sleeve in the bearing cap nut fitting into the well, the diameter of the mandrel being greater than the diameter of the mandrel extension, and an annular shoulder between the mandrel and mandrel extension.

5. The apparatus of claim **4** wherein the sleeve on the bearing cap nut meets the body of the bearing cap nut in an annular shoulder which complements the annular shoulder between the mandrel and mandrel extension.

6. The apparatus of claim **4** wherein the well has a side wall of smaller diameter than the external diameter of the sleeve, the side wall of the well being in rubbing contact with the side wall of the sleeve during rotation of the polisher.

7. Tooth cleaning apparatus comprising an angle member having internal recess means for housing rotatable driving parts, a stationary bearing cap nut adapted to be mounted over the end of one of the recess means, a sleeve projecting from the bearing cap nut, a mandrel extension extending through the bearing cap nut and into the sleeve, a polisher attached to the mandrel extension, and interfitting relatively rotatable means between the bearing cap nut and the polisher for preventing the passage of foreign matter into the internal recess means of

the angle member, the interfitting means comprising a well in the polisher, the sleeve in the bearing cap nut fitting into the well, the well having a cylindrical side wall and a bottom wall, the sleeve having a cylindrical side wall and an end wall, the side walls of the well and the sleeve and the bottom wall and end wall of the well and the sleeve being in rubbing contact during rotation of the polisher.

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