

Jan. 30, 1940.

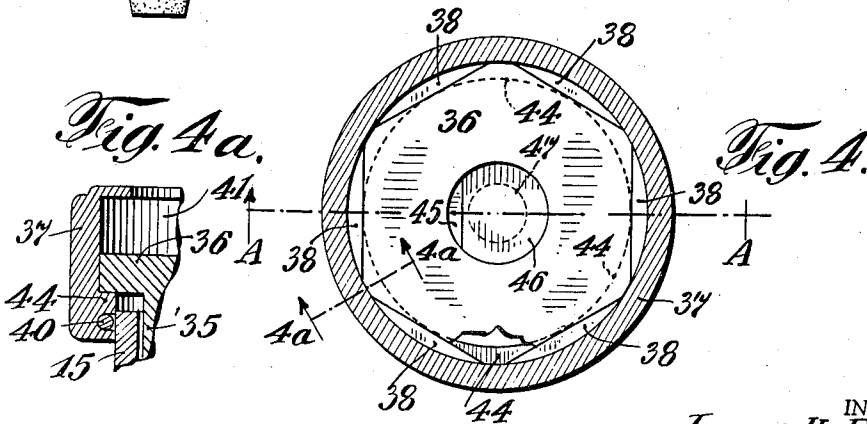
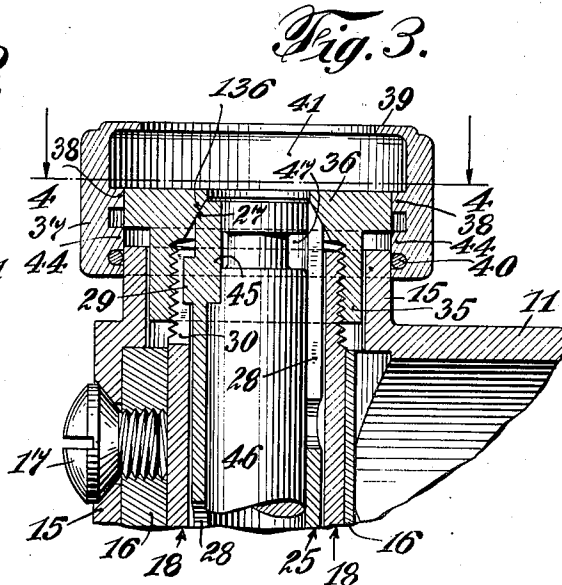
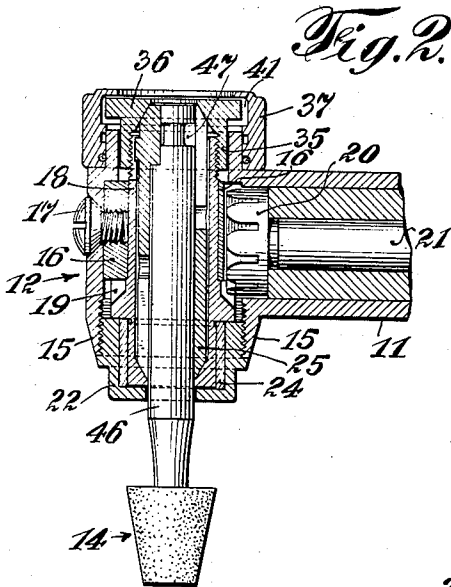
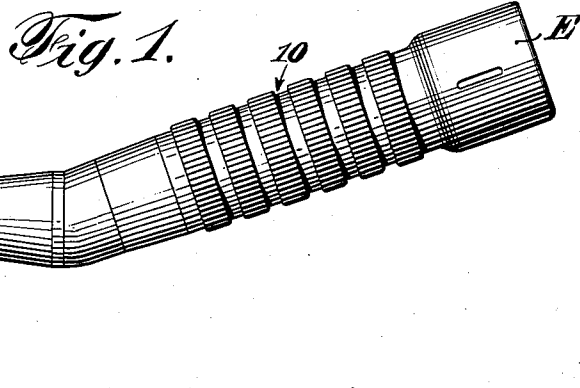
J. H. BLAIR

2,188,426

DENTAL HAND PIECE

Filed Dec. 14, 1937

2 Sheets-Sheet 1



INVENTOR.
James H. Blair
BY *Ramsley, Kent, Chisholm & Lutz*
his ATTORNEYS

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J. H. BLAIR

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2 Sheets-Sheet 2

Fig. 5.

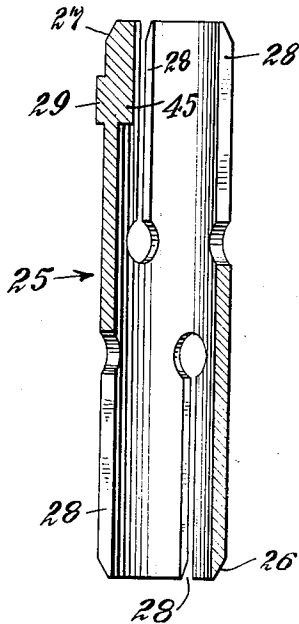


Fig. 7.

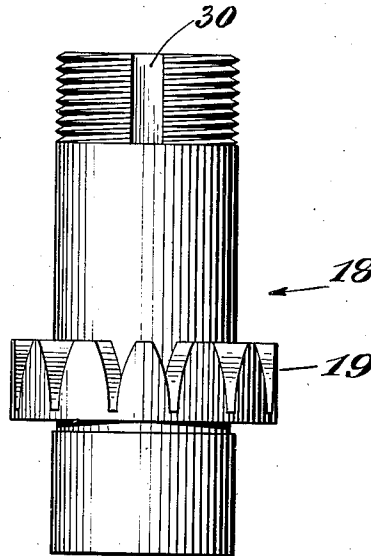


Fig. 6.

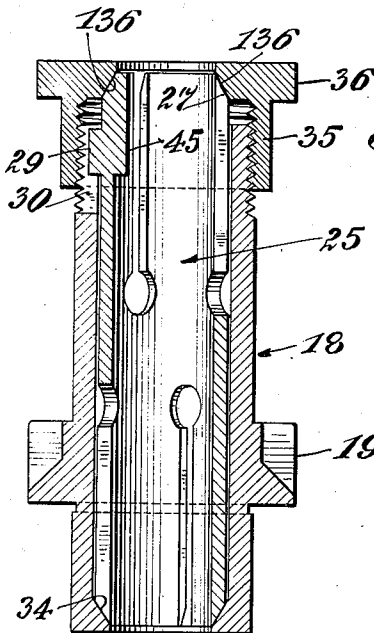
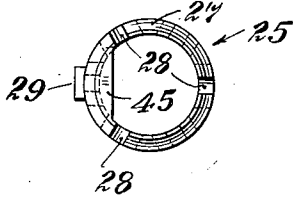


Fig. 8.

INVENTOR.
James H. Blair

BY *Ramsey, Kent, Chisholm & Lutz*
his ATTORNEYS

UNITED STATES PATENT OFFICE

2,188,426

DENTAL HAND PIECE

James H. Blair, Staten Island, N. Y., assignor,
by mesne assignments, to Reconstruction
Finance Corporation, New York, N. Y., a cor-
poration of the United States

Application December 14, 1937, Serial No. 179,661

5 Claims. (Cl. 32—27)

This invention relates to dental hand pieces, which are used to hold and rotate tools such as burrs and mounted points.

Burrs and mounted points as they are purchased by dentists are customarily provided with a standard shank. This shank is of cylindrical form, and adjacent to the free end of the shank it is provided with a segmental recess and a circumferential groove. When the shank is inserted into the conventional dental hand piece, the segmental recess makes interlocking engagement with a driving member and the circumferential groove is engaged by a hook-like latch which holds the tool in place in the hand piece.

In manufacturing the usual dental hand piece and the usual standard shank burrs and mounted points, sufficient tolerance must be allowed to insure that the hand piece will readily receive the burr. Burrs are made by many manufacturers and are even imported from Europe; and the manufacturers must be sure that the shank of each burr is sufficiently small to permit its insertion into any of the dental hand pieces in use by dentists throughout the country. This situation necessitates a relatively large average clearance between the shank of the burr and the socket of the dental hand piece. Due to this clearance, the burr vibrates considerably in use. This vibration causes the dentist difficulty in his drilling and grinding operations and greatly adds to the patient's pain. A clean sharp burr running smoothly without any vibration causes very little pain to the patient during the average tooth cavity operation.

Attempts have been made to overcome the foregoing difficulties by means of special tapered shank burrs, but these are relatively expensive and require the dentist to use a special hand piece with which standard shank burrs cannot be used.

The general object of the present invention is to provide a dental hand piece which will receive standard shank burrs and mounted points, and will hold and operate them without objectionable vibration despite the very considerable manufacturing variations in the size of the shanks.

Another object of the invention is to provide a dental hand piece of improved construction which will firmly grip and accurately center cylindrical shank burrs and mounted points.

Of course, dental hand pieces are used in all kinds of positions as far as up-side-down and right-side-up are concerned. However, it will be convenient throughout the specification and

claims to refer to the hand piece as being in the position shown in the drawings. It will be understood, however, that this is just for convenience in discussing the structure and has no significance with respect to the position in which the hand piece may be placed in actual use.

Figure 1 of the drawings is an elevation of a complete hand piece embodying the present invention.

Figure 2 is a central vertical section showing the driving head with a mounted point assembled therewith.

Figure 3 is an enlarged vertical section of a portion of the structure shown in Figure 2.

Figure 4 is a horizontal section of a portion of the structure, taken in general on the line 4—4 of Figure 3.

Figure 4a is a vertical detail section on the line 4a—4a of Figure 4.

Figure 5 is a central vertical section of a tool-gripping sleeve which is embodied in the assembly of Figures 2 and 3.

Figure 6 is a plan view of the tool-gripping sleeve shown in Figure 5.

Figure 7 is an elevation of a power-rotated sleeve embodied in the assembly of Figures 2 and 3.

Figure 8 is a central vertical section, showing the tool-gripping sleeve of Figure 5 assembled with respect to the power-rotated sleeve of Figure 7.

In Figure 1 there is shown an angular barrel having branches 10 and 11. Branch 11 terminates in a head 12 within which is mechanism to hold the shank of, and rotate, a conventional burr or mounted point 14. The barrel portions 10 and 11 are conventional and contain a shaft which is adapted to be rotated by a power connection made at E.

Barrel portion 11 terminates in a vertical tubular head 15 in the center portion of which is located a bearing sleeve 16, secured by a screw 17. Accurately journaled within sleeve 16 is a power-rotated sleeve designated as a whole by 18. Integral with this sleeve is a gear 19 having vertical teeth which mesh with gear 20 mounted on the end of the drive shaft 21 contained in barrel portion 11.

Threaded into the lower end of casing 15 is a cap member 22 which may be provided with an exterior hexagonal formation to receive a wrench. Pressed into the cap 22 is a second bearing sleeve 24 which also makes accurate fit with the power-rotated sleeve 18. It will be apparent that the construction thus far described provides for ac-

curate and adequate mounting of the power-rotated sleeve 18, and that this sleeve is rotated by power delivered by gear 20.

Within the power-rotated sleeve 18 there is a tool-gripping sleeve designated as a whole by 25. The ends of the tool-gripping sleeve 25 are formed as tapered (conical) noses 26 and 27 (Fig. 5); and from each end of this sleeve three longitudinal slots 28 extend to make the end portions of the sleeve contractible. The sleeve 25 is also provided with an integral key 29 which enters a slot 30 in power-driven sleeve 18, so that the tool-gripping sleeve will be rotated in response to rotation of the power-driven sleeve. The tapered nose 26 rests upon a tapered (conical) seat 34 (Fig. 8) formed at the bottom of sleeve 18. The top of sleeve 18 is provided with a hexagonal nut 35 having a tapered (conical) seat 136 which engages the tapered nose 27. Thus, as nut 35 is screwed onto sleeve 18, the tool-gripping sleeve 25 is automatically centered and the end portions of the tool-gripping sleeve are contracted.

Nut 35 has a hexagonal head 36, and permanently associated with it is a cap or wrench member 37. The cap or wrench member has inwardly projecting segmental portions 38 which constitute a wrench formation that is adapted to engage the wrench faces of the head 36 of the nut. In assembly, the nut 35 is dropped in from the top to the inside of wrench member 37 and then the flange 39 is spun inwardly to prevent removal of the nut. Thus assembled, the nut 35 can be screwed onto the sleeve 18, as shown in Figs. 2 and 3; and a spring ring 40 which is positioned in an internal groove in the wrench member 37 frictionally engages the outside of casing 15. When the parts are in the position shown in Fig. 2, the wrench member 37 is frictionally held against rotation by the action of spring 40, and the head 36 of the nut 35 is free to rotate in the annular recess 41. Thus the cap or wrench member 37 acts as a protective inclosure within which the nut rotates. To loosen or tighten nut 35, the wrench member 37 is moved vertically to the position shown in Fig. 3. Of course, this requires rotational adjustment of the wrench member 37 to bring the segmental projections 38 into alignment with the wrench faces of the nut, as shown in Figs. 3 and 4. Then by turning wrench member 37, the nut 35 is correspondingly turned. To facilitate grasping of the wrench member 37, it is formed with a knurled exterior surface, as shown in Fig. 1.

In elevating the wrench member 37 to the position shown in Fig. 3, it is automatically arrested in the position shown in Fig. 3 by the engagement of circular flange 44 with the corners of the nut. Attention is called to the fact that in Figs. 2 and 3 the section of the wrench member 37 is on the line A-A of Fig. 4, but the flange 44 extends under the corners of the nut head 36, as shown in Fig. 4, thereby arresting the upward movement of the nut with the segments 38 in wrench engagement with the nut. The engagement of flange 44 with the corners of the nut head is more clearly shown in Fig. 4a, which is on line 4a-4a of Fig. 4.

To insert a burr or mounted point into the hand piece, the nut 35 is loosened thereby, allowing the end portions of tool-gripping sleeve 25 to expand. The shank 46 of the burr is then inserted, with the segmental recess in the shank of the burr in alignment with segmental boss 45, which is integral with the tool-gripping sleeve 25.

Then the nut 35 is tightened, whereupon segmental boss 45 rotatively locks the shank of the burr to the tool-gripping sleeve, and the two tapered seats 34 and 136 act upon the tapered noses 26 and 27 of the tool-gripping sleeve to center the same and firmly constrict the end portions of the sleeve about the shank of the burr. Thus the burr is accurately centered and held against vibration, regardless of large manufacturing variations in the size of the shank of the burr. The annular groove 47, which is present in the conventional standard shank butt, has no function when the burr is mounted in a hand piece of the present invention.

In compliance with the patent statutes, I have discussed the best form in which I have contemplated my invention, but it will be understood that the disclosure is illustrative and does not limit the scope of the claims.

What is claimed is:

1. A dental hand piece comprising: a barrel having a free end, a tool head secured to the free end of the barrel and positioned crosswise thereof, a power driven contractible tool-gripping sleeve within the tool head operable to grip the shank of a tool adjacent to both ends of the tool head, the tool projecting from one end of the tool head, and means positioned at the opposite end of the tool head to control contraction and expansion of the tool-gripping sleeve, said means comprising a nut rotating with the tool when the same is in use and a cap holding the nut captive therein independently of the assembly of the cap and nut on the tool head, the cap having limited axial movement relative to the nut and the nut and cap having interengaging formations preventing accidental removal of the cap from the tool head, the cap having a wrench formation which operatively engages the nut when the cap is in one axial position whereby the cap may be used as a wrench to manipulate the nut, and the cap also having an annular space in which the nut may freely rotate when the cap is in another axial position whereby the cap acts as a protective inclosure for the nut when the tool is in use.
2. A dental hand piece comprising: a barrel having a free end, a tool head secured to the free end of the barrel and positioned crosswise thereof, a power driven contractible tool-gripping sleeve within the tool head operable to grip the shank of a tool adjacent to both ends of the tool head, the tool projecting from one end of the tool head, and means positioned at the opposite end of the tool head to control contraction and expansion of the tool-gripping sleeve, said means comprising a nut rotating with the tool when the same is in use and a cap holding the nut captive therein independently of the assembly of the cap and nut on the tool head, the cap having limited axial movement relative to the nut and the nut and cap having interengaging formations preventing accidental removal of the cap from the tool head, the cap having an external knurled surface and having an internal wrench formation which operatively engages the nut when the cap is in one axial position whereby the cap may be used as a wrench to manipulate the nut, and the cap also having an annular space in which the nut may freely rotate when the cap is in another axial position whereby the cap acts as a protective inclosure for the nut when the tool is in use, and friction means to prevent accidental rotation of the cap when the nut is rotating in said annular space.
3. A dental hand piece comprising: a barrel

having a free end, a tool head secured to the free end of the barrel and positioned crosswise thereof, a power driven contractible tool-gripping sleeve within the tool head operable to grip the shank of a tool adjacent to both ends of the tool head, the tool projecting from one end of the tool head and means positioned at the opposite end of the tool head to control contraction and expansion of the tool-gripping sleeve, said means comprising a nut rotating with the tool when the same is in use and a cap holding the nut captive therein independently of the assembly of the cap and nut on the tool head, the cap telescopically engaging the tool head and having limited axial movement relative to the nut and the nut and cap having interengaging formations preventing accidental removal of the cap from the tool head, the cap having a wrench formation which operatively engages the nut when the cap is in one axial position whereby the cap may be used as a wrench to manipulate the nut, and the cap also having an annular space in which the nut may freely rotate when the cap is in another axial position whereby the cap acts as a protective inclosure for the nut when the tool is in use.

4. A dental hand piece comprising: a barrel having a free end, a tool head secured to the free end of the barrel and positioned crosswise thereof, a power driven contractible tool-gripping sleeve within the tool head operable to grip the shank of a tool adjacent to both ends of the tool head, the tool projecting from one end of the tool head, and means positioned at the opposite end of the tool head to control contraction and expansion of the tool-gripping sleeve, said means comprising a nut rotating with the tool when the same is in use and a cap holding the nut captive therein independently of the assembly of the cap and nut on the tool head, the cap telescopically engaging the tool head and having limited axial movement relative to the nut and the nut and cap having interengaging formations preventing

accidental removal of the cap from the tool head, the cap having an external knurled surface and having an internal wrench formation which operatively engages the nut when the cap is in one axial position whereby the cap may be used as a wrench to manipulate the nut, and the cap also having an annular space in which the nut may freely rotate when the cap is in another axial position whereby the cap acts as a protective inclosure for the nut when the tool is in use, and means to prevent accidental rotation of the cap when the nut is rotating in said annular space.

5. A dental hand piece comprising: a barrel having a free end, a tool head secured to the free end of the barrel and positioned crosswise thereof, a power driven contractible tool-gripping sleeve within the tool head operable to grip the shank of a tool adjacent to both ends of the tool head, the tool projecting from one end of the tool head, and means positioned at the opposite end of the tool head to control contraction and expansion of the tool-gripping sleeve, said means comprising a nut rotating with the tool when the same is in use and a cap holding the nut captive therein independently of the assembly of the cap and nut on the tool head, the cap telescopically engaging the tool head and having limited axial movement relative to the nut and the nut and cap having interengaging formations preventing accidental removal of the cap from the tool head, the cap having a wrench formation which operatively engages the nut when the cap is in one axial position whereby the cap may be used as a wrench to manipulate the nut, and the cap also having an annular space in which the nut may freely rotate when the cap is in another axial position whereby the cap acts as a protective inclosure for the nut when the tool is in use, and a spring ring interposed between the cap and the tool head to frictionally oppose movement of the cap relative to the tool head.

JAMES H. BLAIR.