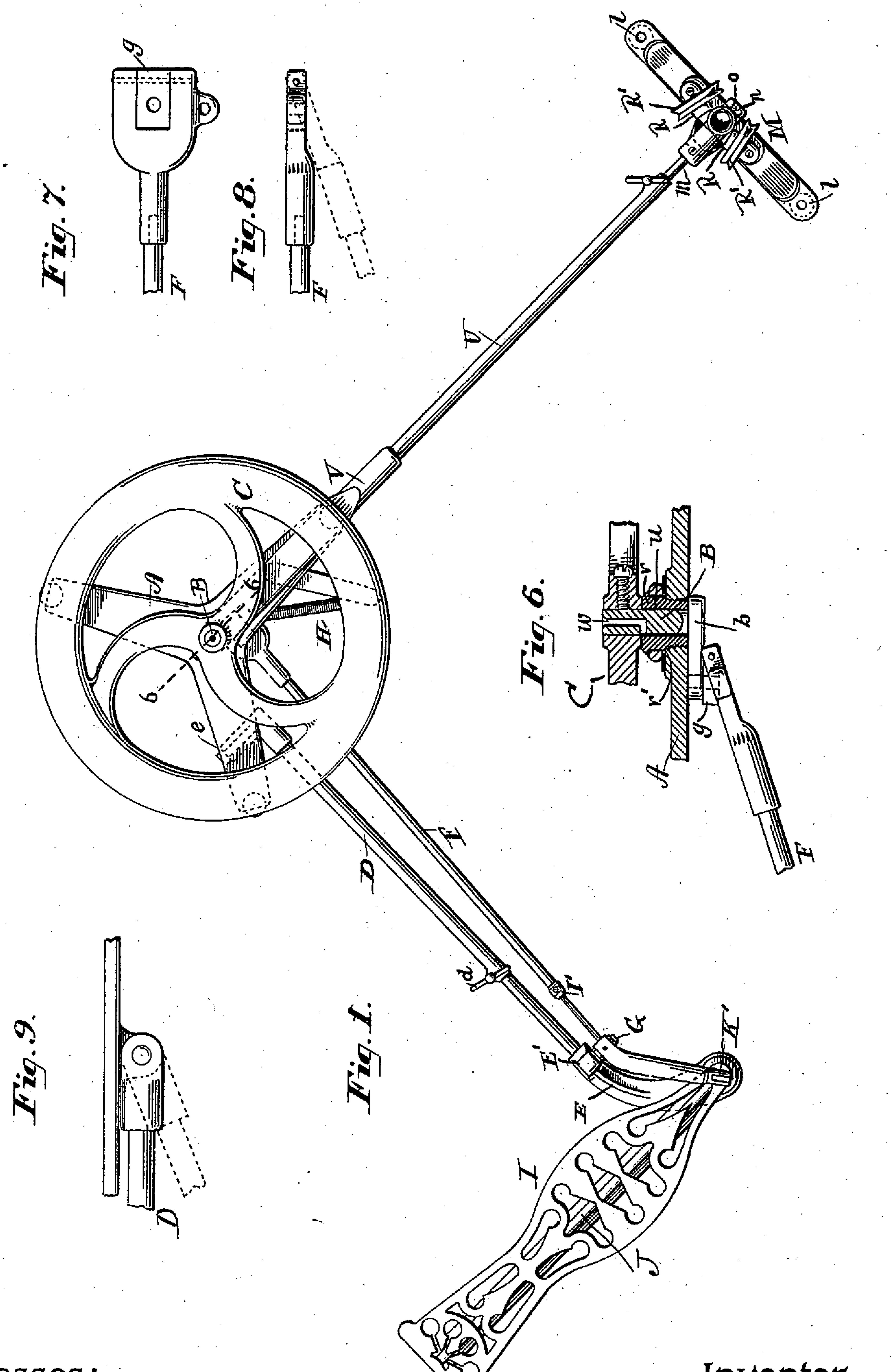
(No Model.) 3 Sheets—Sheet 1.

B. S. BROWN.
DENTAL ENGINE.

No. 504,487. Patented Sept. 5, 1893.



Witnesses:
Edw. F. Simpson, Jr.

Inventor
B. S. Brown
By Atty

(No Model.)

3 Sheets—Sheet 2.

B. S. BROWN.

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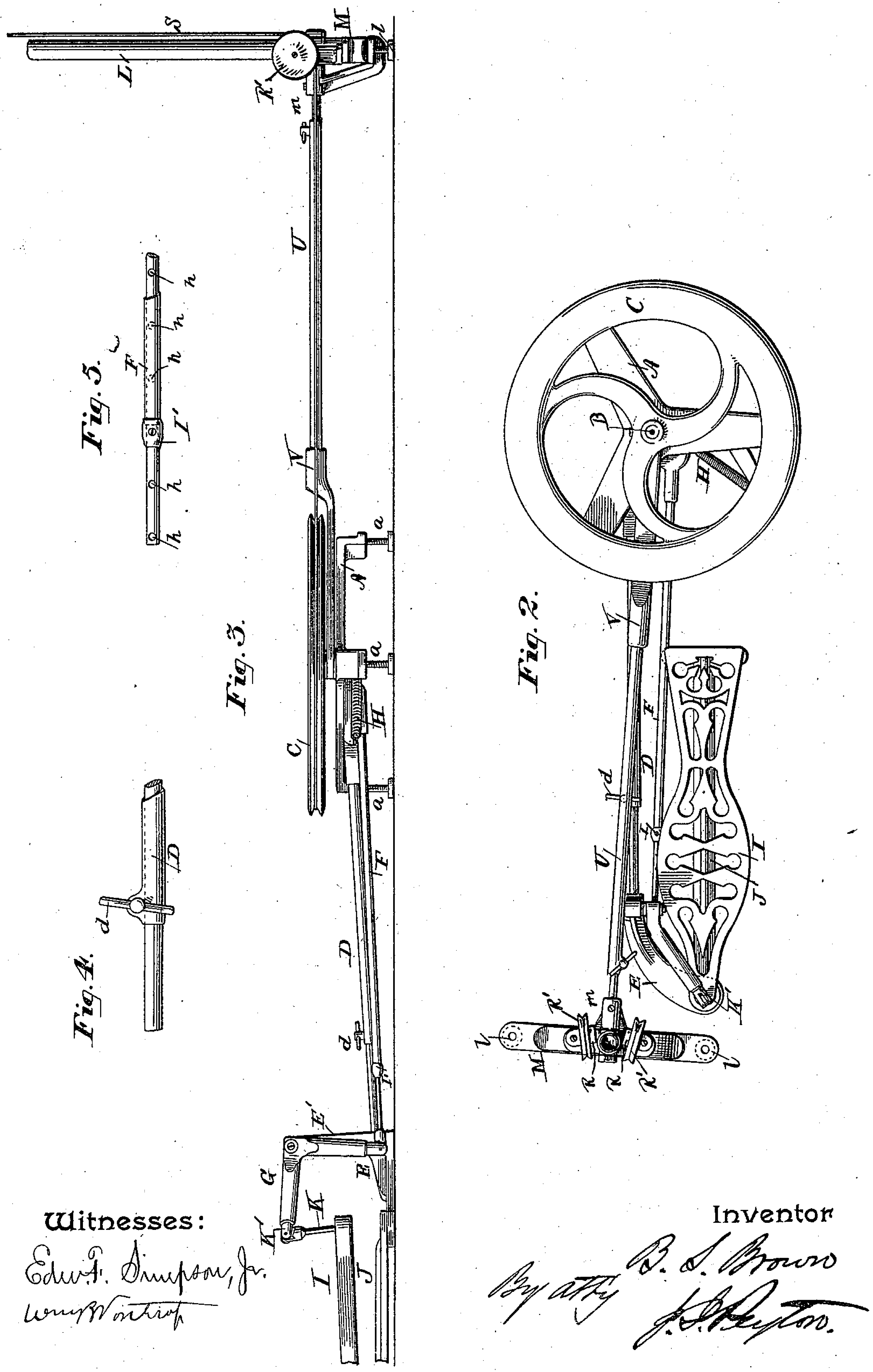

Fig. 3.

Witnesses:

Edw. F. Simpson, Jr.

Wm. B. Winthrop

Inventor

B. S. Brown

By atty J. S. Peyton.

(No Model.)

3 Sheets—Sheet 3.

B. S. BROWN.

DENTAL ENGINE.

No. 504,487. Patented Sept. 5, 1893.

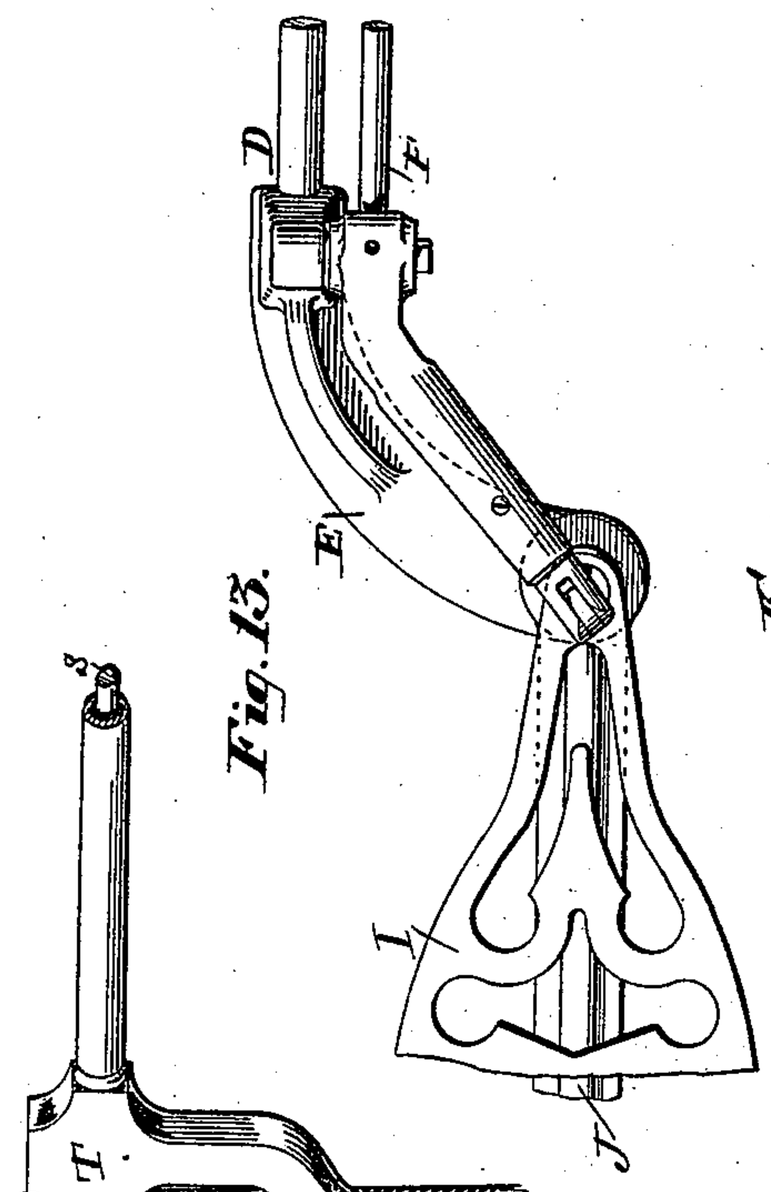

Fig. 13.

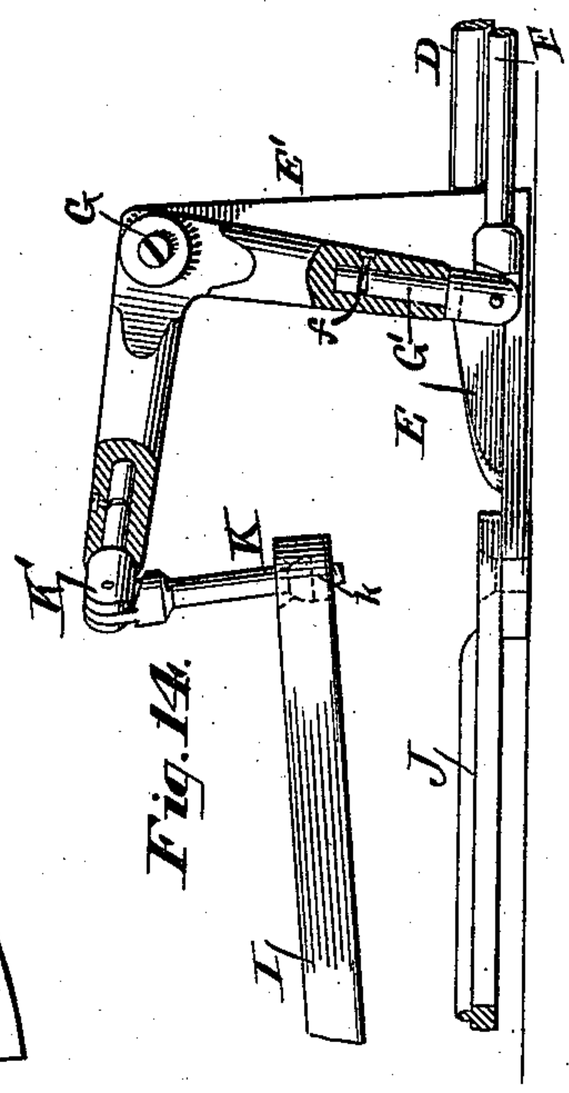

Fig. 14.

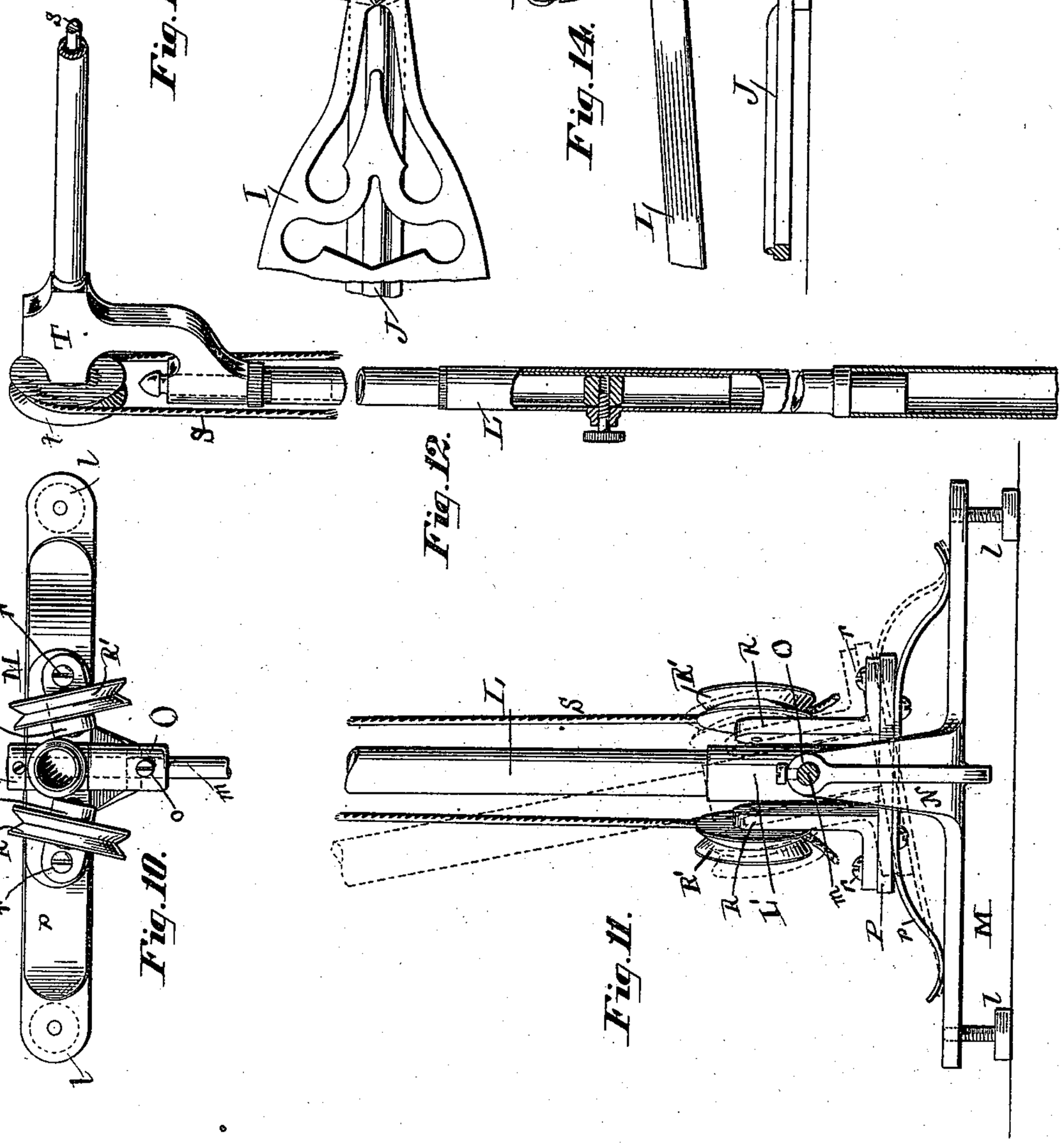

Fig. 12.

Fig. 10.

Fig. 11.

WITNESSES:

Edw. F. Simpson, Jr.

Wm. B. Wartmann

INVENTOR

B. S. Brown

By atty J. L. Boyston.

UNITED STATES PATENT OFFICE.

BENONI S. BROWN, OF HYDE PARK, MASSACHUSETTS, ASSIGNOR TO THE S. S. WHITE DENTAL MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA.

DENTAL ENGINE.

SPECIFICATION forming part of Letters Patent No. 504,487, dated September 5, 1893.

Application filed March 26, 1890. Serial No. 345,430. (No model.)

To all whom it may concern:

Be it known that I, BENONI S. BROWN, of Hyde Park, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Dental Engines, of which the following is a specification.

My invention relates to certain improvements, as hereinafter claimed, applicable to dental engines of the class which are operated by way of foot treadles, and the driving wheels of which rotate about vertical axes. In an application for United States Letters Patent filed by me March 24, 1890, Serial No. 345,011, there is shown an engine of this type, to improve which is the object of my present invention.

In the accompanying drawings, Figure 1 is a plan or top view of the engine with the standard and parts carried thereby omitted. Fig. 2 is a similar view with the standard carrier or base, and treadle folded together. Fig. 3 is a view in elevation with a portion of the standard represented. Fig. 4 is a detail view of a portion of an endwise adjustable or telescoping rod connecting the treadle frame with the engine frame; and Fig. 5 a similar view of a portion of the telescoping connecting rod between the bell-crank lever and driving shaft. Fig. 6 is a vertical section on the line 6 of Fig. 1. Figs. 7 and 8 are a plan view and a side elevation, respectively, showing the manner in which the connecting rod is hinged to the cranked driving shaft. Fig. 9 is a side elevation showing the manner of jointing the treadle frame connecting rod to the engine frame. Figs. 10 to 14 inclusive, are views of parts of the engine on an enlarged scale. Of these views, Fig. 10 is a plan of the standard carrier or base. Fig. 11 is an elevation of the standard base with portions of the standard and driving cord. Fig. 12 is an elevation of the standard with portions broken away and parts in section, with the driven pulley, pulley head, &c., at the top of the standard. Figs. 13 and 14 are a plan and elevation, respectively, of the treadle, and connections thereof, parts being broken away.

A suitable engine frame A is shown as provided with adjustable feet *a* formed by headed screw bolts fitted in threaded holes at the outer ends of arms of the frame. By screwing the feet in or out as required the frame may be leveled upon an uneven surface. A vertical driving shaft B cranked at its lower end is journaled in the center of the engine frame, and has a horizontally rotating driving wheel C secured to it above the frame. A sectional telescoping or endwise adjustable rod D connects the engine frame with a treadle frame E. The outer or enveloping section of this connecting rod is split at its end next the treadle frame, and provided with a screw *d* by means of which to securely clamp the rod sections together when properly adjusted. At its inner end the connecting rod is pivotally connected to the engine frame, being bent or cranked to fit a socket *e* of this frame, so that the rod may have vertical movement when necessary, to accommodate inequalities of the floor upon which the engine may stand. At its outer end the connecting rod is rigidly attached to the treadle frame.

A sectional telescoping or endwise adjustable connecting rod F has hinged connection at its inner end with the crank pin of the crank *b* of the driving shaft and at its outer end has jointed connection with an end of a bell-crank lever G which is pivoted to the upper end of a standard E′ of the treadle frame, so as to rock vertically when actuated.

In order to provide for the horizontal swing imparted to the connecting rod by the movement of its outer end with the crank of the driving shaft, the connection of this rod with the bell-crank lever is made by means of a swiveling end section G′ of the bell-crank. The connecting rod is pivoted to this section which fits a socket in the bell-crank lever and is allowed to turn while prevented from displacement by a set screw engaging an annular groove *f* of the end section. As in my aforesaid application the rising and falling movement imparted to the connecting rod by the vertical rock of the bell-crank lever, is provided for by a hinge consisting of the leaf *g* engaging the crank pin and pivoted to the connecting rod; and there is also provided an off-center spring H secured at its opposite ends to the connecting rod and engine frame, to prevent the driving wheel from coming to

rest on the dead center. Endwise adjustment of the connecting rod is provided for by a set screw passing through a collar I′ engaging one end of the outer section of the rod, and entering the desired one of a number of holes *h* in the inner section of the rod.

The treadle I is hinged at its heel to the outer end of the treadle base J which at its inner end is pivoted to the treadle frame so as to adapt the treadle base and treadle to be swung horizontally into the position desired. The treadle toe is connected by a pitman K with the swiveling end section K′ of the upper arm of the bell crank lever G. This pitman is pivoted at its upper end to the bell-crank lever, passes loosely through a hole in the treadle toe, and has an adjustable section or head *k* screwed into its lower head. This head is of half ball shape and adapted to fit loosely in a socket on the under side of the treadle toe. By this construction the treadle is allowed to swing horizontally and in the event of any obstruction getting beneath it the treadle is free to rise and come to rest regardless of the continued movement of the bell-crank lever.

A rocking standard L preferably composed of telescoping sections to render it adjustable in well known way, is connected at its lower end with a low carrier or base M, provided like the engine frame with adjustable feet *l*. The lower end or tubular bottom section L′ of the standard is pivoted by a rod *m* to an upright N of the base M. This rod *m* constitutes one section of a lengthwise adjustable telescoping connecting rod between the standard base and engine frame, as will farther on be explained. The rod *m* passes through the base upright, and standard section, and is held against displacement, while movement of the standard section in the direction of the length of the rod is prevented, by a removable collar *n* on the end of the rod and bearing against the standard section, and by a set screw *o* passing through the sleeve O of the base upright and impinging against the rod therein. A cross bar P beneath and secured to or formed with the lower standard section is borne against by a spring *p* with a tendency to maintain the standard in its normal upright position. The standard may be rocked about its pivot against the force of the spring, as will be understood by reference to Fig. 11. By jointing the standard low down or near the surface upon which its base rests, it will be seen that a wide range of movement may be given the standard without necessitating its inclination to the extent that would be required were it jointed to a support at a more elevated point as usual in engines of other types. Uprights R R pivoted on the cross bar at opposite sides of the standard, support guide pulleys R′ R′ for the endless driving cord S. The stud axles of these pulleys are carried by the supports or uprights R R which are connected at their bases to the cross bar P by vertical pivots *r r* and are thus allowed to turn horizontally in order that the driving cord may engage the pulleys properly regardless of their distance from the driving wheel. This turning adjustment of the pulleys is important as the angle at which the cord passes from the driving wheel to the guide pulleys varies with every adjustment of the standard base toward or from the engine frame. At the upper end of the standard is mounted as usual the pulley head T with the driven pulley *t* rotated by the driving cord for actuating the flexible shaft *s* to rotate an operating tool carried by a hand-piece in a well known way.

The outer section U of the lengthwise adjustable rod which connects the standard base M with the engine frame and serves to brace said base, is split at one end and provided with a clamp screw similar to that of the connecting rod between the treadle frame and engine frame. In this way the standard base is adapted to be adjusted toward and from the engine frame as desired. The connection of the sectional rod *m* U with the engine frame is by way of an extension or third section V of this rod to which the section U is attached, preferably by screwing into it. As shown by Fig. 6, the rod section V has a bearing opening in its inner end by which it is pivotally connected with a readily removable screw-attached hub *u* of the engine frame, which hub constitutes the bearing for the driving shaft. The hub is provided with a shoulder *v* at its upper end and the connecting rod engages the hub beneath this shoulder. A washer is interposed between the connecting rod and engine frame. A second shoulder *v′* is formed on the hub and the reduced portion of the hub below this shoulder is threaded for engagement with the threaded opening in the engine frame. An angular duct *w* in the driving shaft extends from the upper end thereof to the bearing hub and facilitates lubrication. This oil duct extends centrally along the shaft from its top downward until it is intersected by the lower or transverse portion by which the oil passes to the bearing.

From the above description it will be seen that the driving cord passes from and to the driving wheel by way of the guide pulleys adjacent to the lower end of the standard, and about the driven pulley to actuate the flexible shaft; that the standard base may be swung about the engine frame to locate it as desired; that the treadle may be adjusted into any desired position; and that the engine frame may be placed beneath the dentist's operating chair, out of the way.

I claim as my invention—

1. The combination of the engine frame, the horizontally rotating driving wheel, the cranked driving shaft, the treadle frame, the bell crank lever pivoted to the treadle frame, the treadle for actuating the bell crank lever, the sectional rod adjustable in length and connecting the bell crank lever and the driv-

ing shaft, and the similarly adjustable rod connecting the treadle frame and engine frame, substantially as and for the purpose set forth.

2. The combination of the treadle frame, the bell crank lever pivoted thereto and provided with the swiveling end sections, the treadle for actuating the bell-crank lever, the connecting rod, and the horizontally rotating driving wheel actuated by connection therewith, substantially as and for the purpose set forth.

3. The combination of the engine frame, its detachable shouldered hub, the horizontally rotating driving wheel journaled by its shaft in said hub, the standard base, and the rod connecting the engine frame hub and standard base, substantially as and for the purpose set forth.

4. The combination of the engine frame its hub, the horizontally rotating driving wheel and its shaft having its bearing in said hub and provided with the angular oil duct, substantially as and for the purpose set forth.

5. The combination in a dental engine having a standard carried independently of the engine frame, of the low carrier or standard base to which the standard is pivoted near its lower end close to the surface upon which said base rests and adapted to rock, and the spring operating with a tendency to maintain the standard in an upright position, substantially as and for the purpose set forth.

6. The combination of the engine frame, the standard base, the rod connecting the engine frame and standard base, and the rocking standard pivotally connected with its base by said rod, substantially as and for the purpose set forth.

7. The combination of the engine frame, the horizontally rotating driving wheel, the standard base, the standard pivoted to said base the driving cord and the guide pulleys partaking of the rocking movement of the standard and about which the driving cord passes on its way to and from the driving wheel, substantially as and for the purpose set forth.

8. The combination of the engine frame, the horizontally rotating driving wheel, the standard, the standard base, the sectional rod having connection with the engine frame and standard base and adjustable in length, the driving cord the guide pulleys adjacent to the lower end of the standard and to which the driving cord passes on its way to and from the driving wheel, and the horizontally turning supports for the guide pulleys, substantially as and for the purpose set forth.

In testimony whereof I have hereunto subscribed my name.

BENONI S. BROWN.

Witnesses:
DAVID L. BOWERS,
ANNE M. GILSON.