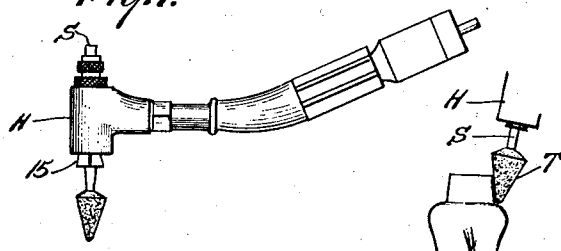
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R. W. BROWN ET AL

CONTRA ANGLE HANDPIECE

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Fig. 1.



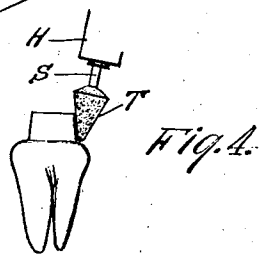


Fig. 4.

Fig. 8.

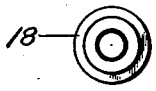


Fig. 2.

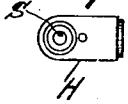


Fig. 3.

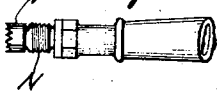


Fig. 9.



Fig. 10.

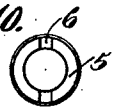




Fig. 11.

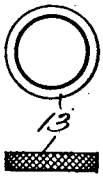


Fig. 12.

Fig. 13.

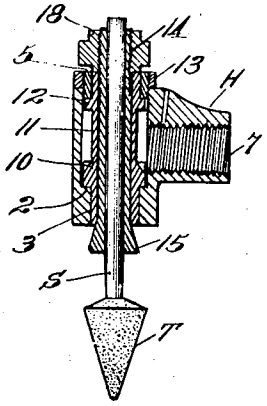
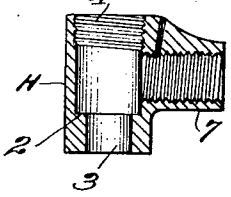


Fig. 5.

Fig. 6.



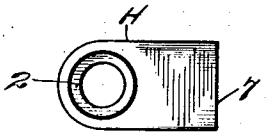


Fig. 7.

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Fig. 14.

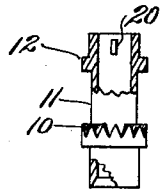


Fig. 15.

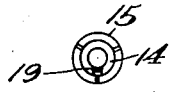


Fig. 16.

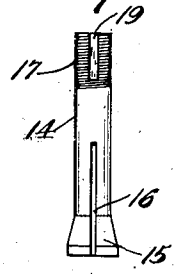


Fig. 17.



Fig. 18.

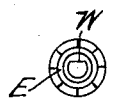


Fig. 21.

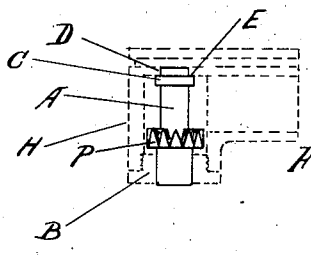


Fig. 20.

Fig. 22.

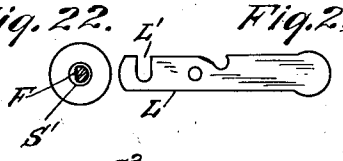
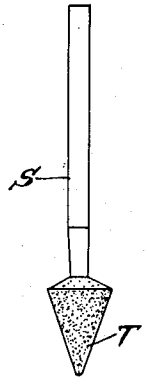


Fig. 24.

Fig. 19.



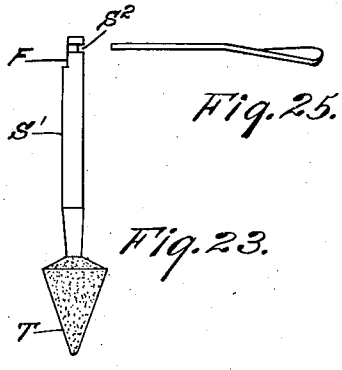


Fig. 25.

Fig. 23.

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Patented Aug. 4, 1925.

1,548,180

UNITED STATES PATENT OFFICE.

RAY W. BROWN AND ANDREW M. SPINKS, OF LOS ANGELES, CALIFORNIA.

CONTRAANGLE HANDPIECE.

Application filed August 23, 1924. Serial No. 733,783.

To all whom it may concern:

Be it known that we, RAY W. BROWN and ANDREW M. SPINKS, citizens of the United States, and residents of Los Angeles, county of Los Angeles, State of California, have invented new and useful Improvements in Contraangle Handpieces, of which the following is a specification.

This invention relates to dental instruments and particularly to hand-pieces.

In the preparation of teeth that are shaped externally, or internally, by one or another of various grinding or abrading tools such as burrs, drills, abrasives, mandrels, burnishers, reamers, facers and mounted points, rotatively operated at a pretty good speed, various mechanisms have been proposed, and some are marketed, for enabling the easy and quick change and application of the desired tools to the driving hand-piece of the mechanism. A common form of hand-piece, of the contra-angle attachment type, is shown as an example of the art. An objection to various forms of hand-pieces, now sold, is an excessive amount of lateral and end play. When a cavity is prepared to form a nearly parallel faced matrix, the lost movement in the tool frequently results in so undercutting a cavity face that, though the matrix can be taken off, the cast metal matrix product cannot be fitted onto the tooth body with desired perfection of attachment.

Again, because of a very great deficiency of bearing area of the parts which have a relative high speed action the parts very quickly wear and thus rapidly increase the initially too great amount of play.

An object of this invention is to overcome the excessive looseness of the attached cutting tool in the head or angle piece and to reduce it to a totally negligible amount, actually necessary in order to allow driving rotation of the tool without any material friction and heating, which latter results from friction of high speed in running parts having a totally insufficient bearing of rotation.

Additionally, an object is to provide a hand-piece affording a highly desirable capacity of axial adjustment of the shank of the tool so that its business (or effective) end can be disposed at various distances from the end face of the piece.

A further object is to provide means for holding the tool in a true central and non-wobbling position in its bearing.

An object is to provide a hand piece having a housing which has no removable bottom bearing and thus to avoid the liability of any part of the housing from working loose and falling away from the body of the tool.

An important object is to provide a hand piece having bearing surfaces of ample and large area to secure durability, as well as to produce a tool having practically no play.

An object is to provide a driven gear of good size to achieve greater number of tooth mesh, and this without objectionable size of housing.

A very important object is to provide for the mounting of the removable tool shank tightly in the rotative driven-gear shaft and so to eliminate any play, axial or lateral, of the shank, and of the sleeve or shaft, this play being a serious source of annoyance.

An object is to provide for the take up of wear of the end-thrust of the parts by provision of a lockable, shiftable bearing in the housing. And in this connection, an object is to provide means for so holding the gear-shaft that the gear teeth cannot be jammed up into the driving pinion with unnecessary pressure.

An object is to provide a hand piece in which a hollow gear-shaft and an inserted tool shank are secured to act as a one-piece unit, and to provide a device positively interlocking with the driven gear shaft.

Other objects and advantages will be made manifest in the following specification of an embodiment of apparatus of the invention; it being understood that other modifications, variations and adaptations may be resorted to within the spirit of the invention and its scope as here claimed.

The invention consists of structure whereby the objects are accomplished, and one structure is illustrated in the accompanying drawings, wherein:

Fig. 1 is a side elevation of the angle-piece, full size scale. Fig. 2 is a top plan of the housing, full size. Fig. 3 shows the driving pinion and part of the attachment, full size. Fig. 4 shows tooth treatment with a grinding "point." Fig. 5 is a longitudinal section of the head piece,

double size. Fig. 6 is a similar section, double size, of the housing. Fig. 7 is a plan of the housing. Fig. 8 is a plan of the collet-or draw-in nut, and Fig. 9 is a side view thereof. Fig. 10 is a plan of the bearing, and Fig. 11 is a side view thereof. Fig. 12 is a plan of the bearing lock-nut, and Fig. 13 is a side view thereof. Fig. 14 is a plan, and Fig. 15 is a partial section and elevation of the hollow gear shaft. Fig. 16 is an end view, and Fig. 17 is a side elevation of the collet. Fig. 18 is a view of the jaw end of the collet. Fig. 19 is a side view of a "mounted point" tool. Figs. 20 to 25 inclusive are views of old parts, to show by comparison the differences in the apparatus of the present invention.

In Fig. 4 there is shown a tooth stump being prepared by a tool T known as a "mounted point", and being but one of many kinds and varieties of tools having a shank S to be fitted in the handpiece housing H and rotatively driven. It will be seen that any undue play of the tool defeats precision, accuracy and economic speed of work. Moreover looseness develops obnoxious noise during operation and this seems to be cruelly heard, through the teeth, by the naturally nervous patient. By the present invention much of the clatter of the instrument parts is eliminated, and the patient made more comfortable to his advantage and the doctor's relief.

In Figs. 20 to 25, inclusive, a construction old in the art is shown and the causes of undue play in this construction will be explained. In the housing H (dotted lines) is a hollow shaft A having a driven gear to mesh with a pinion P (Fig. 3). The shank S′ of the tool T is designed to slip freely and readily into the shaft A and commonly has a lateral play of two or three one-thousandths of an inch which is multiplied at the tip of the tool when the shank tilts obliquely in the shaft. The lower end of the housing receives a threaded bushing B in which the hollow shaft rotates. The working clearance, two or three thousandths, is added to that of the shank in the shaft and so much more play is given the shank sidewise.

The hollow shaft A has at its top end a small collar C presenting a small end face or thrust surface E to the upper shoulder in the housing. This shoulder forms a very narrow bearing D around the end of the shaft A. The very small areas B and E rapidly wear and increased play results, and they heat from high speed contact friction. The shaft has end play in the bearings. Shanks S′ have necks S^2 to receive a latch L, which is slotted at L′ to pass across the neck and so hold the shank against falling out. Much end play occurs at the latch L. The shank S′ has a flattened head F to match against a flat face web W, Fig. 21, in the hollow shaft A. Much rotative play occurs between the head and driving web W. This is added to the backlash in the meshing gearing and pinion. Because of the small diameter of the gear on shaft A, small area of gear contact results and with much lash so that tooth impingement is noticeable. The instrument of Figs. 20 to 25 is one of the best on the market, and has been constantly used by Dr. Spinks, a joint applicant here.

Fully cognizant of the requirements the invention seeks to attain a more precisely operative and close running tool.

To that end the improved structure includes a housing H bored downward from its top end to form a large gear chamber contracted at its lower end to form a shoulder 2 and a long immovable bearing 3. The upper end of the chamber is threaded at 4 to receive an externally threaded bushing 5 whose top end is kerfed at 6 to take a screw driver by which the bushing may be run in. From one side of this extends a box 7 threaded to receive a nipple N (Fig. 3) of the usual driving shaft neck. In front of the nipple is the driving pinion P which projects into the housing chamber to mesh with a driven gear 10. This gear 10 is rigid on a hollow shaft 11 which has a collar 12 whose upper end is engaged by the adjustable bushing 5 so that the lower end face of the gear can be set down with a running contact against the housing shoulder 2. Thus all unnecessary end play is eliminated and is taken up by the bushing 5 as the end thrust faces wear. The hollow shaft 11 has large bearing areas in bearing 3 and in the bushing 5 and only running clearance is permitted. As the bushing is turned in to take up wear it is locked by a nut 13.

Means for securing the cutting tool shank S of a tool T comprises an elongated collet 14 having a tapered head 15 split at 16. The other end of the collet is threaded at 17, to receive a draw-in nut 18, whereby the collet head 15 may be pulled into the lower end of the hollow shaft 11, this being slightly countersunk complementary to the head. The nut 18 is reversible and has reduced ends 19 to set against the near end of the hollow shaft.

While the nut 18 is loosened up on the collet a tool shank S may be shoved into the collet to any desired degree of projection of tool point T. Then the nut 18 is turned in on the collet and as the nut runs against the hollow end, the collet will draw in and the collet jaw close upon the shank S and firmly hold it to rotate with the hollow shaft.

To prevent any possibility of the nut accidentally unscrewing and thus releasing the tool T, the collet is grooved at 19 to slide past a lug or key 20 rigid in the hollow shaft. During operation no drive strain is

put on the key 20 since the shank S is frictionally but very firmly gripped by the contracted collet head-jaws.

The collet, the hollow shaft and the tool are all rigidly locked to run as one piece. There is no play in these parts. The only possible lost motion is a minute end and side play for operative fit of the hollow shaft in its housing and bushing bearings.

The hollow shaft has a large peripheral bearing at each end giving life. It has large end thrust surfaces closely fitted to prevent play.

The collet holds the shaft true to and on axial centre line of the housing. The tool can be driven in either direction without any danger of any parts falling out and into the mouth of a patient. The removable bearing is at the top, and it is locked in.

What is claimed is:

1. A contra-angle dental hand piece including a casing having a lateral, tapped recess for a driving shaft attachment and having a generally cylindrical bore presenting an interior diametrical shoulder at right angles to the axis of the bore and forming a reduced axial bearing, a hollow shaft coextensive with the length of the casing and having a shoulder to bear on the shoulder of the casing and having a gear on its opposite face, a collar near the opposite end of the shaft and positioned within the end of the casing, a ring bushing to screw into the casing against the collar, a lock nut jamming on the bushing and against the casing, and a split clutch comprising a sleeve hollow from end to end for projection therethrough of an inserted tool shank and a drawing-in nut pressing against the said hollow shaft.

2. A contra-angle dental hand piece including a casing having a lateral, tapped recess for a driving shaft attachment and having a generally cylindrical bore presenting an interior diametrical shoulder at right angles to the axis of the bore and forming a reduced axial bearing, a hollow shaft co-extensive with the length of the casing and having a shoulder to bear on the shoulder of the casing and having a gear on its opposite face, a collar near the opposite end of the shaft and positioned within the end of the casing, a ring bushing to screw into the casing against the collar and extending therefrom to the end of the shaft, a lock nut jamming on the bushing and against the casing, and a split clutch comprising a sleeve hollow from end to end for projection therethrough of an inserted tool shank and having a draw-in nut pressing against the said hollow shaft; the sleeve having a generally uniform cylindrical bore from end to end for the shank of the tool.

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ANDREW M. SPINKS.