

(Model.)

2 Sheets—Sheet 1.

E. T. STARR.
Dental Engine.

No. 229,645.

Patented July 6, 1880.

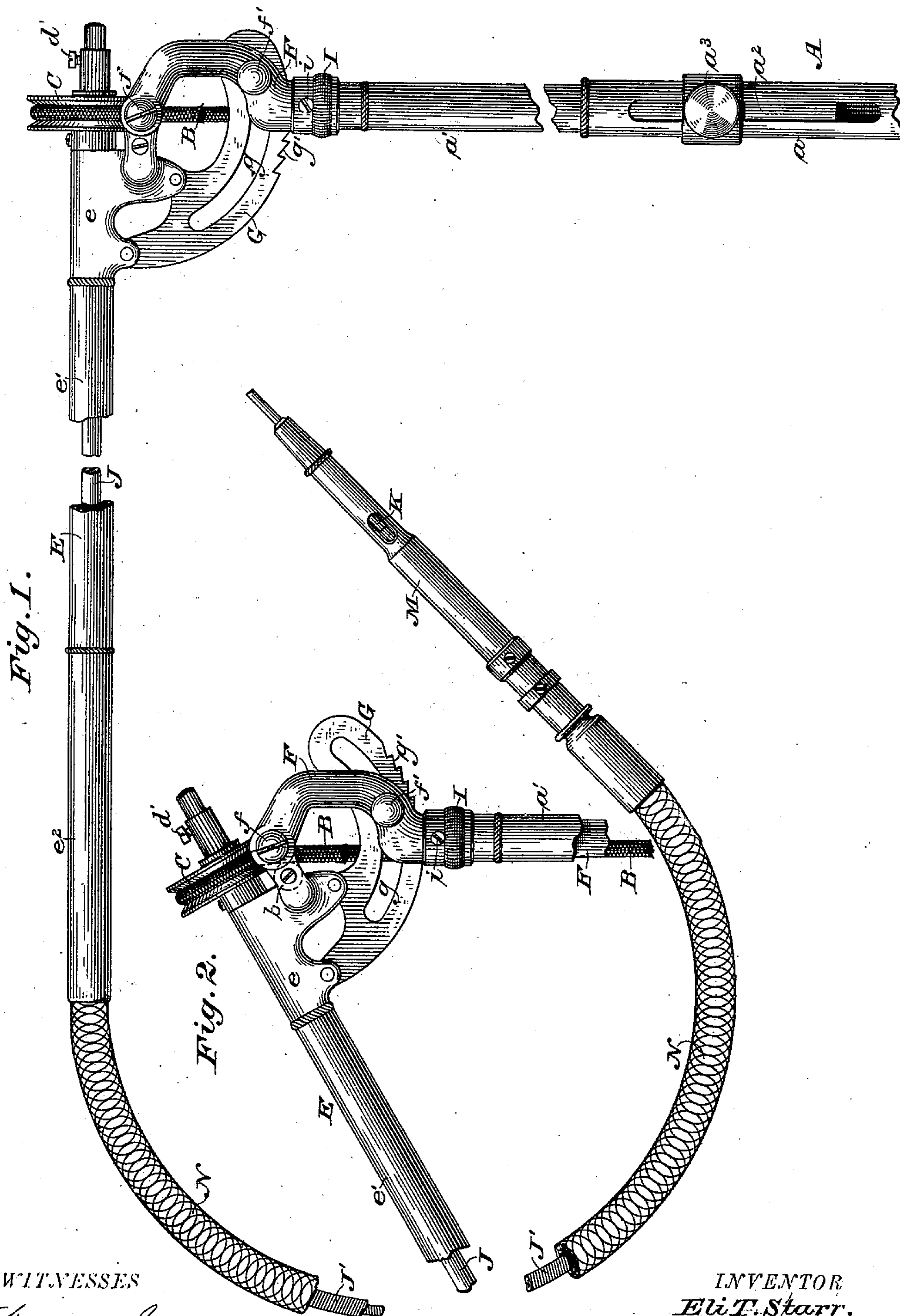


Fig. 1.

Fig. 2.

WITNESSES

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INVENTOR
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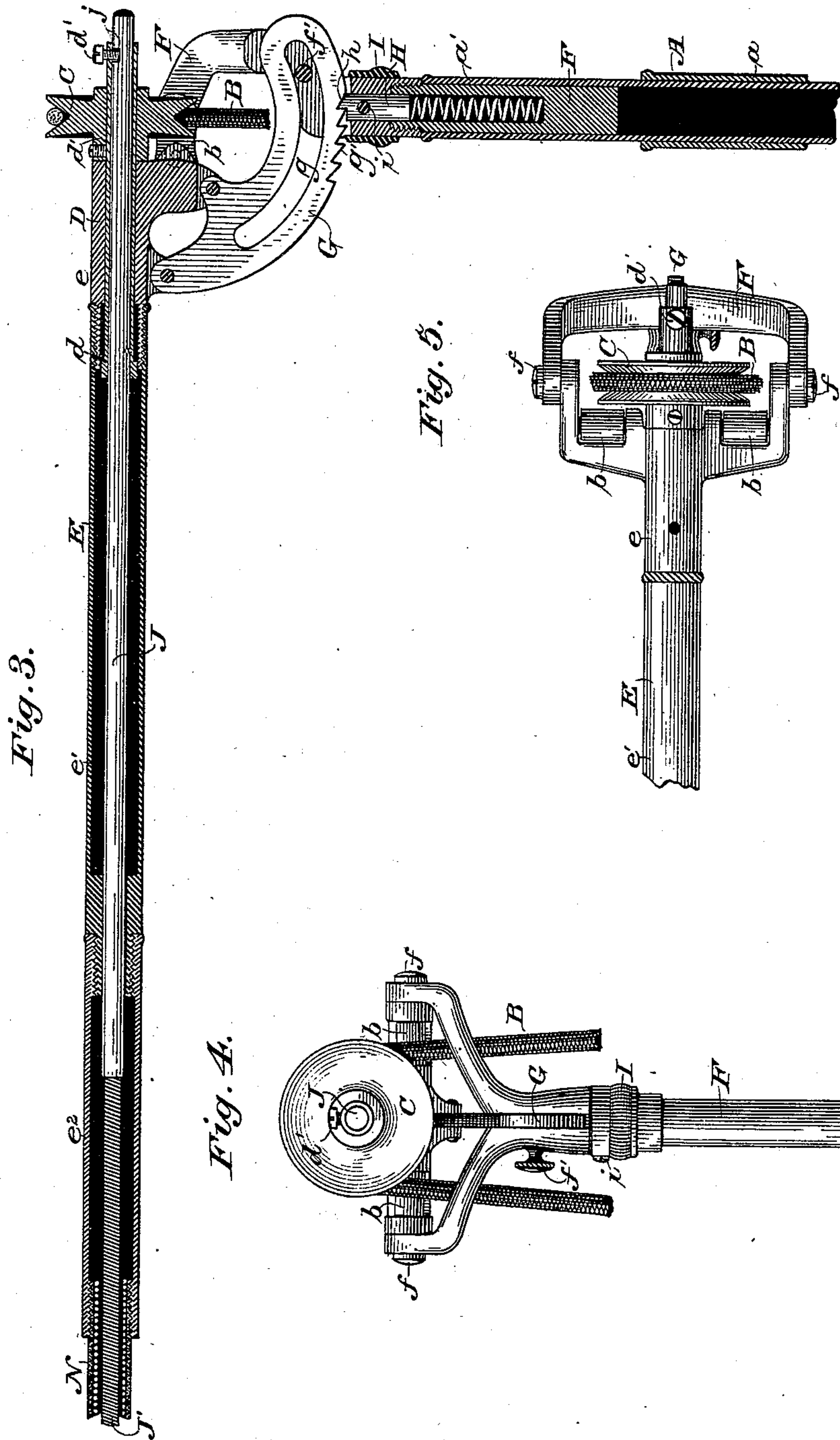
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WITNESSES

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UNITED STATES PATENT OFFICE.

ELI T. STARR, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO JAMES W. WHITE, JAMES CLARENCE WHITE, AND HENRY M. LEWIS, TRUSTEES, OF SAME PLACE.

DENTAL ENGINE.

SPECIFICATION forming part of Letters Patent No. 229,645, dated July 6, 1880.

Application filed April 22, 1880. (Model.)

To all whom it may concern:

Be it known that I, ELI T. STARR, of the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Dental Engines, (Case Z,) of which the following is a specification.

My invention relates more especially to dental engines of the class which embody in their organization the following instrumentalities, to wit: a base; a foot-treadle connected therewith; a fixed standard rising from the base, in which a driving-pulley is journaled and connected with the treadle by a pitman rod or connection, so as to be revolved by said treadle; an engine-arm capable of rocking on the fixed standard of the base while maintained in a normally upright position by a suitable device or spring; an engine-head or lateral arm which carries a driven pulley mounted upon a shaft or spindle turning in bearings in said lateral arm, so as to be capable of a rapid revolving motion, which is imparted to it by a driving-belt passing over said driven pulley from the driving-pulley of the engine; a flexible power conveyer or shaft connected endwise with said driven spindle so as to be turned thereby, and a spindle tool-holder connected with the outer or free end of said power-conveyer, so as to be rapidly revolved in its bearings in a hand-piece casing which is grasped by the hand of the operator, whereby the operator may, while working the engine with his foot, guide the operating-tool carried by the spindle tool-holder with his hand, and hold it to its work, the hand-piece and operating-tool being free to be moved about in various directions to enable said tool to work at different points, owing to the flexure of the power-conveyer, without interrupting the transmission of the driving power.

One form of such an engine has long been made and sold under the name of the "S. S. White dental engine," and it is upon that engine that my invention is designed more particularly as an improvement, the object of my present invention being to improve the organization of the lateral arm and its appurtenances

and connections at the upper end of the engine-arm, so as to give great freedom of movement to the hand-piece and the flexible power-conveyer, and to the enveloping sheath or cover of said conveyer, without interfering with the driving-belt connection of the engine.

My invention consists of certain new combinations of devices set forth at the end of the specification.

In the accompanying drawings, which illustrate my improvements, Figure 1 is a view, in elevation, of so much of the apparatus as is necessary to illustrate the subject-matter herein claimed, the lateral arm or engine-head being in a horizontal position relatively to the upright engine-arm, or at a right angle thereto. Fig. 2 is a similar view with the lateral arm rocked downward or depressed. Fig. 3 is a vertical longitudinal central section through the lateral arm and upper end of the engine-arm, to show more clearly the construction of the several parts. Fig. 4 is a rear view of the engine-head, and Fig. 5 is a top or plan view of said head.

I have deemed it unnecessary to show in the accompanying drawings the lower works of the engine, which preferably include, as before stated, a base, a fixed standard rising therefrom, a driving-pulley, a foot-treadle for driving said pulley, and a connection between the said standard and the normally-upright engine-arm A, which permits said engine-arm to rock or vibrate relatively to the said base and standard, as these elements of the engine constitute no part of my present invention. Said elements are, moreover, clearly shown and described in Letters Patent heretofore granted to me, September 2, 1879, and November 25, 1879, respectively numbered 219,320 and 222,093.

I prefer the said elements to be constructed substantially in accordance with the specifications of said Letters Patent—that is, with the base provided with a tilting device and the engine-arm so constructed and combined at its lower end with the standard rising from the base as to permit said engine-arm not only to rock or be deflected from a normally-upright

position, but also to be secured at the desired angle relative to the said standard and base, so as to throw the upper end of the engine-arm in front of or toward the patient while seated in the operating-chair, without necessitating the location of the base of the engine and treadle thereof inconveniently close to the said chair.

The engine-arm A is constructed, as usual, in sections a a' , the endwise relationship of which may be varied and determined by well-known means—as, for example, by the slot a^2 and set-screw a^3 . (Shown in Fig. 1.) This provision is for the purpose of lengthening or adjusting the engine-arm, so as to preserve the proper tension upon the driving-belt B, which passes from the driving-pulley at the lower end of the engine-arm to the driven pulley C at the upper end thereof. The said driven pulley C is keyed or fixed upon a hollow spindle or journal, D, so as to compel said spindle to turn in bearings in the tubular lateral arm or engine-head E of the engine.

The tubular portion of said lateral arm consists, for convenience of construction and fitting of the parts, of three sections, e e' e^2 , as clearly shown in section in Fig. 3. The butt-end of the lateral arm is forked or branched, and is connected by transverse pivots f with a correspondingly forked pivotal shank or journal, F, which shank fits in the upper tubular end of the engine-arm A, so that the lateral arm or engine-head may turn or swivel freely horizontally around or upon said engine-arm, as usual. The said transverse pivotal connection of the lateral arm permits said arm and the pulley carried thereby to vibrate vertically relative to the engine-arm.

The said lateral arm E is locked or supported at any desired angle relatively to the engine-arm by a curved plate, G, having the transverse pivots f of the lateral arm as a center, around which it turns, the upper end of said plate G being fastened to suitable lugs depending from the lateral arm, while its lower or opposite end is passed between the converging branched or forked arms of the pivotal shank F, a pin or set-screw, f' , being passed through said branches or arms of the pivotal shank and through a curved slot, g , in said plate, so as to guide and brace the said plate in its movements with the lateral arm around or upon its transverse or rocking pivots f . The end walls of said slot g also determine the range of motion of the lateral arm upon its rocking pivots.

The lower curved edge of the plate G is provided with a series of ratchet-teeth, g' , with which a tooth or shoulder, h , on the end of an endwise-movable plunger of bolt H automatically engages, to lock or support the lateral arm in any desired position in its vertical range of adjustment, the plunger being mounted in a socket formed in the pivotal shank F, and automatically thrown up by a suitable spring, the stress of which normally engages the plunger with the ratchet-teeth.

In order to rock the lateral arm downward the bolt or device H is retracted from engagement with the ratchet-teeth g' on the plate G by means of a thimble or sleeve, I, surrounding the cylindrical portion of the pivotal shank F, just below its branching arms, the said thimble being connected with the plunger by a transverse pin, i , which is permitted sufficient play by longitudinal slots in the walls of the pivotal shank to retract the plunger.

Suitable guide-pulleys b b for the driving-belt B are journaled between suitable lugs in the forked arm of the lateral arm or engine-head, as shown particularly in Figs. 4 and 5, whereby the belt is guided and retained in its proper working position irrespective of the position to which the lateral arm and driven pulley may be turned or rocked in using the machine.

Passing through the tubular spindle D, on which the driven pulley C is fixed, is a stiff shaft, J, constituting an extension of a flexible shaft or power-conveyer, J', the two shafts being rigidly united in the usual ways, so as to constitute virtually one shaft or conveyer. The outer end of the stiff section J of the power-conveyer has a bearing near the outer end of the tubular lateral arm, as shown in the sectional view, Fig. 3.

The outer or free end of the flexible power-conveyer is connected with the butt-end of a spindle-chuck, K, turning in bearings in a hand-piece casing, M, the front end of said chuck being provided with a socket and tool-locking devices, as usual, to permit of the driving and ready interchange of the operating-tools used with this class of machines.

The said hand-piece casing is connected with the outer end of the tubular lateral arm E by means of a flexible tube or sheath, N, such as those in common use, which envelops the flexible shaft or power-conveyer to protect it.

The flexible shaft, by its stiff section or extension J, is passed into or through the tubular spindle D, as aforesaid, and is compelled to turn positively therewith, while prevented from moving endwise therein by a transverse pin or key, d' , the said pin being passed through an opening in the wall of the spindle, as shown in Fig. 3, so as to engage a recess or transverse groove, j , in said stiff section J of the flexible shaft.

For the purpose of permitting variations in the endwise relationship of the flexible power-conveyer and its enveloping-sheath, which occur by reason of the greater or less degree to which the flexible power-conveyer is bent in manipulating the instrument, the tubular spindle D is permitted to move endwise in its bearings to a proper extent, the range of movement being limited, in this example, in one direction by the fixed pulley C, which is fitted to abut against the butt-end of the tubular lateral arm E, and in the other direction by an annular shoulder, d , formed upon the front end of the spindle, which shoulder is fitted to abut against a similar shoulder formed in the outer

end of the section *e* of said lateral arm, as clearly shown in Fig. 3.

I am aware that it is not new to permit variations in the endwise relationship of the flexible power-conveyer and its flexible enveloping-sheath in order to compensate for the greater or less degree of flexure of said conveyer and sheath while being used. Such variation is permitted in the combinations of flexible conveyer and sheath patented to Nelson Stow, August 6, 1872, (reissued March 4, 1879,) and July 21, 1874, the organization of the latter patent being the one preferably employed by me, as I have above described.

I do not broadly claim securing a vertically-rocking lateral arm or engine-head in different positions vertically relatively to the upright engine-arm, as this is also old, being shown, for instance, in my patent of November 25, 1879, before referred to; but there has never been such an arm or head organized with an automatic locking device for the purpose of supporting or holding it, as far as I am aware; nor do I claim a yielding supporting and returning spring to throw the engine-arm upward automatically when rocked downward and relieved from strain, as such a returning device has no similarity to my invention, and, moreover, has been in use for years.

I claim as my invention—

1. The combination, substantially as hereinbefore set forth, of the lateral arm, the rocking pivots thereof, the plate rocking with said arm, and the locking device acting upon said plate to positively support the lateral arm in its adjusted position.

2. The combination, substantially as hereinbefore set forth, of the lateral arm, the pivotal shank which permits said arm to be turned horizontally, the rocking pivotal connection between said arm and shank which permits said arm to be rocked vertically, and an automatic device to lock or positively support the lateral arm in different positions or angles vertically to which it may be adjusted relatively to the engine-arm.

3. The combination, substantially as hereinbefore set forth, of the engine-arm, the pivotal shank, the lateral arm connected with said shank by crosswise pivots, the plate connected with said lateral arm to support it in different positions vertically, the positive locking device of said plate, the guide-pulleys carried by the lateral arm, the tubular spindle, the driven pulley, and the flexible power-conveyer connected endwise with said spindle.

4. The combination, substantially as hereinbefore set forth, of the pivotal shank, the transversely-pivoted lateral arm, the slotted plate rocking with said arm to support it at different angles vertically, and the pin or device of said shank passing through the slot of said plate.

In testimony whereof I have hereunto subscribed my name.

ELI T. STARR.

Witnesses:

LEVI TEAL,
J. A. B. WILLIAMS.