T. S. PHILLIPS.

Hand-Piece for Dental-Engine.

No. 219,873. **Patented Sept. 23, 1879.**

Fig. 1.

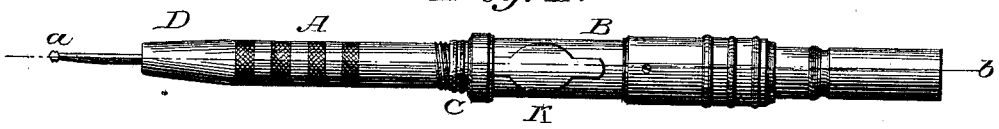


Fig. 2.

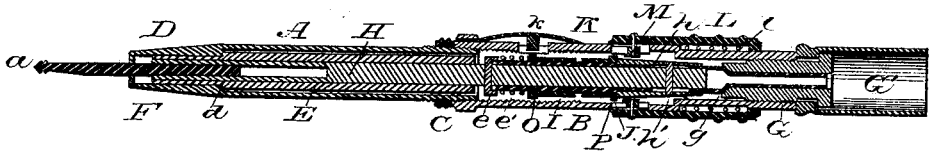


Fig. 5.

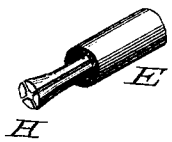


Fig. 3.

Fig. 4.

Fig. 6.

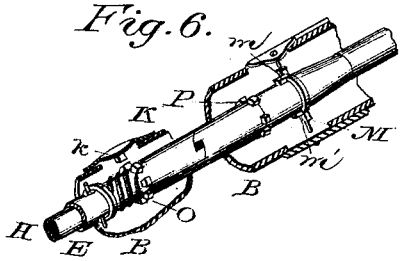
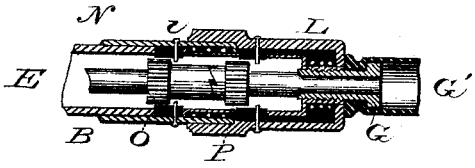


Fig. 7.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN HAND-PIECES FOR DENTAL ENGINES.

Specification forming part of Letters Patent No. **219,873**, dated September 23, 1879; application filed November 1, 1878.

To all whom it may concern:

Be it known that I, THOMAS S. PHILLIPS, of the city of Buffalo, county of Erie, and State of New York, have invented a new and useful Improvement in Hand-Pieces for Dental Engines, of which the following is a specification.

The invention relates to a hand-piece for carrying a drill, burr, or other rotating tool used in operations upon the teeth in which the tool is held and driven by lateral pressure upon its sides.

The object of this invention is to produce a hand-piece of this description in which the tool is held by a tool-holder interposed between it and the tubular shaft or spindle by which motion is conveyed, thus allowing the tool to be fastened or released without change of diameter or position of the shaft in any part.

This invention consists in the combination of a hollow spindle rotating in bearings in an inclosing-case, and a griping tool-holder separate from but contained within the shaft, with a cam or cams which give a slight longitudinal motion to the tool-holder in the shaft, for the purpose of holding or releasing the tool, appropriate means being provided for operating the cams from the outside of the case, as will be hereinafter more fully described.

It also consists in so forming the nose-piece of the instrument as to leave a chamber or vacant space around the tool as it emerges from its socket, for the purpose of arresting the passage of saliva, grit, or other deleterious matter into the bearings of the shaft, or into the socket, thus preventing unnecessary wear of the bearings, or the rusting fast of the tool, if it should be allowed to remain in the instrument after use.

In the accompanying drawings, Figure I represents an elevation of the instrument. Fig. II is a longitudinal section of the same on the line *a b*. Fig. III is a longitudinal section of the shaft and tool-holder. Fig. IV is a longitudinal section of the same parts, showing the tool-holder drawn into the shaft and holding the drill *a*. Fig. V is a perspective view, showing the longitudinal divisions in the tool-holder. Fig. VI is a perspective view of part of the shaft and the cams which operate the tool-holder. Fig. VII is a sectional view, showing a variation in the construction of the parts used to operate the cams from the outside of the case.

The tool *a* is held in a socket in the end of the tool-holder H, the end of which is enlarged, forming a taper head. Three or four longitudinal cuts divide it in that part containing the socket, to allow of its being sprung together for the purpose of griping and holding the tool.

The body of the tool-holder is of uniform size, and is contained within the shaft E, in which it has a slight longitudinal motion.

The tool-holder is operated by means of two cams, one of which, I, encircles and is fastened upon the shaft E. The other cam, J, encircles the shaft E, but plays freely upon it. Behind it is a ring or sleeve, *h'*, which also plays freely upon the shaft E, but is connected with the tool-holder by means of a transverse pin, which passes through slots in the shaft E, which are large enough to allow of a proper degree of longitudinal motion of the tool-holder and sleeve *h'*.

If the cam J be rotated upon the shaft, its slant surfaces will bear upon their counterparts upon the cam I, and according as the motion be in one direction or the other, the tool-holder will move inwardly or outwardly, and the tool will be held or released.

In order to operate the cams, as described, from the outside of the case which incloses the working parts of the instrument, they are provided with a series of radial projections, which are plainly shown in Figs. VI and VII at O and P.

Upon the outside of the case B is shown the thumb-spring K, which has upon its inner side the spur *k*, which, if pressure be made upon the spring, will engage with the projections O and prevent the rotation of the cam I and the shaft E, to which it is fastened. Farther back upon the case B will be seen the sleeve L, encircling it.

The sleeve L is forced backward by the spiral spring *l*, which is interposed between a shoulder upon the case B and a flange upon the sleeve L.

A ring, M, is connected to the sleeve L

through large square slots in the case B, so that they are capable both of longitudinal movement and partial rotation.

The ring M has upon its side projections *m m'*, which, when the ring is forced forward, will engage with the projections P upon the cam J. If the spring K be at the same time depressed, the cam I will be held stationary, and a slight rotation of the sleeve L will have the effect of operating the cam J and griping or releasing the tool *a*.

Referring to Fig. VII, a modification of the above-described plan is shown, in which a second sleeve, N, having longitudinal motion only, is used instead of the spring K, it being loosely connected to the sleeve L, so that the two sleeves will move longitudinally together, while the sleeve L will alone be capable of partial rotation.

A longitudinal movement of the sleeve L forward will also move the sleeve N and engage both cams, and a partial rotary movement will operate the tool-holder, as before.

The nose-piece D forms the end of the case A, and serves as a bearing for the journal of the shaft E.

The bore of the nose-piece D is contracted at its extreme outer portion to nearly the size of the shank of the tool *a*, so that it will nearly touch but not bear upon it.

As the shaft-bearing does not occupy the whole length of the nose-piece D, the chamber F is formed, the object of which is to arrest the passage of saliva or dirt into the instrument.

The shaft E has a journal formed upon it at either end, which journals are terminated by taper shoulders, as shown at *d* and *g*.

For the purpose of providing for wear and end motion of the shaft, the case in which the bearings for the journals are fastened is made in two sections, A and B, which screw together and are secured by the collar or lock-nut C.

This arrangement will be seen to allow of variation in the length of the case, and of such adjustment as to prevent end motion of the shaft E in its bearings.

I make no claim to a device in which the tool is held in a split socket in the end of and forming an integral part of a shaft or spindle revolving in bearings, as such an arrangement of parts is not new, and is shown entirely incased within the sleeve which forms the handle of the hand-piece in the patent of J. Requa, which is dated January 22, 1878, and numbered 199,469.

If the journal of the shaft is at its end, where the split socket must of necessity be formed, it is evident that the opening and closure of the socket upon the tool will induce such a variation in the diameter of the journal as to preclude and render impossible a close fit of the journal in its bearing. Consequently the tool cannot be held closely to its work and carried steadily unless it is made to fit closely in the nose-piece, and it has always been found that a great deal of wear will take place at this point between the nose-piece and tool.

Moreover, as the splits made in forming the adjustable socket will reach from the journal-surface to the socket, it will be seen that the shank of the tool contained therein will become smeared with the dirty oil from the bearing, and unless extreme care is used this oil will exude around the tool and soil the face of the patient. This may be avoided by the application of the cap and packing described in the patent of J. E. Swallow, dated December 26, 1876, and numbered 185,651; but in this case a certain amount of friction will be induced by the pressure of the gasket upon the tool, and if it be made of soft vulcanized rubber, as is usually the case, it will be eventually softened and destroyed by the action of the oil upon it, and it will then need replacement.

By the present invention these objections are removed, and I am enabled to produce a hand-piece in which the shaft is closely fitted in its bearings, irrespective of the holding or releasing of the tool, which is retained by a device totally distinct from the shaft, while the exudation of oil and the entrance of deleterious substances to the bearing is prevented by the peculiar construction of the nose-piece without causing extra friction or necessitating renewal of parts.

I therefore claim as my invention and desire to secure by Letters Patent—

1. The combination, in the hand-piece of a dental engine, of a hollow shaft revolving in bearings in an inclosing-case, a tool-holder contained within the shaft holding the tool by lateral pressure thereupon, and one or more cams moving the tool-holder longitudinally in the shaft, for the purpose of holding or releasing the tool, substantially as described.

2. The combination, in the hand-piece of a dental drilling-machine, of the case B, the spring-detent K *k*, the cam I, and shaft E, substantially as described.

3. The combination, in a dental hand-piece, of the sleeve L, case B, spurs *m m'*, cam J, and tool-holder H, substantially as described.

4. The chamber F in the hand-piece of a dental engine, formed by the extension of the nose-piece beyond the end of the shaft and its approach to without bearing upon the tool, substantially as described.

5. The combination, in the hand-piece of a dental engine, of the sleeve L, the sleeve N, the cam I, and the cam J, substantially as described.

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