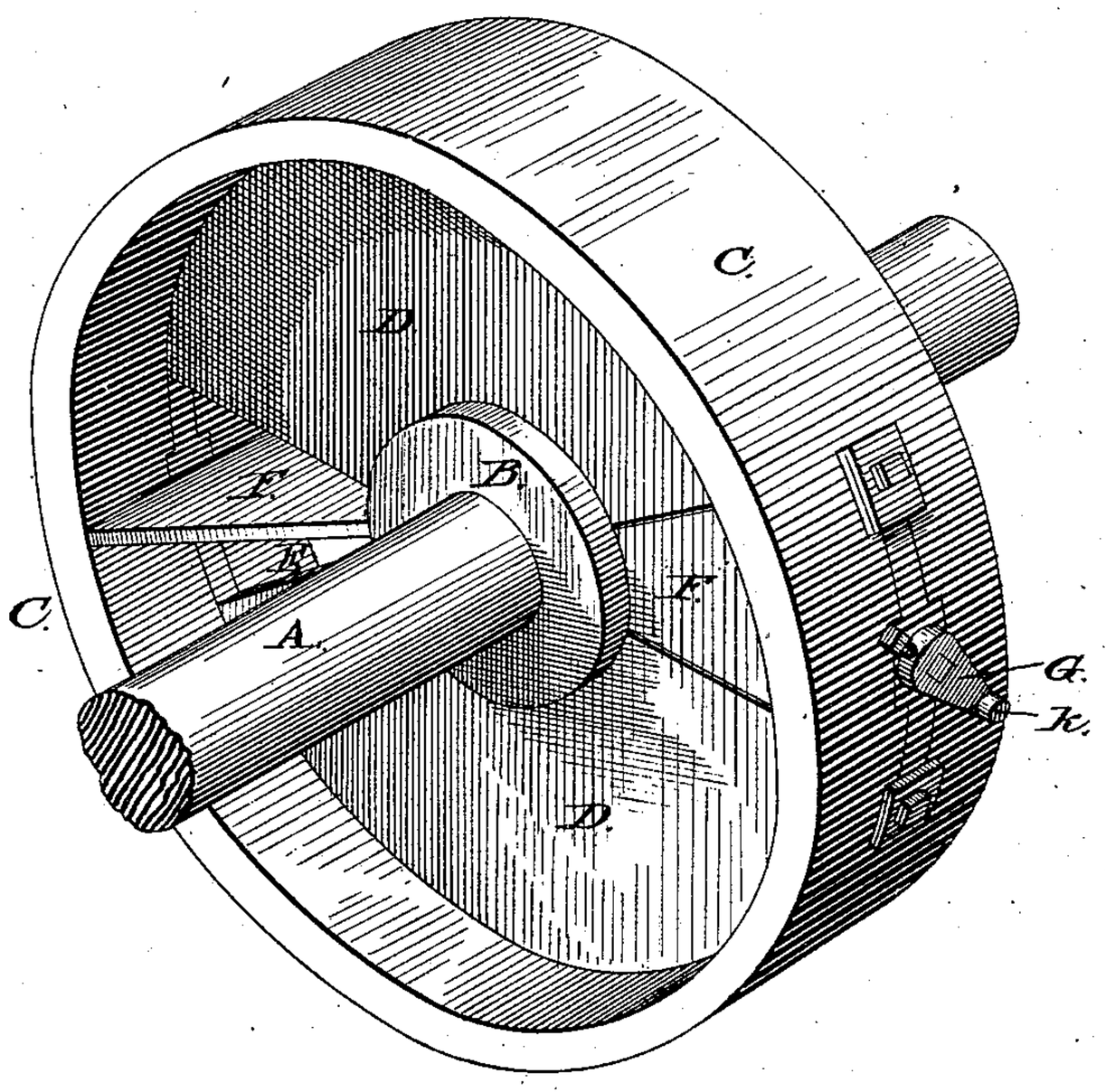
(No Model.) 2 Sheets—Sheet 1.

J. P. FLETCHER.

ROTARY ENGINE.

No. 289,822. Patented Dec. 11, 1883.

Fig. 1.



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(No Model.)

2 Sheets—Sheet 2.

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Fig. 2.

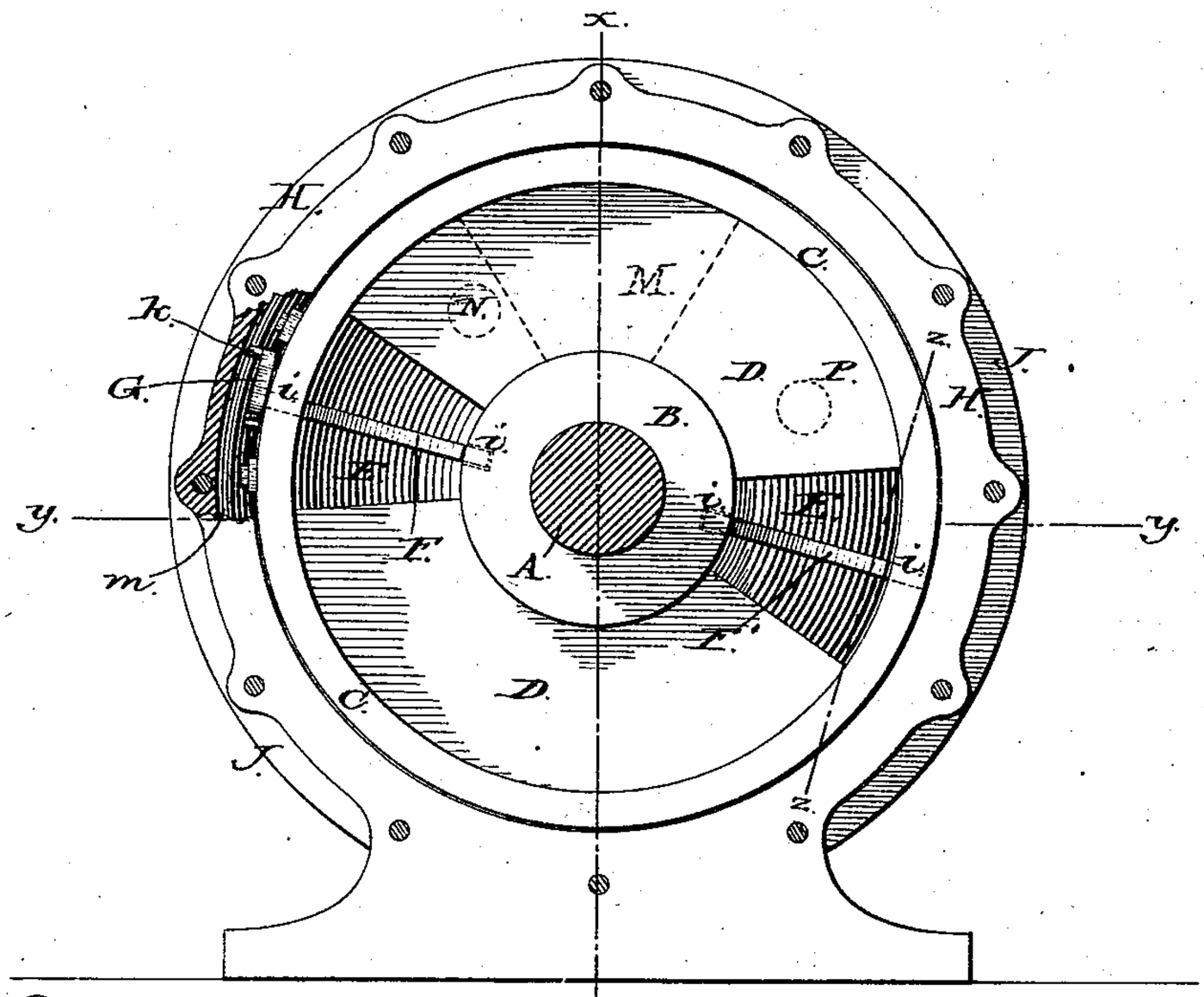


Fig. 3.

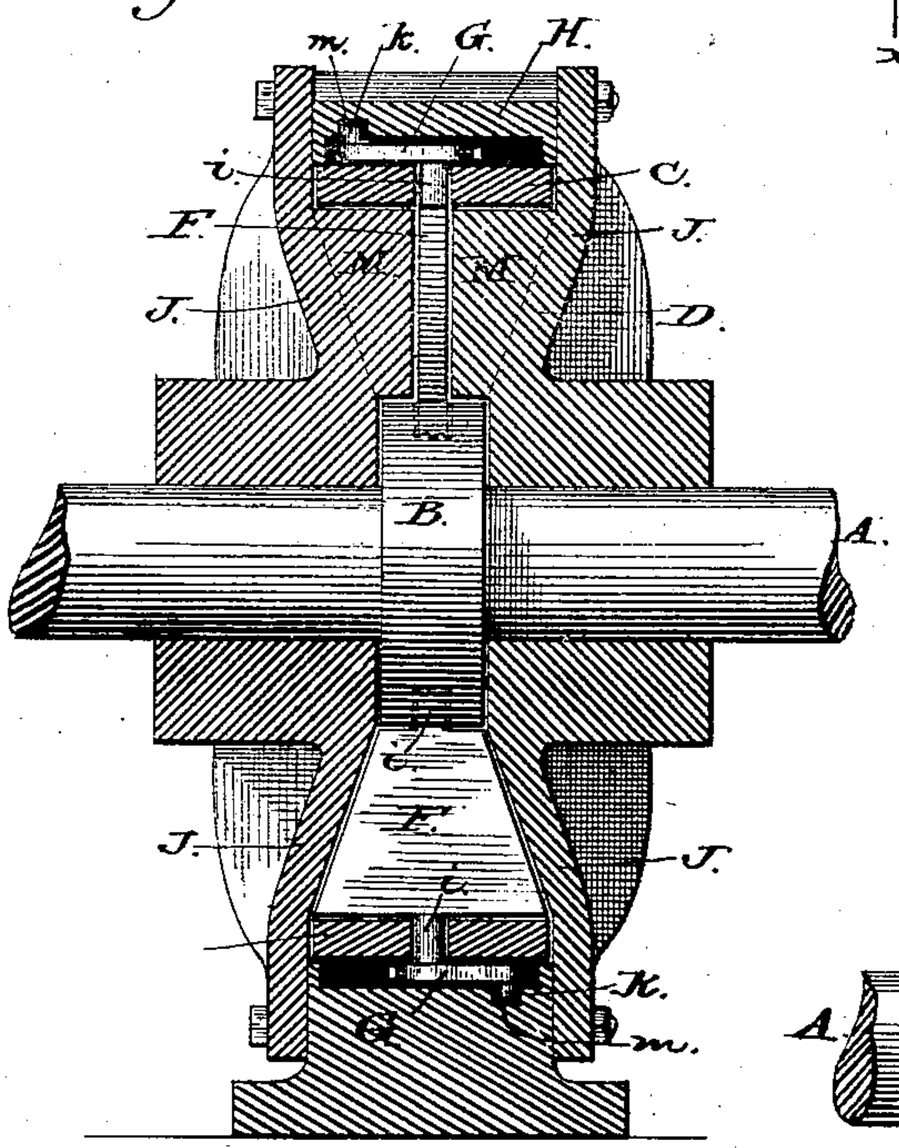


Fig. 4.

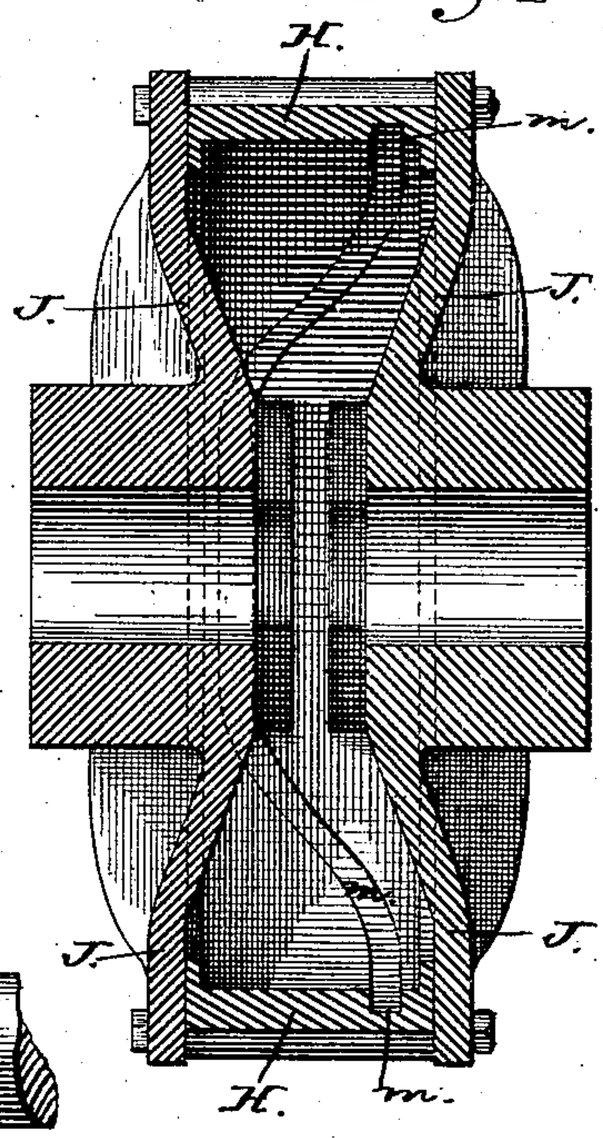
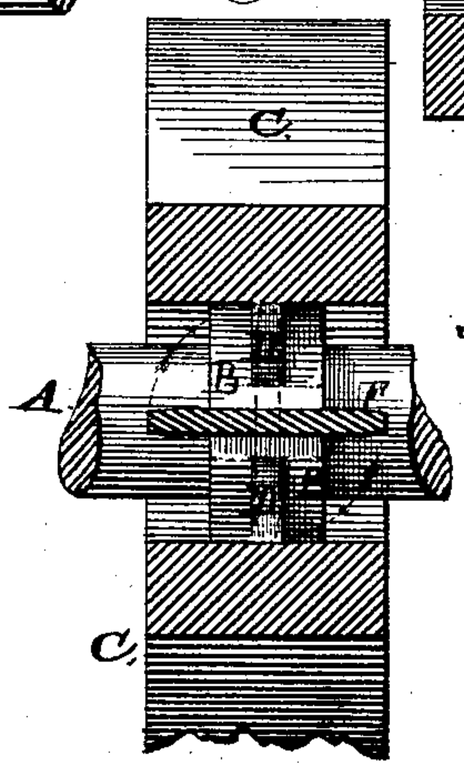


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN P. FLETCHER, OF NEW YORK, N. Y.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 289,822, dated December 11, 1883.

Application filed April 10, 1883. (No model.)

To all whom it may concern:

Be it known that I, JOHN P. FLETCHER, of the city, county, and State of New York, have invented a new and useful Improvement in Rotary Engines; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

My invention relates to an improvement in the construction of rotary engines, whereby the pistons of the engine shall be relieved wholly from pressure when changing their position, and be unaffected in their movement by centrifugal force.

It consists in the combination, with the web of a wheel fixed upon the shaft of the engine to rotate centrally within a circular working-chamber, and with vanes or pistons rotating each upon a radial axis within an opening cut through the web, of a rim forming the periphery of the wheel, whose width shall correspond to the width of the annular piston-chamber, so as to make therewith, on either side, a lateral steam-tight joint capable of being packed, if required, and which shall also form a steam-tight joint with the upper edge of each vane, and furnish, likewise, an outer pivotal bearing for its axis.

It consists, also, in the combination of a crank and crank-pin with the outer end of the projecting pivot of each vane upon the outer surface of the rim of the wheel, to engage a cam-groove on the inner face of the casing of the wheel, and thereby insure a proper automatic rotation of the vanes in unison with the rotation of the wheel when turned parallel with the web to lie wholly within said opening, so as to pass freely between the lateral abutments interposed between the supply and exhaust ports of the chamber, and when turned at a right angle with the web to reach and extend from side to side of the chamber, to present thereby a working-surface, against which the steam-pressure may operate to produce a rotation of the shaft, the proper rotation of the vanes or pistons being automatically produced, in approaching and leaving each fixed abutment, by means of a cam-groove actuating a crank, or by other suitable devices.

In the accompanying drawings, Figure 1 is a view in perspective of the piston-wheel of my improved rotary engine removed from its casing; Fig. 2, an elevation of the wheel within its casing, the front plate of the casing being removed. Fig. 3 is a central transverse section of the engine complete in line *x x* of Fig. 2, illustrating one of the pistons passing through the transverse abutments fixed between the inlet and outlet ports; Fig. 4, a central transverse section through the casing alone in line *y y* of Fig. 2, the piston-wheel being removed to show the form of the cam-groove cut on the inner periphery of the casing to actuate the pistons; and Fig. 5, a section through the wheel alone, cut in line *z z* of Fig. 2, illustrating the piston turned at right angles to the wheel to be acted upon by the steam-pressure.

A represents the shaft of the engine, upon which is formed or fixed a wheel constructed of a solid hub, B, a wide rim, C, and an interposed solid web, D, connecting the rim and hub. In this web are formed two or more openings, E E, extending from the hub to the rim, within each of which is pivoted upon a radial axis a flat plate, constituting a vane or piston, F, Fig. 3, whose lower end is of a length corresponding to the width of the hub B, and whose upper end corresponds in length with the width of the rim C of the wheel, as illustrated in Fig. 3.

The opening E is made to conform in outline with that of the rotating piston F, fitted therein, and the thickness of the plate is limited so as not to exceed that of the web of the wheel, so that when the piston is turned parallel with the web it shall be wholly within the opening therein without projecting beyond either face thereof. Each plate or piston F is pivoted upon pins *i i*, projecting centrally from its ends, the pin on the inner end being stepped in a recess in the hub, and that on the outer end extended to project through the rim of the wheel, as shown in Fig. 3. The piston is rotated upon its axis from a position parallel with the web to one at right angles thereto by means of a crank-arm, G, fitted upon the

end of the outer pivot-pin, and provided with a crank-pin, *k*, adapted to move in a cam-groove, *m*, cut in the inner face or periphery of the casing within which the wheel is inclosed.

The casing for the wheel may be constructed in any appropriate manner. In the drawings it is represented as formed of an annular or cylindrical rim, H, so far larger in diameter than the wheel as to allow a space between the two for the cranks G G on the outer periphery of the wheel. To this rim are bolted the two outer face-plates, J J. These plates are made to fit against the rim and hub of the wheel, and to conform intermediately to a straight line drawn from the one to the other, (see Figs. 3 and 4,) so that the piston-plates F F shall, when opened at a right angle to the web of the wheel, fit accurately against the same and form a close joint therewith in moving over the face thereof. The center of each face-plate J is enlarged and made solid, to furnish suitable bearings for the shaft upon which the wheel is secured, the journal-bearings being bored through the same, as shown in the drawings. The space inclosed on each side of the wheel by the face-plates J is divided into one or more working-chambers by means of radial abutments M M, Fig. 3, projecting inwardly opposite to each other from each face-plate, so as to fit accurately against the wheel with a tight joint. A steam-supply port, N, (see dotted lines, Fig. 2,) is formed on one side of the abutments, and an exhaust-port, P, on the other side, to connect with the feed and discharge pipes. The pins *k* on the cranks G G engage the groove *m*, cut in the inner face of the rim of the casing, and this groove is so curved (see Fig. 4) as that, as the pistons approach the abutments in the revolution of the wheel, they are turned into line parallel with the web of the wheel, so as to be wholly within the thickness thereof, and thus pass freely between the abutments, and after passing through are again turned into position at right angles to the web, so as to extend completely across the casing from side to side thereof. As this rotation of each piston occurs after it has passed the exhaust-port and before reaching the supply-port, the piston is wholly relieved from pressure when so moving.

In the operation of the engine as a motor, steam or other fluid is admitted through the supply-port N (see dotted lines, Fig. 2) against the face of the piston-plate F, which has been turned at a right angle to the web of the wheel into a plane parallel with the shaft A, so as to completely fill transversely the space on either side of the wheel between its web and the walls or face-plates of the casing, as shown in Figs. 2 and 4. The pressure of the fluid is thus exerted squarely against the full face of the piston to drive it forward. In the meantime all pressure is removed from in front of the next piston F, Fig. 2, by the communication opened between the spaces in front of it and the exhaust-port P. Shortly after the first piston F has been brought into its operative position under pressure, and the pressure thereby cut off from the second piston F the latter will pass the exhaust-port P, so that it will be thereby relieved from pressure on both sides, and may thereupon be freely turned to pass the abutments M M.

The rotation of the pistons at the proper moment may be effected by other devices than the crank-arm and cam-groove herein described and illustrated, and my invention contemplates the substitution of any known mechanical device for producing an automatic rotation of the pistons, each at the proper moment to pass the abutments and resume an operative position.

The engine may be completely balanced by admitting the steam and providing an exhaust therefor at opposite points in the circumference, in which case two sets of abutments and pistons are required.

I contemplate likewise exhausting the steam from one set of working-chambers into a second set, either concentric with the first or adjacent thereto, in which pistons of larger area of surface are employed, all the pistons being, however, connected with the same shaft, which said devices for working the steam expansively I shall make the subject of separate application for Letters Patent.

It is evident that my rotary engine may serve as a pump as well as a motor, and I contemplate its use for such purpose.

I claim as my invention—

1. The combination, in a rotary engine, with vanes or pistons turning each upon a radial axis within openings in the otherwise solid web of its driving-wheel, of a rim upon the wheel made in one therewith, furnishing a journal-bearing for the outer pivot of each vane, and forming a steam-tight joint with the outer end of the vane and laterally with the casing of the wheel, substantially in the manner and for the purpose herein set forth.

2. The combination, in a rotary engine, with the inner periphery of its casing, and with vanes or pistons rotating each upon a radial axis in openings formed in the web of the driving-wheel inclosed by the casing, of a crank-arm upon the axial pivot of each piston, fitted with a pin to engage a cam-groove formed in the inner periphery of the casing, substantially in the manner and for the purpose herein set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN P. FLETCHER.

Witnesses:
A. W. STEIGER,
JOHN A. ELLIS.