

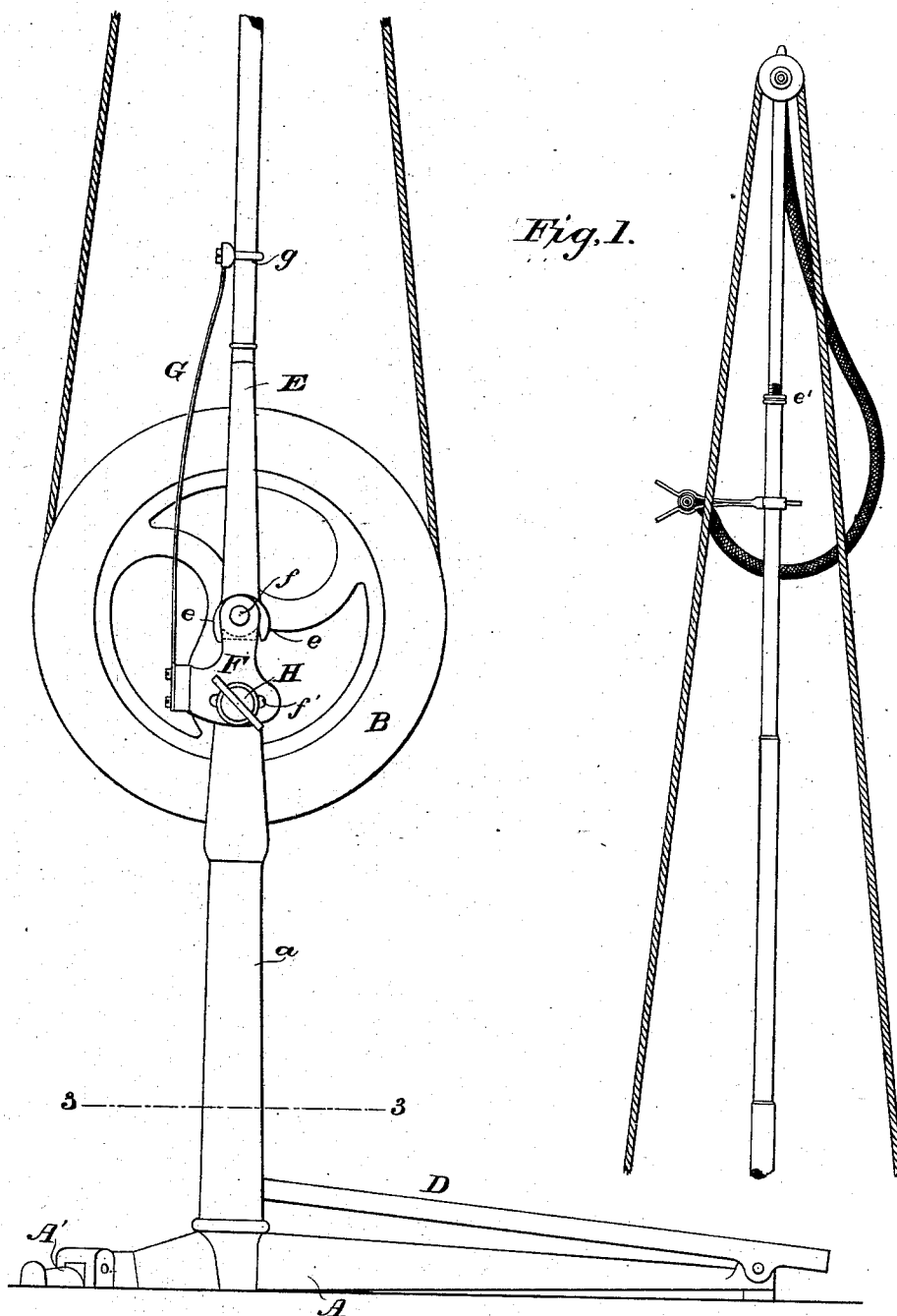
(No Model.)

E. T. STARR.
DENTAL ENGINE.

3 Sheets—Sheet 1.

No. 278,464.

Patented May 29, 1883.



WITNESSES

Wm. A. Skinkle
Geo. W. Young

INVENTOR

By his Attorneys

Eli T. Starr,
Baldwin, Kirtland & Peyton

(No Model.)

3 Sheets—Sheet 2.

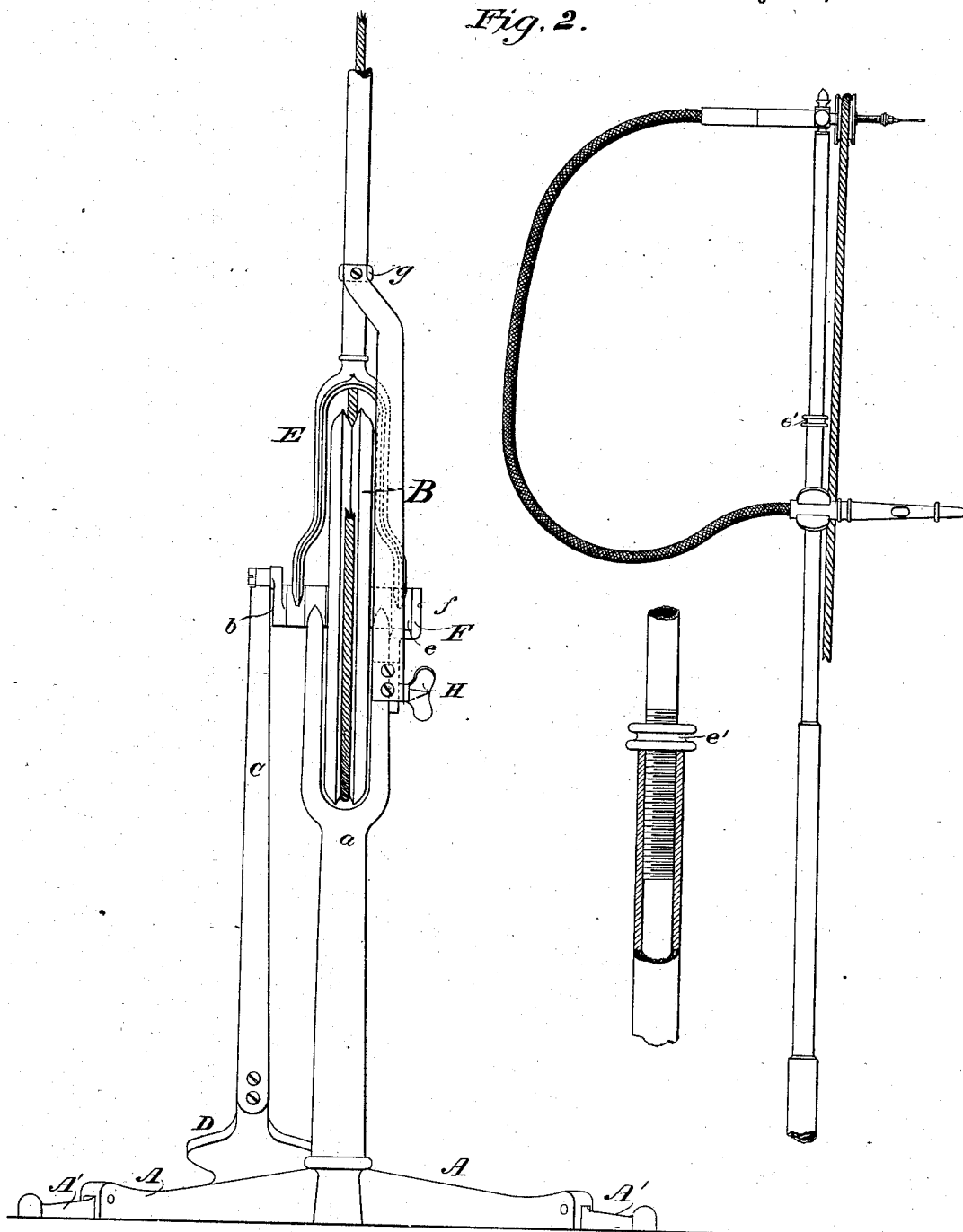
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Fig. 2.



WITNESSES

Wm A. Skink
Geo W. Young

INVENTOR

Eli T. Starr

By his Attorneys

Baldwin, Hopkins & Peyton

(No Model.)

3 Sheets—Sheet 3.

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Fig. 3.

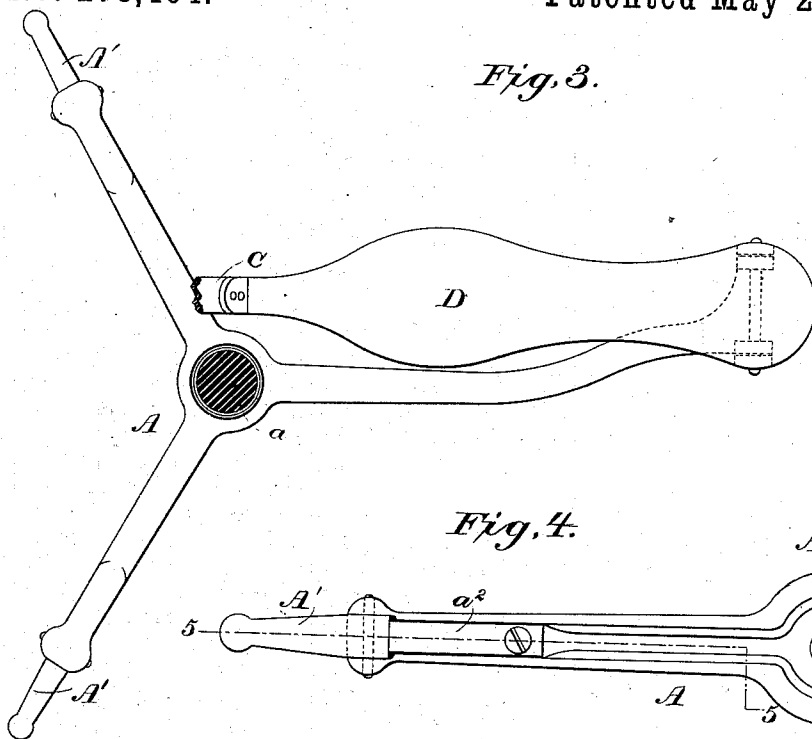


Fig. 4.

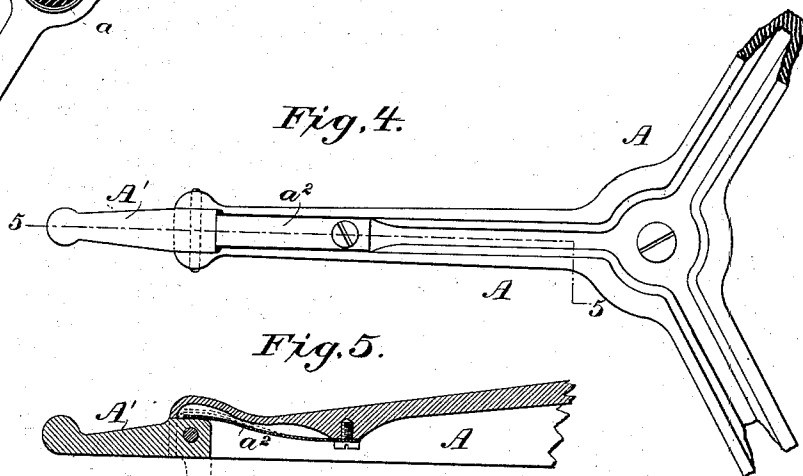


Fig. 5.

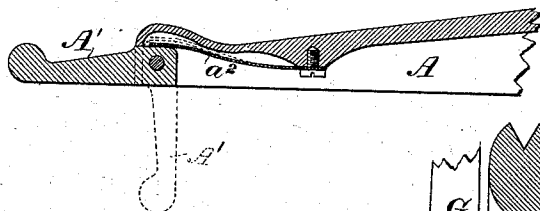


Fig. 6.

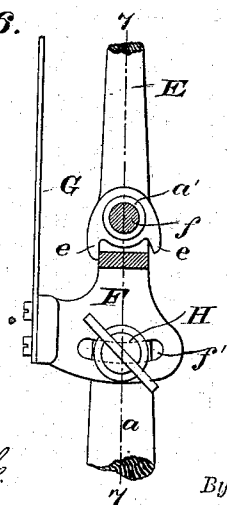
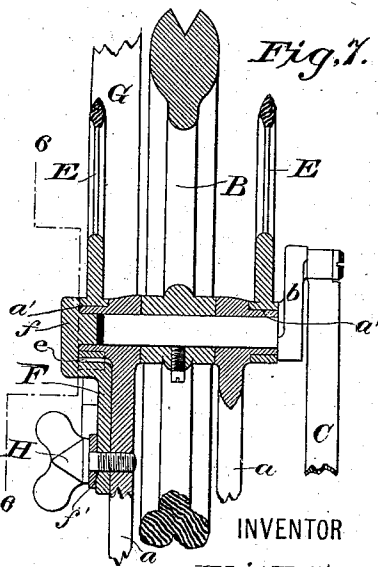


Fig. 7.



WITNESSES

Wm A. Shinkle
Geo W. Young

By his Attorneys

Eli T. Starr,
Baldwin, Hopewell & Peyton.

UNITED STATES PATENT OFFICE.

ELI T. STARR, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE S. S. WHITE DENTAL MANUFACTURING COMPANY, OF SAME PLACE.

DENTAL ENGINE.

SPECIFICATION forming part of Letters Patent No. 278,464, dated May 29, 1883.

Application filed February 13, 1883. (No model.) Patented in England August 13, 1879, No. 3,262.

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, of which the following is a specification.

My invention relates more especially to improvements upon the well-known "S. S. White" dental engine. That engine consists of a supporting base or tripod, upon which is pivoted an upright arm carrying a driven spindle and flexible shaft, connected therewith, which communicates motion to the operating-tool, power being imparted to the flexible shaft from a foot-treadle, also mounted on the base. The flexible shaft is enveloped and protected by a flexible sheath or cover secured to or projecting from the head or upper end of the engine-arm, which arm has the capacity of rocking backward and forward, whereby an increased range of movement is given to the operating-tool over that afforded by the length and flexure of the driving-shaft, the said rocking arm being maintained in a normally upright position by a counter-balance or spring. I have found it desirable to give the engine base or tripod the capacity of being tilted or inclined, so as to throw or bring the head or upper end of the engine-arm in front of or toward the patient, irrespective of the rocking movement of said arm, and without bringing the base or treadle inconveniently close to the patient, which capacity affords great freedom to the flexible driving-shaft and to the flexible sheath or cover when that is employed to envelop and protect the said shaft. The treadle, being mounted upon the base or tripod, is also inclined therewith, thus presenting the treadle to the foot in a proper manner to enable it to be worked by the operator with ease and comfort, the foot not being compelled to constantly maintain and operate in an unnatural and strained position.

To attain these ends I have devised improvements constituting my present invention, which improvements consist, first, in providing the base or tripod of a dental engine with an inclining device or mechanism, whereby the base may be tilted and the arm of the engine thrown out of the perpendicular; and, sec-

ondly, in providing the base or arms of the tripod of a dental engine with devices or mechanism capable of being adjusted either to incline the base and tilt the engine-arm carried thereby in different directions, (or to either side of the perpendicular,) or to allow said base or tripod to rest evenly and squarely upon the floor or supporting-surface.

My present invention also consists in certain new combinations of devices, particularly recited at the close of this specification.

The accompanying drawings show a dental engine embodying all my improvements in the best way now known to me. Obviously, however, some of my improvements may be used without the others, and in engines differing somewhat in their details of construction from that therein shown.

Figure 1 is a side elevation of my improved engine with the top portion or upper works thereof broken off and brought down to one side to show the whole apparatus; Fig. 2, a view thereof from the back of the engine; Fig. 3, a plan or top view of the base or tripod with the treadle pivoted thereon, the standard and pitman being in section on the line 3 3 of Figs. 1 and 2; Fig. 4, a bottom view of one of the arms of the tripod-base, and Fig. 5 a longitudinal section therethrough on the line 5 5 of Fig. 4; Fig. 6, a view of a portion of the fixed standard which rises from the base of the rocking arm, and of the mechanism for varying the normal position of said arm, partly in section on the line 6 6 of Fig. 7; and Fig. 7, a vertical section through a portion of the apparatus on the line 7 7 of Fig. 6.

The base, tripod, or stand A is provided with a fixed upright or standard, *a*, forming part of the base, preferably the upper end of which is forked or divided for the reception of the driving-pulley or fly-wheel B, the journal or trunnions of which turn in suitable bearings or boxes in said standard in the usual manner. A driving-crank, *b*, is attached to one end of the pulley journal or axle in this instance, and is connected by a plate-spring pitman, C, preferably, with the treadle, pedal, or foot-board D, pivoted or jointed upon one arm of the tripod or upon the base, as usual. The forked or divided end of the standard is

also provided, outside the pulley, with trunnions or pivots $a' a'$ for the reception of the forked lower end of the engine-arm E, which is also of well-known construction, carrying upon its upper end a driven pulley and its spindle, to which latter the flexible driving-shaft is connected, as usual. Suitable belt-connections pass from the driving to the driven pulley. The flexible shaft or power-conveyer and its enveloping protecting-sheath, when the latter is used, are similar to those employed in the S. S. White dental engine, hereinbefore referred to, and substantially similar to those shown in Nelson Stow's Re-issued Letters Patent No. 8,607, of March 4, 1879, the original of which is dated August 6, 1872.

In order to give the tripod or base the capacity of being tilted or inclined at pleasure in different directions, so as to throw or bring the head or upper end of the engine-arm in front of or toward the patient or out of the perpendicular, irrespective and independently of its rocking movement upon the base, and without at the same time necessitating bringing the base or treadle inconveniently close to the patient or operating-chair, and, furthermore, also, in order to incline the pedal, treadle, or foot-board so that it may be operated, when the foot is thrown out, with ease and comfort, I provide the base or tripod with mechanism consisting, by preference, of pivot-pieces or toes $A' A'$, which are mounted or attached preferably one to each arm of the tripod opposite the arm or portion upon which the treadle is mounted. These pivot-pieces are acted upon by retaining plate-springs $a^2 a^2$, as clearly shown in Figs. 4 and 5, said springs acting to maintain the pivot-pieces in their adjusted position, whether that be a position to tilt the base or otherwise. The toes or pieces are pivoted, when the tripod form of base is employed, by, preference in the ends of the arms of the tripod, so that when thrown out or adjusted in line with said arms the base is permitted to rest squarely and evenly upon the floor or supporting-surface, but when moved, rocked, or adjusted inwardly at right angles, or nearly so, to said arms, raise that portion of the tripod-base to which they are pivoted, consequently tilting or inclining the base, its standard, and the engine-arm, with its appurtenances, together with the treadle.

It will be obvious that when both the inclining toes or devices are adjusted to tilt the base said base will be tilted in the direction of the length of the treadle, while if one only at a time of the toes be used or adjusted the base will be tilted sidewise, whereby I am enabled to incline or tilt the base and its appurtenances in different directions or to either side of the perpendicular, as may be desirable or necessary. The upper end or head of the engine-arm may therefore be brought, if the engine be in proper position, toward or in front of the patient, affording great freedom of movement to the flexible driving-shaft and to its en-

veloping sheath or cover, which is a desideratum of much importance in the perfect working of dental engines.

It will be obvious that various changes in the details of the inclining or tilting devices or mechanism will readily suggest themselves to skillful mechanics without departing from my invention. For instance, the toes or inclining devices shown may be made in sections longitudinally extensible, so as to incline the base and engine-arm to a greater or less degree.

To control the rocking movement of the engine-arm or to return it automatically to and maintain it in a normal position, various counter-balances have been employed, the best form of which is considered to be a spring the tension of which, as soon as the force exerted to rock or deflect the arm is removed, returns said arm to its normal position. The returning or counterbalancing springs (both spiral and plate springs) have been applied in various ways.

In order to enable the normal position of the engine-arm relatively to the base to be varied at pleasure, and also to permit this variation in normal position without destroying the rocking capacity of the arm, I employ in this instance a plate, F, pivoted at f concentrically with the rocking arm, and secure to said plate one end of a plate-spring, G, the other end of which is provided with a yoke or loop, g , through which the rocking arm passes, said yoke being the means by which the spring acts upon the arm in the example shown. The plate F is provided with a curved slot, f' , concentric with its pivot, through which a set-screw or locking-bolt passes into a socket formed in the standard of the base or tripod. By tightening this set-screw or bolt the plate may be locked in any position desired in its range of movement around its pivot permitted by the slot, and consequently the angle of the arm varied at pleasure, which angle will be the normal position of the rocking arm, inasmuch as it will be so maintained by the spring, and automatically returned, when deflected or rocked, to that position when the strain is removed by the force or tension of said spring.

By the construction and organization above described I am enabled to secure the plate-spring which retains the rocking arm in its normal position to the base, while allowing it to act upon said arm above the base, and thereby avoid the necessity of extending the engine-arm or a portion thereof below its pivots to be acted upon by the spring, and, furthermore, obtain a compact arrangement of parts.

The branch of the forked rocking arm E next the adjusting-plate F, it will be observed, is provided below its pivot with depending ears or lugs $e e$, which overlap or pass down upon both sides of the upper contracted portion of said plate, which construction is for the purpose of limiting the range of movement of the rocking arm, no matter in what

normal position it may be placed by the adjustment of the plate F, inasmuch as said lugs come in contact, when the arm is rocked, with the sides of the plate, which plate is fastened firmly to the standard of the base by its securing device.

It will be obvious that the capacity of variable change in normal position may be given to the rocking arm in various ways, which will readily suggest themselves to skilled mechanics upon reading this specification, without departing from my invention.

I have hereinbefore stated that the engine-arm is of well-known construction, and I prefer it to be composed of sections, as in the before-mentioned S. S. White engine, one of which is extensible on the other by screw-threads preferably or equivalent means, and locked together, when desired, by a suitable jam-nut, as shown at *e'* in Figs. 1 and 2, this extensibility of the engine-arm being for well-known purposes.

This case is a division and continuation of my original application filed February 1, 1879, and I wish it understood that I do not claim herein in this second division of my said application the subject-matter claimed in the first division of said original application, which was filed June 17, 1879, and patented September 2, 1879, as No. 219,320; nor do I claim herein any patentable subject-matter shown, described, or substantially indicated in my said original application, except that particularly comprehended in the following clauses of claim.

I reserve as the subject-matter of my said original application any and all patentable subject-matter therein indicated which is not claimed in my said patent of September 2, 1879, nor included in the claims of this application. This application is therefore restricted to the subject-matter claimed herein, which I state as follows:

1. The combination, substantially as hereinbefore set forth, of the dental-engine base, its arm, and mechanism for inclining or tilting said base.

2. The combination, substantially as hereinbefore set forth, of the dental-engine base, provided with a device or mechanism to tilt or incline it, with the engine-arm capable of movement out of the perpendicular.

3. The combination, substantially as hereinbefore set forth, of the base, its inclining or tilting mechanism, the engine-arm, and the

treadle mounted on the base, whereby said base, arm, and treadle may be tilted or inclined together.

4. The combination, substantially as hereinbefore set forth, of the base, its arm, a tilting device to incline said base, and mechanism to lock the tilting device in position as adjusted.

5. The combination, substantially as hereinbefore set forth, of the dental-engine base, its arm, and devices or mechanism to incline the base in different directions, whereby the said arm may be moved to either side of the perpendicular by the tilting of the base.

6. The combination, substantially as hereinbefore set forth, of the base, the engine-arm capable of rocking on said base, mechanism to maintain said arm in different positions relatively to the base, and devices or mechanism to tilt or incline said base.

7. The combination, substantially as hereinbefore set forth, of the base, the engine-arm rocking thereon, and the device or mechanism to tilt or incline the base at an angle to the plane of the independent rocking movement of the said arm.

8. The combination, substantially as hereinbefore set forth, of the base, its tilting device, the mechanism for locking the tilting device to the base, the rocking engine-arm, and the mechanism for normally inclining the engine-arm relatively to the base.

9. The combination, substantially as hereinbefore set forth, of the base, its tilting mechanism, the driving-pulley, the engine-arm, the driven pulley, and the flexible shaft.

10. The combination, substantially as hereinbefore set forth, of the base, its tilting mechanism, the driving-pulley, the treadle, the rocking engine-arm, the mechanism for changing the normal position of said arm, the driven pulley, its spindle, and the flexible driving-shaft.

11. The combination, substantially as hereinbefore set forth, of the tilting engine-base, the engine-arm, and the flexible shaft and its enveloping-sheath carried by said arm.

In testimony whereof I have hereunto subscribed my name this 9th day of February, A. D. 1883.

ELI T. STARR.

Witnesses:

GEORGE P. MORGAN,
WM. J. PEYTON.