

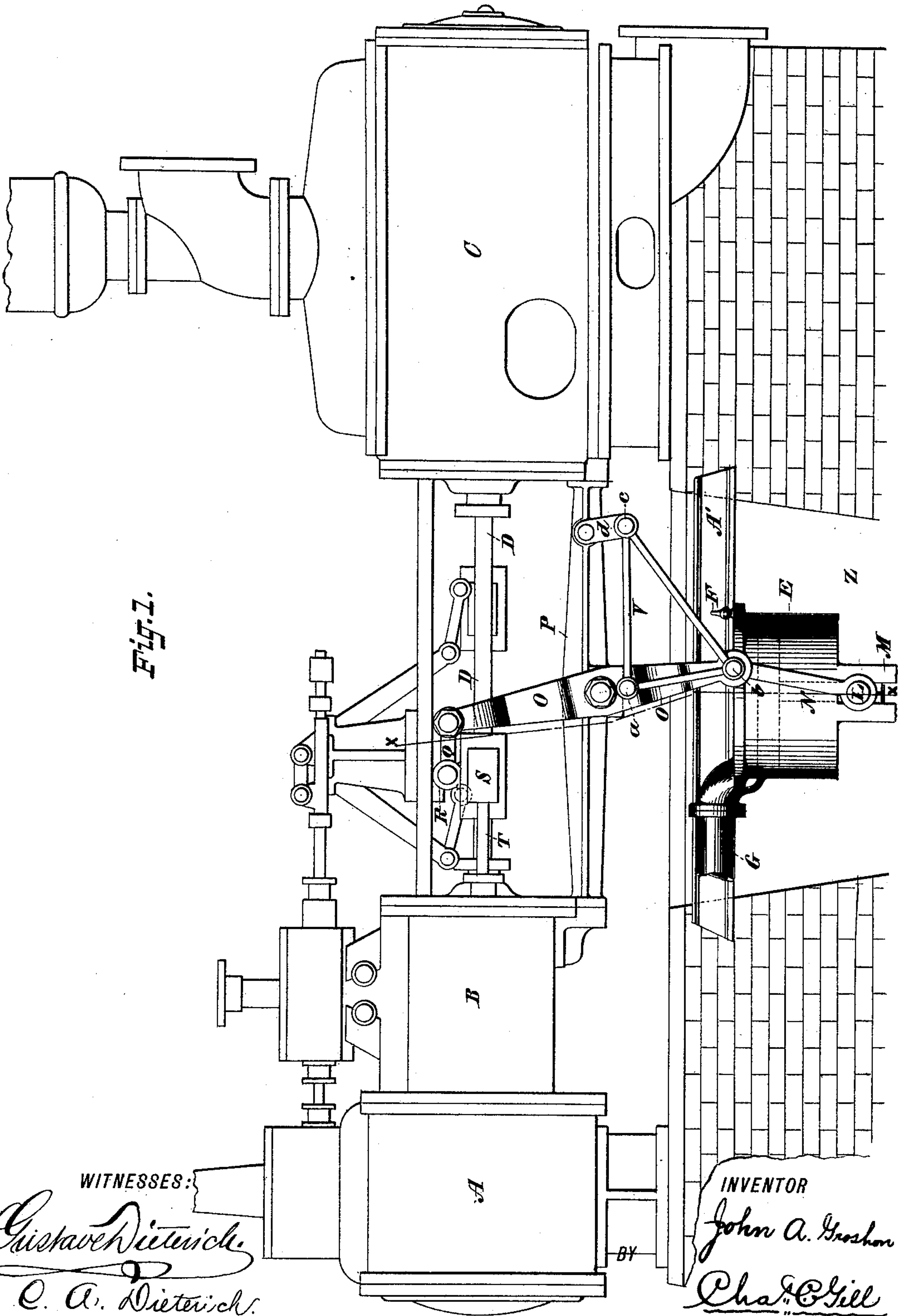
(No Model.)

3 Sheets—Sheet 1.

J. A. GROSHON.
STEAM ENGINE.

No. 410,412.

Patented Sept. 3, 1889.



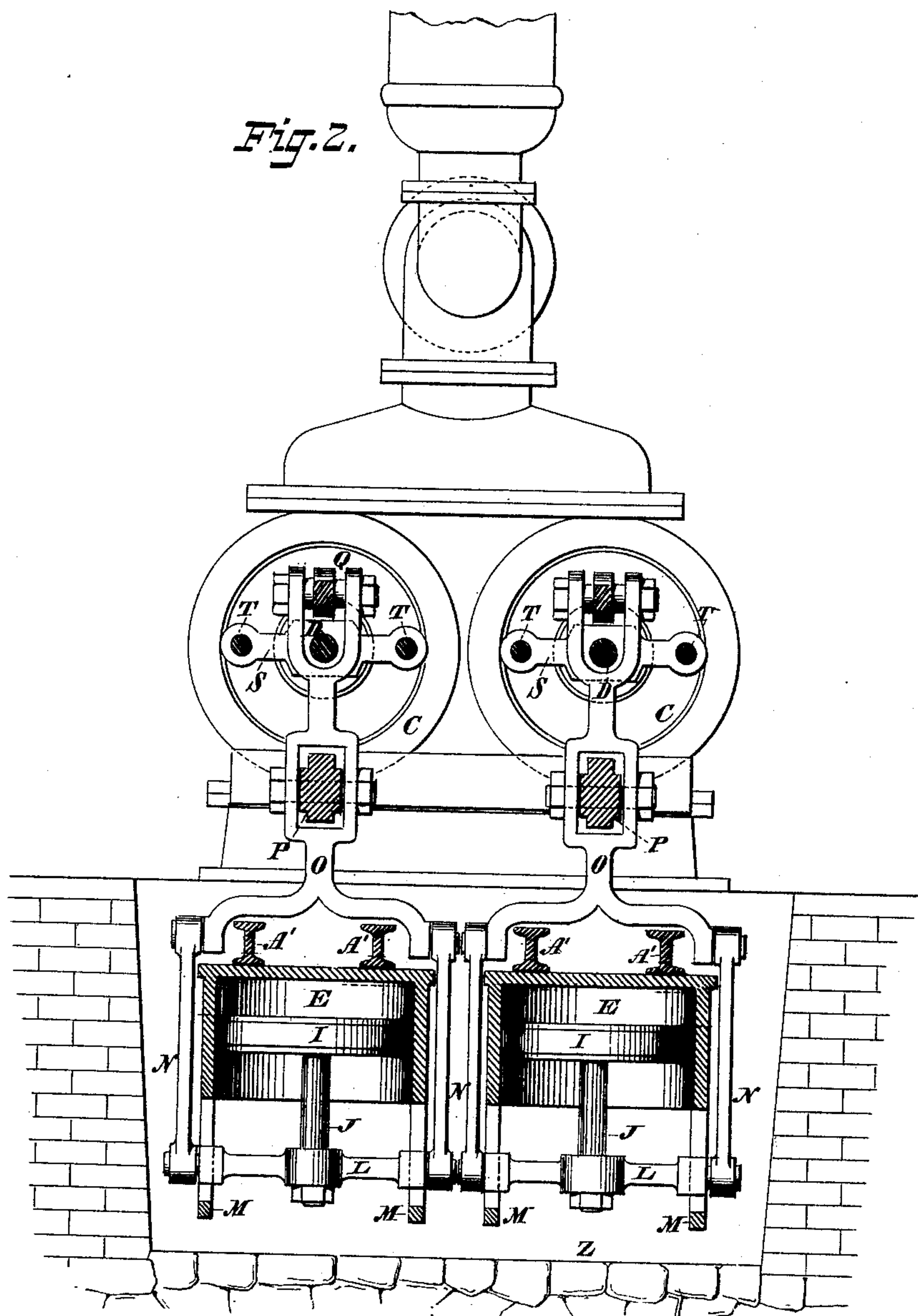
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STEAM ENGINE.

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WITNESSES:

Gustave Dietrich
C. A. Dietrich.

INVENTOR

John A. Groshon
BY *Chas. C. Gill*
ATTORNEY

(No Model.)

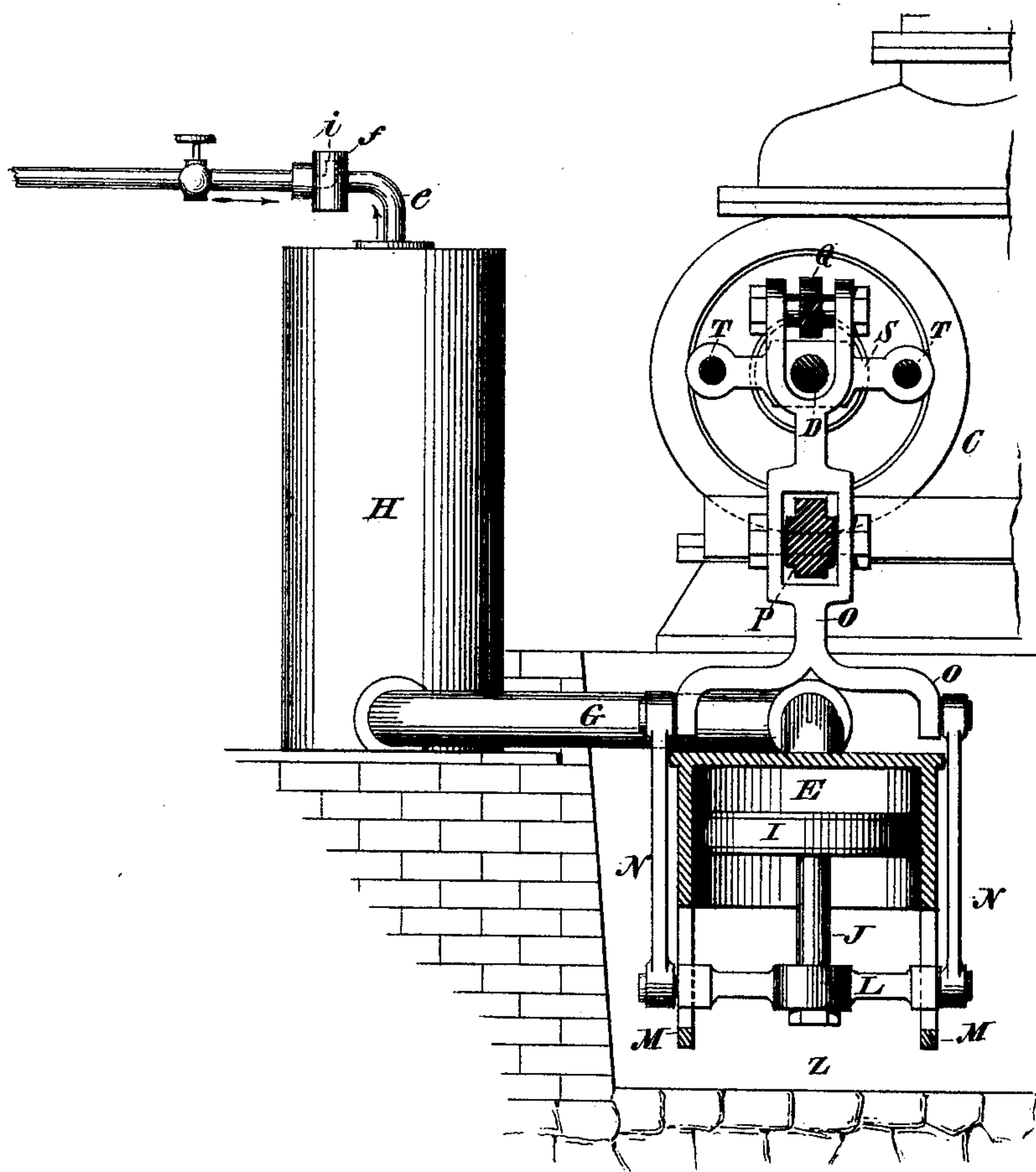
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Fig. 3.



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UNITED STATES PATENT OFFICE.

JOHN A. GROSHON, OF NEW YORK, N. Y.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 410,412, dated September 3, 1889.

Application filed February 9, 1888. Renewed May 16, 1889. Serial No. 310,938. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. GROSHON, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Steam-Engines, of which the following is a specification.

The invention relates to improvements in direct-acting steam-engines; and it consists in the combination, with the main piston-rod, of an auxiliary cylinder open at one end, and having a vacuum at the other and provided with a piston connected with the piston-rod of the engine by suitable levers, whereby during the first portion of the stroke of the main piston-rod the pressure in the auxiliary cylinder operates to oppose the same and during the latter part of said stroke assist the same.

The invention further consists in the connection of the vacuum end of said auxiliary cylinder with means, hereinafter described, for insuring the preservation of the vacuum, and also in the details of the construction and arrangement of the rods or levers connecting the piston of the auxiliary cylinder with the piston-rod of the engine.

I do not confine the invention to any particular style of direct-acting engine; but in the accompanying drawings I have shown it, for convenience, applied to a compound steam pumping-engine of the "Blake" pattern.

Figure 1 is a side elevation of the engine; Fig. 2, a section on the dotted line *xx* of Fig. 1; and Fig. 3 is a like view of same shown in connection with a vacuum-box which is in communication with the vacuum end of the auxiliary cylinder.

In the drawings, A represents the low-pressure steam-cylinder; B, the high-pressure steam-cylinder; C, the water-cylinder; D, the main piston-rod for said cylinder, and E the auxiliary cylinder, which, with its connections, is made the subject of the present application.

The engine shown having two pistons, two of the auxiliary cylinders are provided, one being in connection with each piston-rod. Each of the cylinders E is open at one end to the atmosphere, and is closed at the other end, this latter end, which I denominate the "vacuum end," being provided with a relief-valve F, or connected by means of a pipe G

with the condenser or with a vacuum-tank H, the purpose of the relief-valve or the connection of the cylinder with the condenser or the tank H being to insure the preservation of the vacuum in the vacuum end of the cylinder E.

The cylinders E and the manner of connecting their pistons with the main piston-rods of the engine are identical with each other; hence it will be unnecessary to describe but one of them with the one set of connections. The piston I of the cylinder E is connected by means of the rod J with the cross-head L, (shown more clearly in Figs. 2 and 3,) the ends of the cross-head being adapted to move in the guides M, arranged one on each side of the cylinder E. The extreme ends of the cross-head L are connected by links N with the lower portion of the rocking lever O, which is pivotally secured to the bar P and carries at its upper end a small link Q, which is pivoted to an ear R, connected with the cross-head S, the latter being arranged on the main piston-rod D and low-pressure rods T, as shown more clearly in Figs. 2 and 3. To each of the rocking levers O, I provide the steady-links V, (illustrated in Fig. 1,) which operate to guide the movement of the levers O and prevent any rattling thereof. Each set of the steady-links consists of three bars, pivoted at *a*, *b*, and *c*, respectively, as shown in Fig. 1, forming substantially a triangle, the pivot at *c* passing through the link *d*, which is pivotally secured to the bar P, and the pivot at *a* entering the lever O.

In the operation of the invention it will be observed that the pressure of the atmosphere against the piston I will operate through the rocking lever O to retard the piston-rod D during the first portion of its stroke, and that after the piston-rod has moved a sufficient distance to bring the rocking lever O beyond the line of center of the piston I and its rod J this pressure on the head I will assist the movement of the piston-rod D, the effect of this being to present a resistance during the first portion of the stroke of the main piston-rod prior to the expansion of the steam, and then to cause this resistance to assist the movement of the piston-rod during the latter portion of its stroke after the expansive action of the steam has taken place. In order

that the vacuum on the upper side of the piston-head I may be preserved, a small relief-valve F has been provided, which may be used either alone or in connection with the
5 pipe G, leading to the usual condenser, or to a vacuum-tank H, the latter being illustrated in Fig. 3, and the purpose of which, as well as of the condenser, is to withdraw any air from the upper part of the cylinder E that
10 might by any possibility find its way therein. The vacuum-tank H is provided at its upper end with a pipe e, leading to the vertical cylinder f, wherein is provided a steam-jet i, which creates an upward suction through the
15 pipe e, discharging any air that may find its way into the tank H from the cylinder E.

It will be obvious that, if desired, the steam-jet i could be placed in the pipe G without the intervention of the tank H; but it appears to be more desirable to make use of the
20 tank.

The pumping-engine is mounted upon a suitable base of masonry, wherein is provided the pit Z and the cross supporting-bar A', as
25 illustrated in Fig. 1.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In combination with a direct - acting

steam-engine, the auxiliary cylinder E, open to the atmosphere at one end and closed at
30 the other end, and there forming a vacuum, the piston and piston-rod for the auxiliary cylinder, cross-head L, links N, and the rocking lever O, connected at its lower end with the said links and at its upper end with the
35 piston-rod, substantially as and for the purposes described.

2. In combination with a direct - acting steam-engine, the auxiliary cylinder E, open to the atmosphere at one end and closed at
40 the other end, and there forming a vacuum, the piston I, rod J, cross-head L, guides M, links N, and the rocking lever O, pivoted at its lower end to said links and at its upper end connected with the piston-rod of the en-
45 gine, substantially as and for the purposes described.

Signed at New York, in the county of New York and State of New York, this 7th day of February, A. D. 1888.

JOHN A. GROSHON.

Witnesses:

CHARLES C. GILL,
W. A. C. MATTHIE.