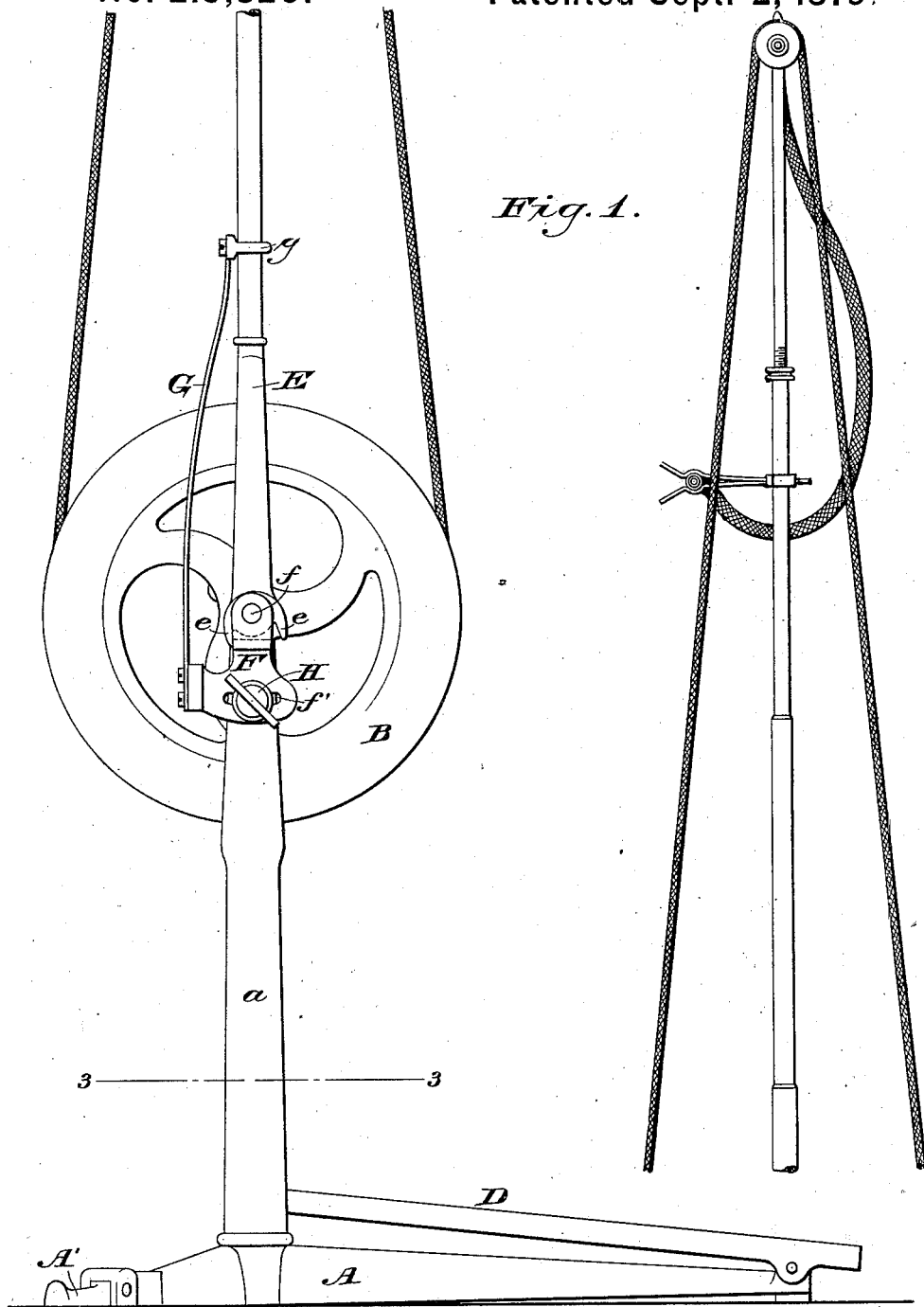


E. T. STARR.
Dental-Engine.

No. 219,320.

Patented Sept. 2, 1879.

Fig. 1.



WITNESSES

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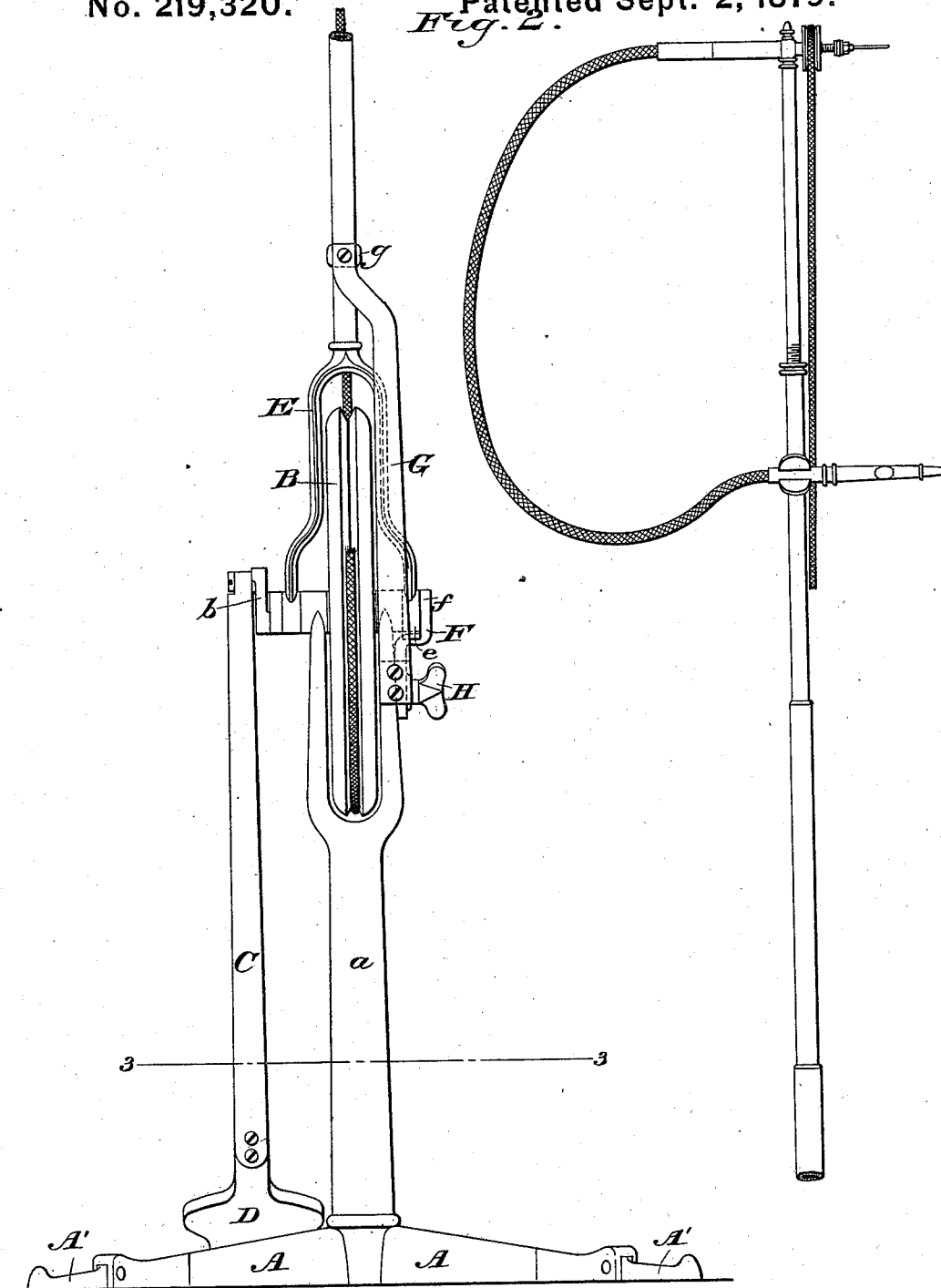
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Fig. 2.



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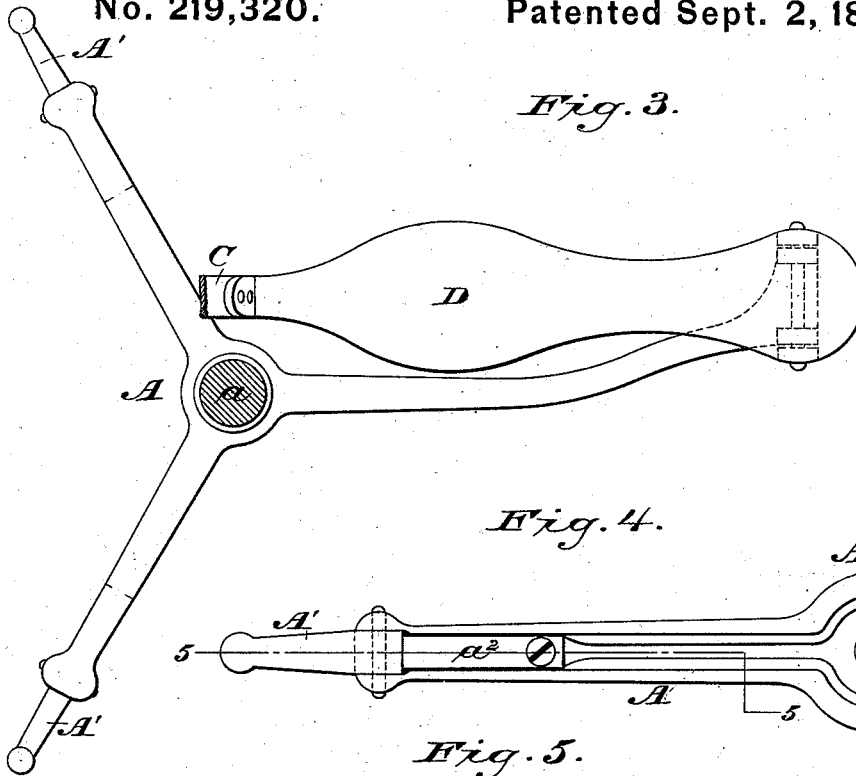


Fig. 3.

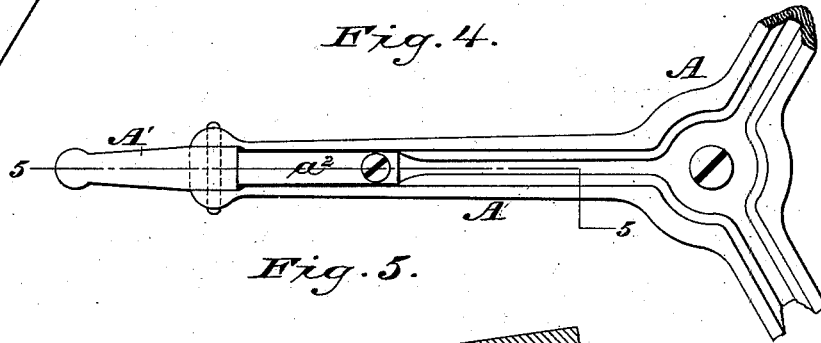


Fig. 4.

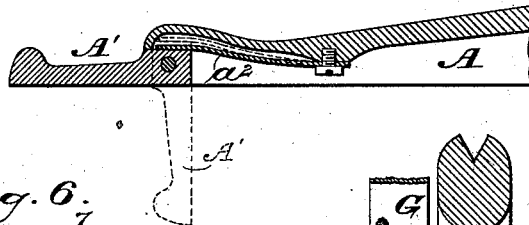


Fig. 5.

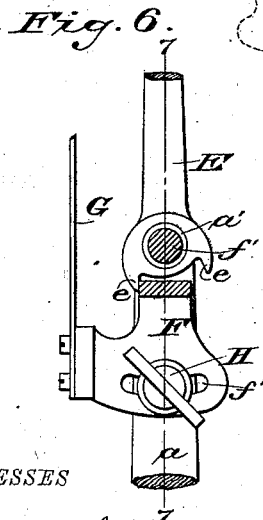


Fig. 6.

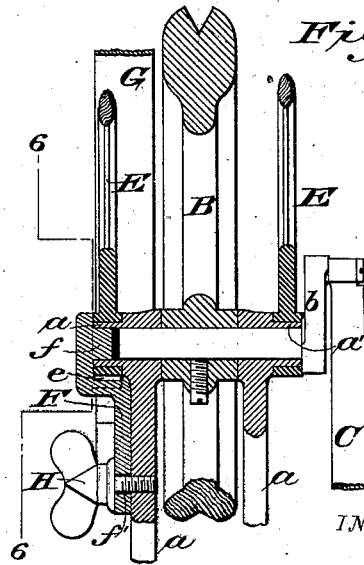


Fig. 7.

WITNESSES

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UNITED STATES PATENT OFFICE

ELI T. STARR, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO SAMUEL S. WHITE, OF SAME PLACE.

IMPROVEMENT IN DENTAL ENGINES.

Specification forming part of Letters Patent No. **219,320**, dated September 2, 1879; application filed June 17, 1879.

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 embodies in its structure a supporting-base or tripod, upon which is pivoted an upright arm carrying a flexible driving-shaft, which communicates motion to an 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 of the engine-arm, which arm has the capacity of rocking upon the fixed standard of the base, so as to give the operating-tool an increased range of movement over that afforded by the mere flexure of the shaft and sheath, the said engine-arm being maintained in a normally upright position by a counter-balance or spring.

The object of the first part of my present invention is to tilt or incline the base and engine-arm so that said arm will be thrown out of the perpendicular, which end I attain by means of a toe pivoted to the base, and capable of being adjusted to tilt said base and engine-arm carried thereby, or permit the base to rest with the engine-arm in a perpendicular, or substantially perpendicular, or upright position.

The object of the next part of my invention is to tilt or incline the base and engine-arm in different directions, or to either side of the perpendicular, which ends I attain by duplicate tilting-toes pivoted to the base upon different sides.

The object of the next part of my invention is to enable the normal position of the engine-arm to be changed from the perpendicular to different angles relatively to the base, while still permitting it to rock thereon, which ends I attain by means of a plate connected with a counterbalancing or returning spring acting on the rocking arm, the adjustment of said

plate varying the normal position of the engine-arm relatively to the base without destroying its rocking capacity.

The accompanying drawings show a dental engine embodying all my present 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, the top portion thereof being 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 view 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 or base; Fig. 5, a longitudinal section through the same on the line 5 5 of Fig. 4; Fig. 6, a view of a portion of the standard which rises from the base, the rocking arm, and 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, the upper end of which is forked or divided for the reception of the driving-pulley 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, and is connected by a plate-spring pitman, C, with the treadle, pedal, or foot-board D, pivoted 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'*, for the reception of the forked end of the engine-arm E, which is also of well-known construction, and carries upon its upper end a driven pulley and its spindle, to which latter the flexible driving-shaft is connected, as usual.

The flexible shaft or power-conveyer and its enveloping protecting-sheath, when the latter is used, are of well-known constructions, being

similar to those employed in the S. S. White dental engine hereinbefore referred to, and substantially similar to those shown in Nelson Stow's reissued Letters Patent No. 8,607, of March 4, 1879.

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 also in order to incline the pedal, treadle, or foot-board D so that it may be operated when the foot is thrown out with ease and comfort, I provide the base or the two arms of the tripod opposite the portion or arm thereof upon which the treadle is mounted with toes or pivot-pieces A' A', which 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 toes in their adjusted position, whether that be in a position to tilt the base or otherwise.

The toes are pivoted, when the tripod form of base is employed, in the ends of the arms or feet 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 or 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. The upper end or head of said arm is therefore brought, if the engine is in proper position, toward or in front of the patient, affording great freedom to the enveloping sleeve or sheath and to the inclosed driving-shaft, which is a desideratum of much importance in the perfect working of dental engines.

It will be obvious that when both the inclining-toes are adjusted to tilt the base said base will be tilted in the direction of the length of the treadle, while by using one only of the toes at a time 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.

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

In order to enable the normal position of

the engine-arm to be varied relatively to the base or tripod without destroying its rocking capacity, 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 spring, G—a plate-spring by preference—the other end of which is provided with a yoke or loop, g , through which the rocking arm passes, said yoke being the means in this organization by which the spring acts upon the arm.

The plate F is provided with a curved slot, f' , concentric with its pivot, through which a set-screw or locking-bolt, H, passes into a threaded socket formed in the standard of the base or tripod. By tightening this set-screw the plate may be locked at 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, to that position 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, thereby avoiding 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, owing to the adjustment of the plate, inasmuch as said lugs come in contact, when the arm is rocked upon its pivots, with the sides of the plate, which plate is firmly fastened to the standard of the base by its securing device.

I wish it to be understood that I do not herein claim, broadly, the combination of an engine-base, an engine-arm, and a device for inclining or tilting said base, as that subject-matter forms part of my application for Letters Patent of the United States filed February 1, 1879, of which application this present one is a division. Nor do I wish to be understood as claiming, broadly, the combination of the dental-engine base, its rocking arm, and mechanism for varying the normal position of the rocking arm, as that subject-matter also forms part of my application of February 1, 1879, above referred to. Nor do I claim herein, broadly, the combination of a tilting base with an engine-arm capable of being set at different angles relatively to the base; nor the combination, broadly, of a dental-engine base, an engine-arm, and mechanism for chang-

ing the normal position of said arm while still permitting it to rock or vibrate, the two last-recited combinations also constituting part of the subject-matter of my said application filed February 1, 1879. I claim herein, as far as the subject-matter above disclaimed is concerned, only the particular instrumentalities and organizations of devices hereinbefore described, and shown in the accompanying drawings.

What I claim herein as of my own invention is—

1. The combination, substantially as hereinbefore set forth, of the base, the engine-arm, and the duplicate inclining or tilting toes, which permit the base and engine-arm to be tilted or inclined in different directions.

2. The combination, substantially as hereinbefore set forth, of the base or tripod with the pivoted toe, to incline it and the engine-arm carried thereby.

3. The combination, substantially as hereinbefore set forth, of the base or tripod, its inclining-toe, and the spring to maintain said toe in its adjusted position.

4. The combination, substantially as hereinbefore set forth, of the base or tripod, the engine-arm, the treadle mounted upon the base, and the inclining-toes to tilt said base, arm, and treadle.

5. The combination, substantially as hereinbefore set forth, of the base, its rocking arm, the plate and its locking device for varying the normal position of the rocking arm while still permitting it to rock, and the counterbalancing-spring, connected at one end with said plate and at the other with the engine-arm.

6. The combination, substantially as hereinbefore set forth, of the base, the rocking arm, the flexible shaft connected with the rocking arm, the adjustable plate for varying the normal position of said arm, and the spring connected with the adjustable plate at one

end, and acting upon the rocking arm to maintain it in its normal position while permitting it to be deflected or rocked upon its pivots.

7. The combination, substantially as hereinbefore set forth, of the base, the engine-arm pivoted thereto, the pivoted adjusting-plate for varying the normal position of the rocking arm, the pivot of which is coincident with the pivots of the engine-arm, and the locking device to secure said plate to the base.

8. The plate-spring secured at one end to the engine-base, and provided at the other with a loop or yoke, through which the rocking arm passes.

9. The combination, substantially as hereinbefore set forth, of the base, the forked engine-arm pivoted thereon, and the ears or lugs upon said arm to limit its range of movement.

10. The combination, substantially as hereinbefore set forth, of the base, the engine-arm rocking thereon, mechanism for varying the normal position of said arm, lugs or devices for limiting the range of rocking movement of the arm, and the spring acting upon the arm.

11. The combination, substantially as hereinbefore set forth, of the base, its inclining devices, the treadle, the rocking engine-arm, and the spring to keep said arm in its normal position.

12. The combination of the base, the engine-arm, the inclining device of the base and arm, the device for varying the normal position of said arm, and the returning-spring, which permits the arm to rock, whatever may be its normal position as determined by the adjusting mechanism.

In testimony whereof I have hereunto subscribed my name.

ELI T. STARR.

Witnesses:

GEORGE P. MORGAN,
ALBERT P. ROOT.