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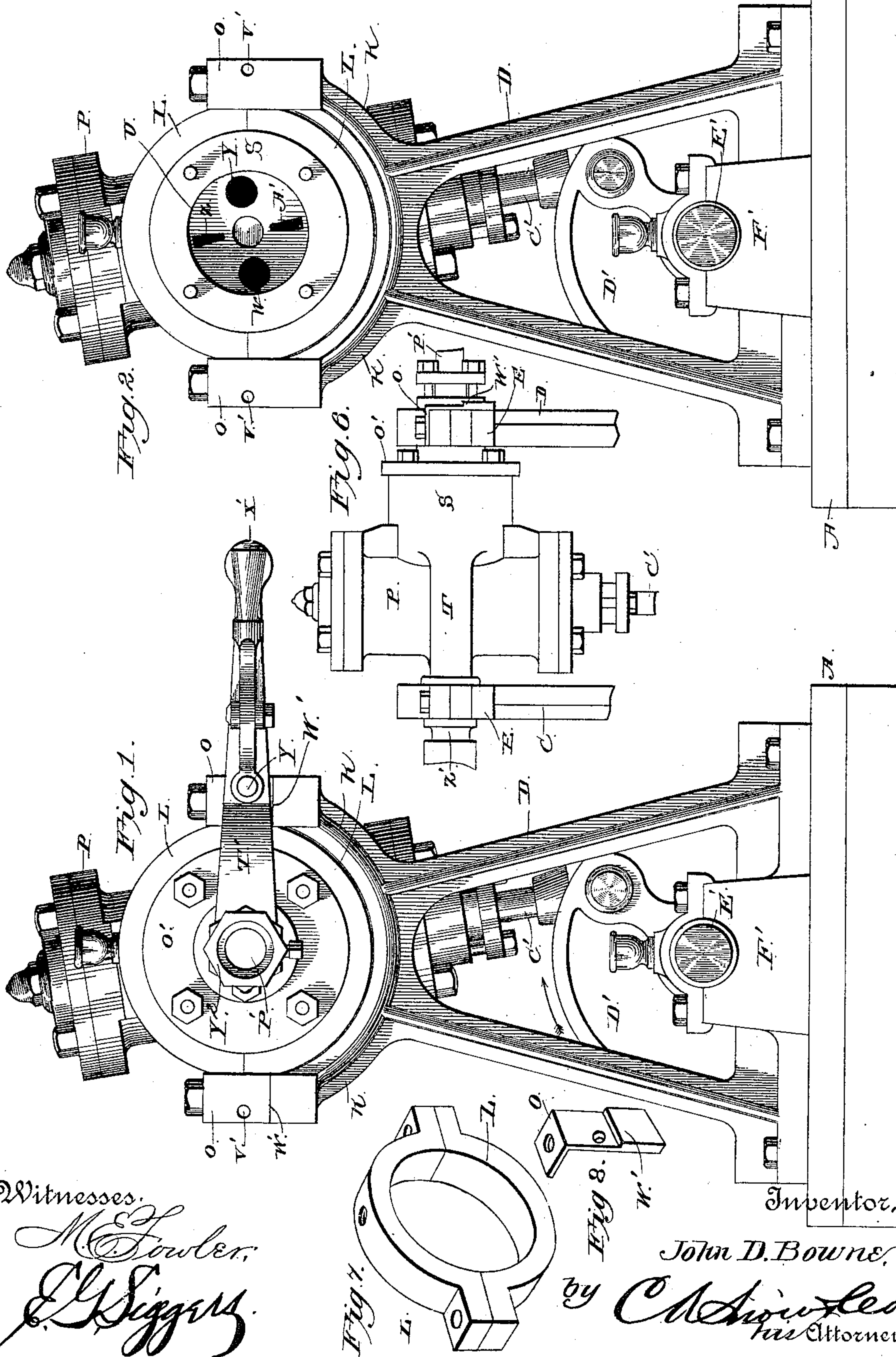
2 Sheets—Sheet 1.

J. D. BOWNE.

OSCILLATING STEAM ENGINE.

No. 379,630.

Patented Mar. 20, 1888.



Witnesses.
M. S. Fowler,
J. H. Siggers.

Inventor,
John D. Bowne,
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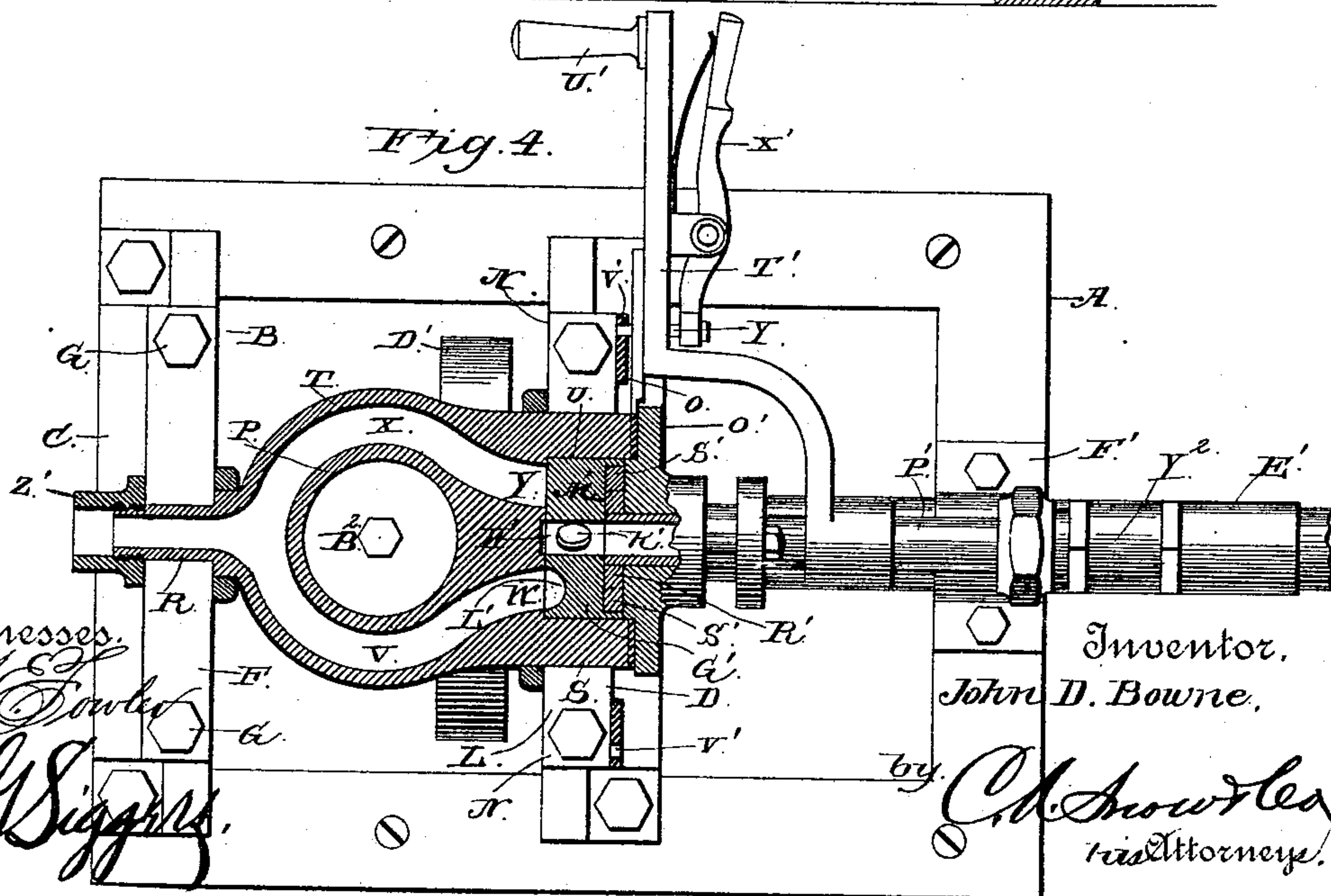
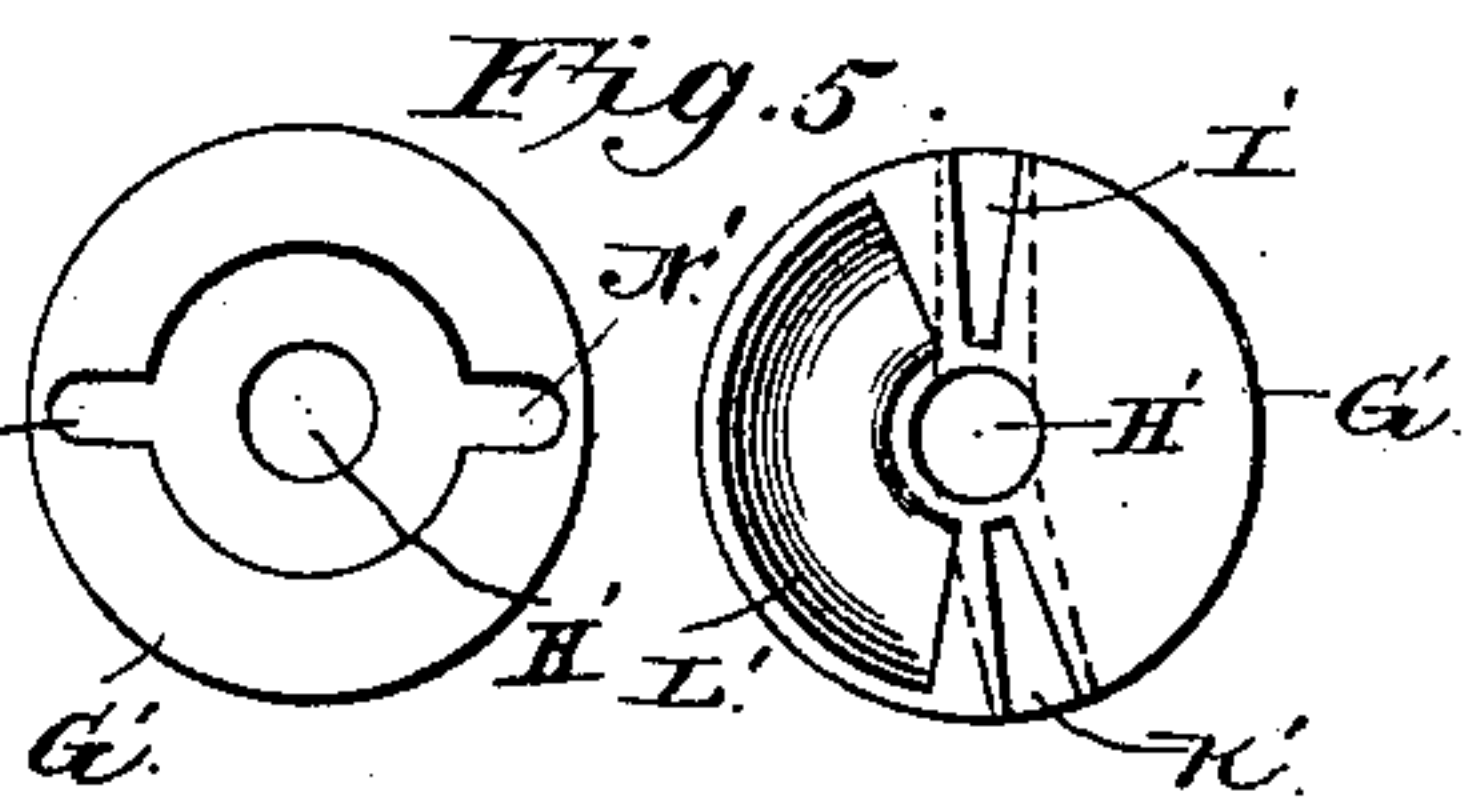
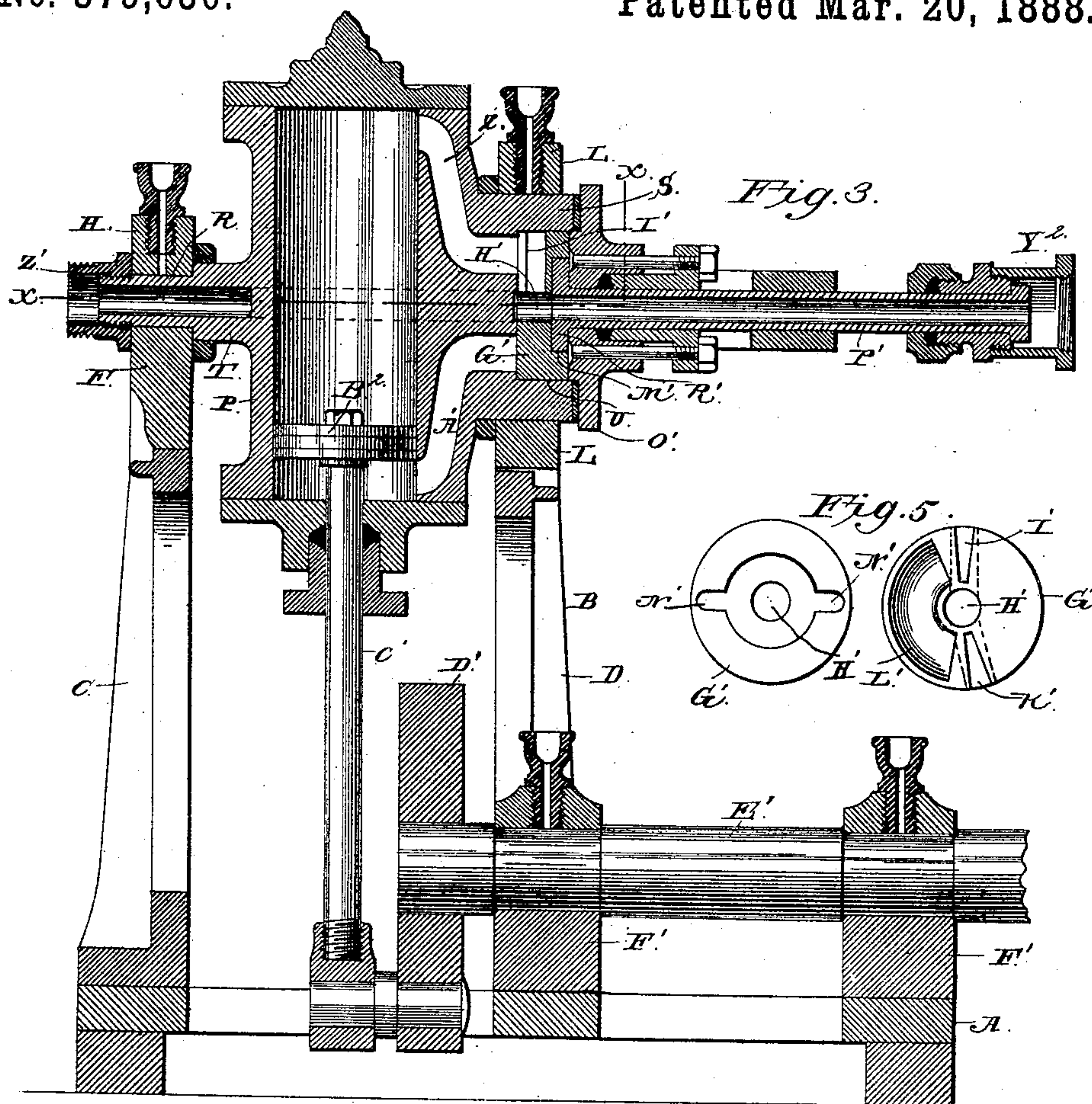
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Inventor,
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UNITED STATES PATENT OFFICE.

JOHN D. BOWNE, OF JAMESBURG, NEW JERSEY.

OSCILLATING STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 379,630, dated March 20, 1888.

Application filed October 11, 1887. Serial No. 252,060. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. BOWNE, a citizen of the United States, residing at Jamesburg, in the county of Middlesex and State of New Jersey, have invented a new and useful Improvement in Oscillating Steam-Engines, of which the following is a specification.

My invention relates to an improvement in oscillating steam-engines; and it consists in the peculiar construction and combination of devices, that will be more fully set forth hereinafter, and particularly pointed out in the claims.

Figure 1 is a front elevation of an oscillating engine embodying my improvement. Fig. 2 is a similar view of the same with the front plate of the steam-chest and the valve removed. Fig. 3 is a vertical central longitudinal sectional view of the same. Fig. 4 is a horizontal sectional view taken on the line *xx* of Fig. 3. Fig. 5 is a detail view of both sides of the valve. Fig. 6 is a detail view of a modified form of my engine. Fig. 7 is a detailed elevation of the bearing-ring. Fig. 8 is a similar view of one of the yokes.

A represents the bed-plate of the engine, which is rectangular, as here shown, and B represents the frame of the engine, which comprises a pair of standards, C D. The upper end of the standard C has a pair of arms, E.

F represents a bridge or bearing, which rests upon and connects the arms E thereof, and is bolted thereto by means of bolts G. On the upper side of the bridge F, at the center of the same, is bolted a block, H. The standard D, which is arranged at a suitable distance from the standard C, has its upper end provided with a pair of curved arms, K.

L represents an annular bearing-ring, which comprises a pair of semicircular sections, the ends of which extend outward at right angles to form arms N, which bear upon each other and upon the upper sides of the arms K of standard D. Yokes O are bolted to the arms K and to the arms N, as shown, and thereby the sections are secured together and the annular ring is secured in position on the upper end of standard D.

P represents the steam-cylinder, which is provided at its center on opposite sides with

a pair of projecting trunnions, R S, the said trunnions being formed integrally with the said cylinder. The trunnion R is journaled in a circular opening made in the opposing sides of the bridge F and the block H, and the trunnion S, which is much larger than the trunnion R, is journaled in the annular ring L, and thereby the cylinder is adapted to oscillate in its bearings. Formed integrally with the outer side of the cylinder is an annular rib or flange, T. The outer end of the trunnion S is bored, as shown, to form a cylindrical cavity, U, which constitutes the steam-chest.

V represents a channel, which is formed in the rib T of the steam-chest, and extends from a port, W, at the inner end of the steam-chest through one side of the rib T, and communicates with a cylindrical bore or opening in the trunnion R.

X represents a curved channel, which is formed in the annular rib T, communicates at one end with the bore or opening in the trunnion R, and communicates at its front end with a port, Y, at the inner end of the steam-chest on the side thereof diametrically opposite the port W.

Z represents a steam-port, which is made in the upper side of the steam-chest at the inner end thereof, and communicates with the upper end of the steam-cylinder through a suitable channel, and A' represents a similar port in the steam-chest at a point diametrically opposite the port Z, and communicates with the lower end of the steam-cylinder through a suitable channel.

B' represents the piston, which is of the usual construction and reciprocates in the steam-cylinder. This piston is provided with a piston-rod, C', which extends through a packing-gland at the lower end of the steam-cylinder, and is connected to a crank arm or wheel, D', on the inner end of a horizontal shaft, E', which shaft is journaled in bearings F', secured on the bed-plate A.

G' represents a cylindrical valve, which is adapted to fit snugly in the cylindrical bore of the steam-chest and to bear tightly against the inner end of the steam-chest and form a steam-tight joint therewith. Through the center of the valve G' is made a cylindrical opening, H'.

I' and K' represent a pair of openings which

are made in the valve, radiate from the central opening therein, and communicate therewith, the said openings being arranged a distance of about one hundred and fifty degrees apart. By this means, when one of the openings in the valve registers with one of the inlet-ports at the inner end of the steam-chest, the other opening in the valve will be arranged at a slight distance (see Figs. 5 and 6) beyond one side of the other inlet-port, so that the latter will be covered.

L' represents a cavity or recess which is made in the inner side of the valve G' and extends through nearly half a circle thereon, the ends of the said cavity or recess being near the openings I' and K'. In the front side of the valve G' is an annular countersunk opening, M', which communicates with the opening H' and is concentric thereto, and from opposite sides of the said recess M' project cavities or arms N', which communicate therewith.

O' represents a circular plate, which is bolted to the front end of the trunnion S and covers the front side of the steam-chest.

P' represents a steam-inlet pipe, which passes through a packing-box in the center of the plate O', and has rigidly secured to its inner end a circular disk, R', which fits in the annular recess M' in the front side of the valve, and is provided at diametrically-opposite points with projecting studs S', that enter the recesses or arms N'. By this means it will be readily understood that the valve may be held stationary in the steam-chest when the latter oscillates with the steam-cylinder.

T' represents a lever, which is secured rigidly to the inlet-pipe P' at a point beyond the front side of the plate O', is curved, as shown, and thereby caused to bear against the front sides of the yokes O, and has a handle, U', at its outer end. Openings V' are made in the yokes O at diametrically-opposite points with relation to the center of the steam-chest, and the said yokes O are provided with projecting shoulders or stops W' on their front sides at a suitable distance below the openings V'.

X' represents a spring-actuated lever, which is fulcrumed in a bearing on the front side of the lever T', and to the inner end of the said lever X' is connected a pin or stud, Y', which passes through an opening in the lever T' and is adapted to engage one of the openings V'.

Y² represents a coupling, which is swiveled to the outer end of the inlet-pipe P' and is adapted to connect the pipe from the steam-boiler (not shown) to the pipe P', so that the latter may rotate without affecting the steam-pipe.

Z' represents a coupling, (see Figs. 3, 4, and 6,) which is attached to the outer end of the trunnion R of the steam-cylinder and is adapted to be swiveled to an exhaust-pipe to carry away exhaust-steam.

The operation of my invention is as follows: When the lever T' is arranged in a position shown in Fig. 1, the inlet-pipe is turned with it to so arrange the valve G' in position in the

steam-chest that the recess L' in the said valve communicates with the opening W in the steam-chest, and the openings I' and K' in the valve are adapted to register alternately with the ports Z and A', respectively, in the steam-chest as the cylinder and the steam-chest oscillate. When the engine is thus arranged, the crank-shaft is adapted to be rotated in the direction indicated by the arrow in Fig. 1, the steam being admitted alternately to opposite ends of the cylinder through the ports Z and A' as the same are alternately opened by the openings in the valve, and the steam being exhausted alternately through the said ports Z and A' and through the exhaust-channel communicating with the port W and with the recess L' in the valve. When the lever T' is turned in the opposite direction and is locked to the yoke on the opposite side of standard D, the valve is moved through one-half a rotation, so as to cause its recess L' to coincide with the port Y of the steam-chest, and thereby the engine is reversed, as will be very readily understood.

I do not limit myself to having the trunnion S of the steam-cylinder journaled in the annular ring L, as the plate O' may be provided on its front side with a trunnion of reduced diameter, and the ring L may be made only sufficiently large to receive the said trunnion, and thereby reduce the bearing-surface and consequently reduce friction, as will be readily understood. Such a modified form of my invention is illustrated in Fig. 6.

I do not wish to limit myself to the means hereinbefore described for securing the lever T' to the frame of the engine in either position, as other means may be employed for accomplishing this purpose, it being only essential for the operation of the engine that the reversing-lever T' be rigidly held when arranged in either position.

Having thus described my invention, I claim—

1. The combination, in a steam-engine, of the oscillating cylinder having the steam-chest on one side thereof and oscillating therewith, the said steam-chest being provided with the inlet and exhaust ports communicating with the said cylinder, and the valve arranged in the steam-chest, adapted to remain stationary while the steam-chest operates with the cylinder, and provided with the openings adapted to register with the inlet-ports, and provided, further, with a recess, L', adapted to register with one of the exhaust-ports, substantially as described.

2. The combination, in a steam-engine, of the oscillating cylinder having a trunnion, S, projecting from its center to one side, said trunnion being bored cylindrically and constituting a steam-chest having ports Z and A', communicating with opposite ends of the cylinder, and exhaust ports W and Y, arranged between the ports Z and A', and the cylindrical valve arranged in the steam-chest and secured against rotation therein, the said valve having the

openings I' and K', adapted to alternately open and close the ports Z and A', respectively, and provided, further, on its inner side with the recess L', for the purpose set forth, substantially as described.

3. The combination, in a steam-engine, of the oscillating cylinder having the trunnion S on one side bored centrally and forming the steam-chest, the trunnion R on the side opposite the trunnion S, the channels formed in the sides of the cylinder, communicating with an opening in the trunnion R and with the ports arranged at diametrically-opposite points at the inner end of the steam-chest, and the ports Z and A', arranged at diametrically-opposite

points in the inner end of the steam-chest and communicating with opposite ends of the steam-cylinder, with the cylindrical valve secured firmly in the steam-chest and stationary relatively thereto, the said steam-valve having the openings I' and K', adapted to alternately register with the openings A' and Z and the recess L', substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

JOHN D. BOWNE.

Witnesses:

JOHN H. SIGGERS,
E. G. SIGGERS.