(No Model.)

A. J. McDONALD.

DENTAL ENGINE.

No. 604,836. Patented May 31, 1898.

Fig. II

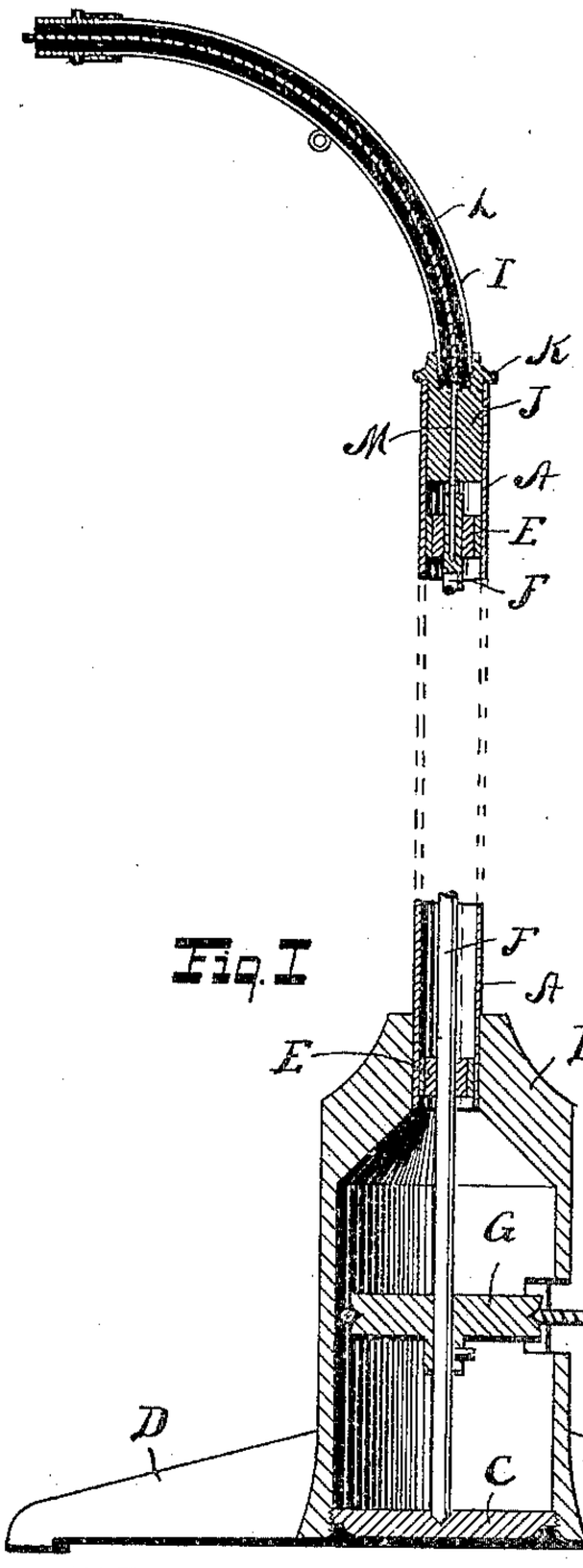


Fig. III

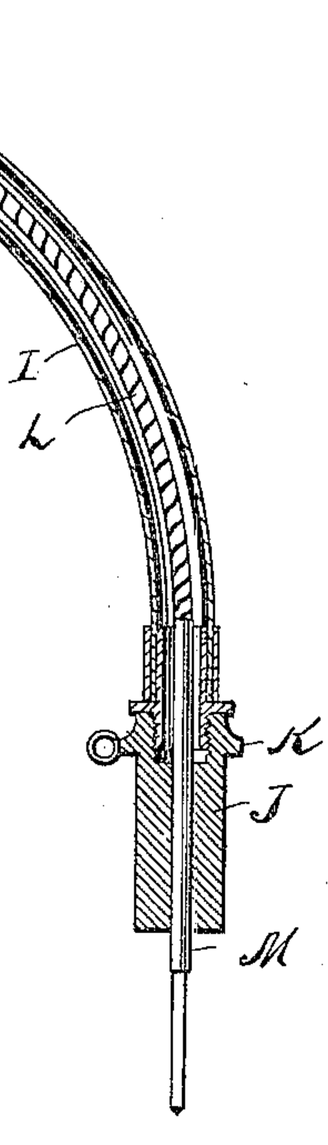
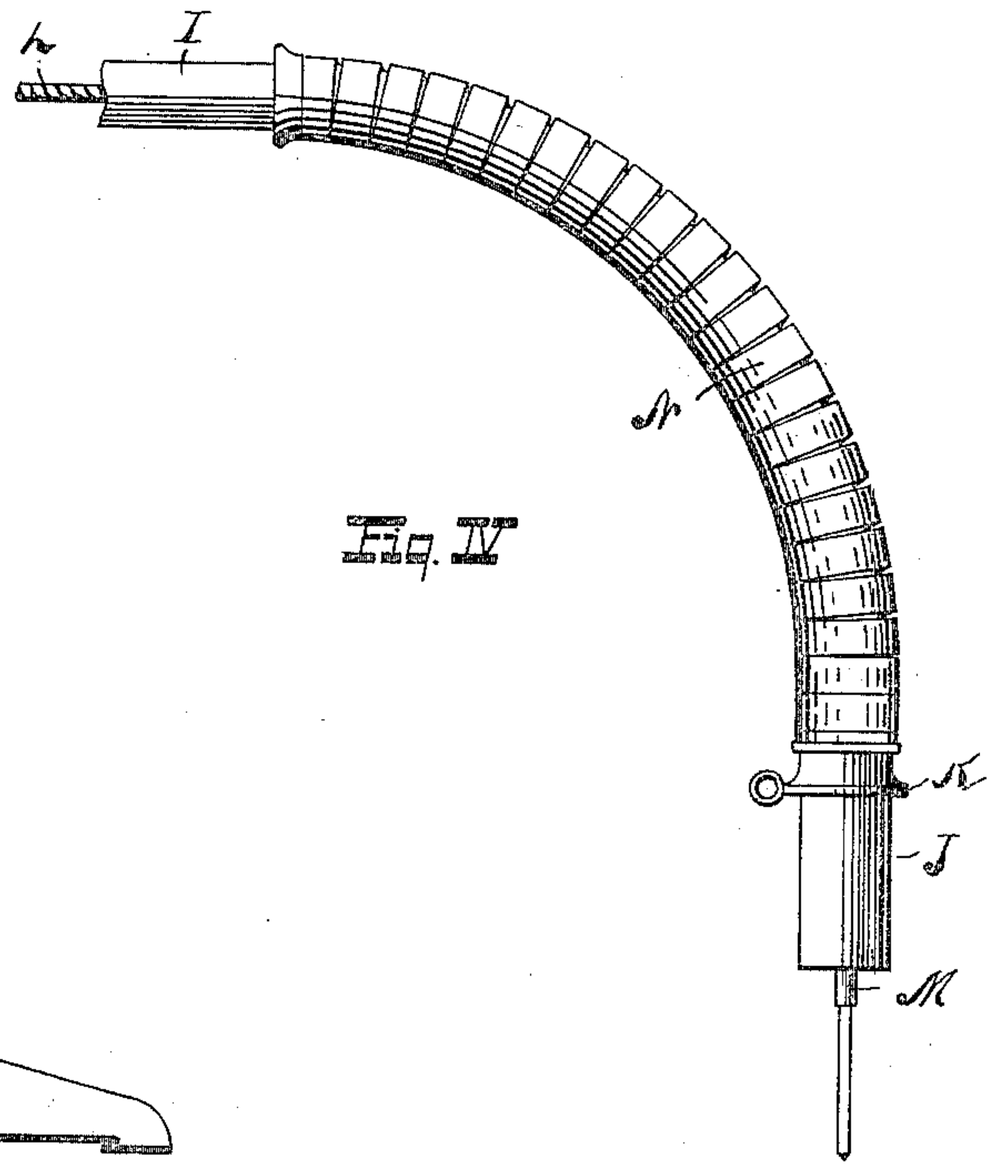


Fig. I

Fig. IV



WITNESSES

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ARTHUR J. McDONALD, OF KANSAS CITY, MISSOURI.

DENTAL ENGINE.

SPECIFICATION forming part of Letters Patent No. 604,836, dated May 31, 1898.

Application filed May 11, 1896. Serial No. 591,185. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR J. McDONALD, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Dental Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improvements in dental engines.

My invention relates more particularly to the class of dental engines in which the flexible shaft commonly used in connection with the handpiece is attached to a driving-shaft revolubly mounted in a suitable stand or framework.

The object of my invention is to provide, in a dental engine in which the driving-shaft is revolubly mounted in a suitable support, means by which the flexible shaft may be provided with a slip-joint connection with the driving-shaft, whereby the flexible shaft may be connected or detached from the driving-shaft without having to stop the revolving of the driving-shaft when such connection or disconnection is made.

Another object of my invention is to provide, in a dental engine having a driving-shaft revolubly mounted in a suitable support, a tubular arm having a sliding connection with the said support and a flexible shaft revoluble in the tubular arm and having a slip-joint connection with the driving-shaft, whereby the tubular arm and the flexible shaft may be detached from or connected with the said support and driving-shaft, respectively, without having to stop the rotation of the driving-shaft.

My invention further provides, in a dental engine in which a driving-shaft is revolubly mounted in a suitable support, a tubular arm having both a sliding and a rotatable connection with the said support and a flexible shaft revoluble in the tubular arm and having a slip-joint connection with the driving-shaft, whereby the arm may be rotated upon the support for convenience in using the handpiece, to which the flexible shaft is attached, and the tubular arm and flexible shaft may be detached from or connected with the said support and driving-shaft, respectively, without having to stop the rotation of the driving-shaft.

My invention further provides a vertical driving-shaft mounted revolubly in a suitable support, a flexible shaft to which the handpiece is attached, having a slip-joint connection with the driving-shaft, and a tubular arm in which the flexible shaft is revoluble, so constructed as to retain the flexible shaft in a curved position, the said tubular arm having a slip-joint as well as a pivotal connection with the said support.

My invention further provides a vertical driving-shaft revolubly mounted in a suitable support, a flexible shaft having a slip-joint connection therewith, and a curved rigid tubular arm in which the flexible shaft is located, the said curved arm having a slip-joint as well as a pivotal connection with the said support.

My invention further provides certain peculiarities of construction hereinafter fully described and claimed.

In the accompanying drawings I have illustrated two forms of my invention.

Figure 1 represents a vertical sectional view of an engine constructed in accordance with the principles of my invention, a portion of the supporting-tube and the driving-shaft being broken away. Fig. 2 represents a side elevation of the rigid curved tubular arm. Fig. 3 represents a vertical sectional view of a modified form of curved tubular arm. Fig. 4 represents an elevational view of the form of curved tubular arm shown in Fig. 3. In this view is shown the coil-spring encircling the flexible tubular arm.

Similar letters of reference indicate similar parts.

A indicates a vertical tube, the lower end of which is rigidly secured in any suitable manner within a vertical opening in the top of a vertical cylindrical base B, the interior of which is hollow, the lower end being closed by means of a horizontal disk C, the periphery of which is screw-threaded and fitted in the internally-screw-threaded lower end of the base B. The lower end of the base is provided with three radially-extending feet D. Within the tube A are secured in any

suitable manner bearings E, in which is revolubly mounted a vertical driving-shaft F, the lower end of which is pivotally mounted in the disk C. A horizontal pulley-wheel G is secured upon the shaft F within the hollow portion of the base B, which is provided with a side opening through which a driving-belt H, connecting the motive mechanism and the pulley G, may pass.

I indicates a curved tube having, preferably, the form of a ninety-degree arc. The lower end of the tube is provided with an enlarged portion J, cylindrical in form and pivotally fitted to the interior of the upper end of the vertical tube A. The enlarged lower end of the tubular arm I is provided with an outwardly-extending flange K, which is adapted to rest upon the upper end of the tube A.

L indicates a flexible shaft of the ordinary construction, to the outer end of which is adapted to be attached the ordinary handpiece, in which are mounted the instruments commonly used by the operator. The said handpiece and manner of connecting with the flexible shaft is well known and, forming no part of my invention, is not shown in the drawings. The lower end of the flexible shaft is provided with a solid tip M, the lower end of which is of a shape otherwise than round, such as square or hexagonal in cross-section. The said extreme lower end of the tip is adapted to fit in a vertical opening in the upper end of the vertical shaft F, the said vertical opening conforming in shape to the shape of the end of the tip. The upper end of the shaft F is preferably inwardly and downwardly beveled, so that the tip M may be easily inserted in the opening in the top of the shaft. The end of the tip may also be pointed for the same purpose.

In the modified form shown in Figs. 3 and 4 the tubular arm I is composed of some flexible substance, such as leather, the lower end being secured in any suitable manner, as by gluing to the upper end of a cylindrically-formed cap J, which is provided with a flange at its top, as indicated by K. The cap is revolubly fitted to the inner end of the vertical tube A. (Shown in Fig. 1.) The said cap is also provided with an axial opening therethrough, through which may pass the tip on the lower end of the flexible shaft. Encircling the flexible tubular arm is a coiled wire N, preferably of a spring material, which serves to prevent an abrupt bend in the flexible tube I. The wire forming the said coil N may be of any desirable shape, but I prefer to use a flat wire, thicker at its lower end and decreasing in gage to its upper end.

In operating my invention power is communicated to the driving-shaft by means of the belt H and the pulley G from the motive power used, which may be an electric, water, or other motor. The tubular arm I, having mounted therein the flexible shaft L, has its enlarged lower end inserted in the upper end of the tube A. At the same time the tip of the flexible shaft L is inserted in the opening in the upper end of the shaft F, and motion from the driving-shaft is thus imparted to the flexible shaft. The tubular arm I may then be rotated upon the supporting-tube A to suit the position desired by the operator in using the handpiece. If another handpiece is desired by the operator for use in operating upon a subject, the tubular arm I, together with the flexible shaft, may be instantly removed and another tubular arm having mounted therein another flexible shaft, to which is attached the desired handpiece, may be connected to the engine, as already described. By the use of the tubular arm and flexible shaft, having, respectively, a slip-joint connection with the tube A and shaft F, a change of handpieces may be made without loss of time and without having to stop the engine. The curved arm also serves to change the position of the flexible shaft from a vertical to a horizontal one at its outer end, in which position it is mostly used. The use of a vertical driving-shaft mounted as described permits of a convenient form of construction. A dental engine so constructed may readily be attached to any desirable motive power and can be located conveniently for use without being in the way to any great extent.

The sliding connection between the flexible shaft and the driving-shaft performs two functions. It permits the quick attachment or removal of the curved tubular arm and the flexible shaft, and it also provides for the prevention of the "cramping" of the flexible shaft when the shaft is bent in a small arc. This is accomplished by the slipping of the tip of the flexible shaft in the opening in the end of the driving-shaft, while if the connection were rigid too much friction would be created between the flexible shaft and the wall of the curved tube.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a dental engine, the combination with a rotary driving-shaft mounted in a tubular support, of a rotatable cap movable lengthwise upon the said support, a curved tubular arm secured to the said cap, and a flexible shaft located in the said tubular arm and connected to and rotatable with the driving-shaft, substantially as described.

2. In a dental engine, the combination with a rotary driving-shaft, of a tube in which the shaft is mounted, a flexible shaft provided at one end with a rigid spindle a portion of which is cylindrical and the outer end of which is otherwise than round and is adapted to be inserted within a similarly-shaped opening in one end of the driving-shaft, a cap rotatably and longitudinally movable in one end of the tube and provided with a peripheral flange abutting against one end of the tube

and having an axial opening in which the cylindrical portion of the spindle is rotatably fitted, and a curved tubular arm in which the flexible shaft is rotatable, one end of the said tubular arm being rigidly secured to the flanged end of the cap, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ARTHUR J. McDONALD.

Witnesses:
KEENER M. IMBODEN,
WARREN D. HOUSE.