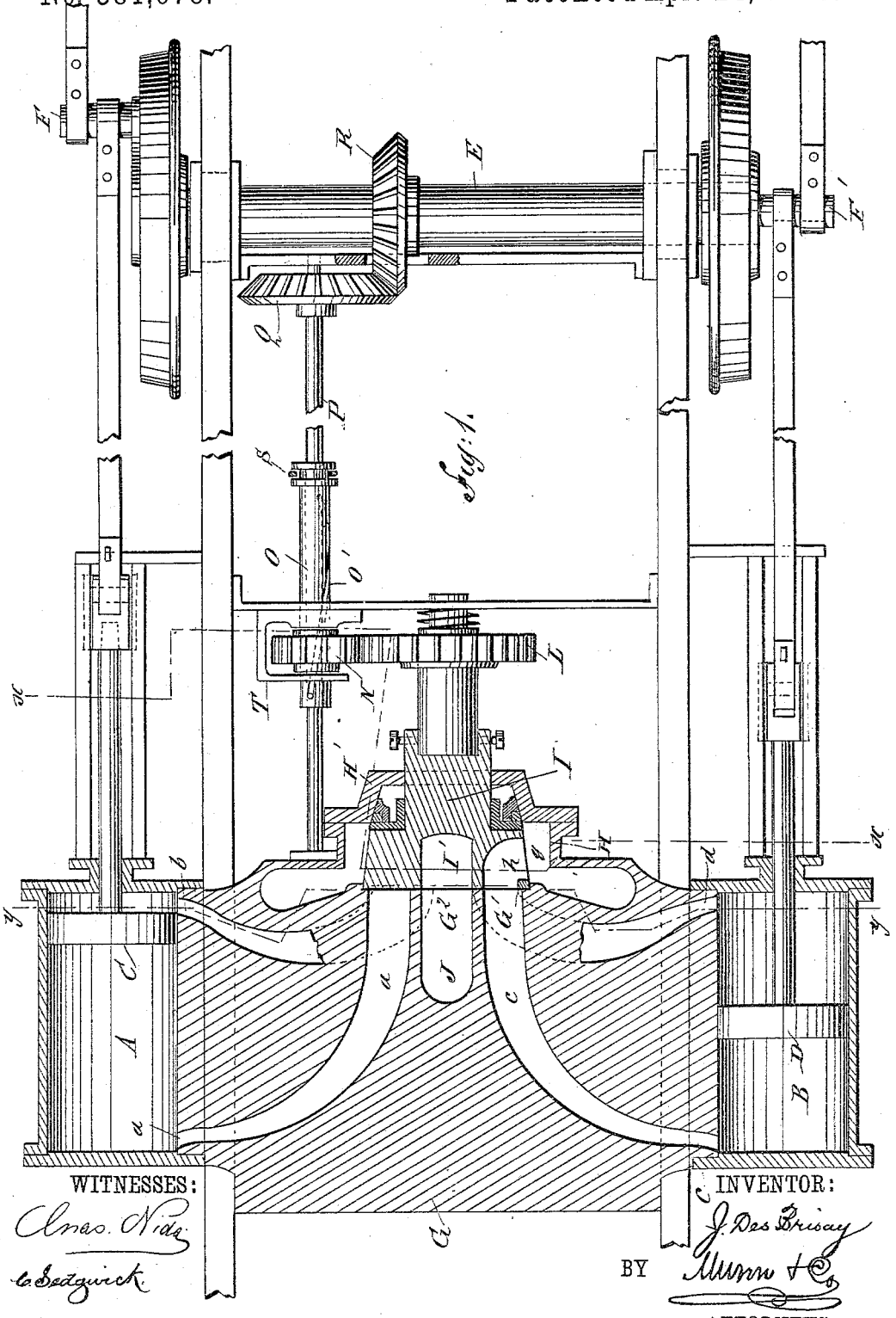
(No Model.) 4 Sheets—Sheet 1.

# J. DES BRISAY.

## VALVE GEAR.

No. 381,678. Patented Apr. 24, 1888.




WITNESSES:

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ATTORNEYS.

(No Model.) 4 Sheets—Sheet 2.

# J. DES BRISAY.

## VALVE GEAR.

No. 381,678. Patented Apr. 24, 1888.

Fig: 2.

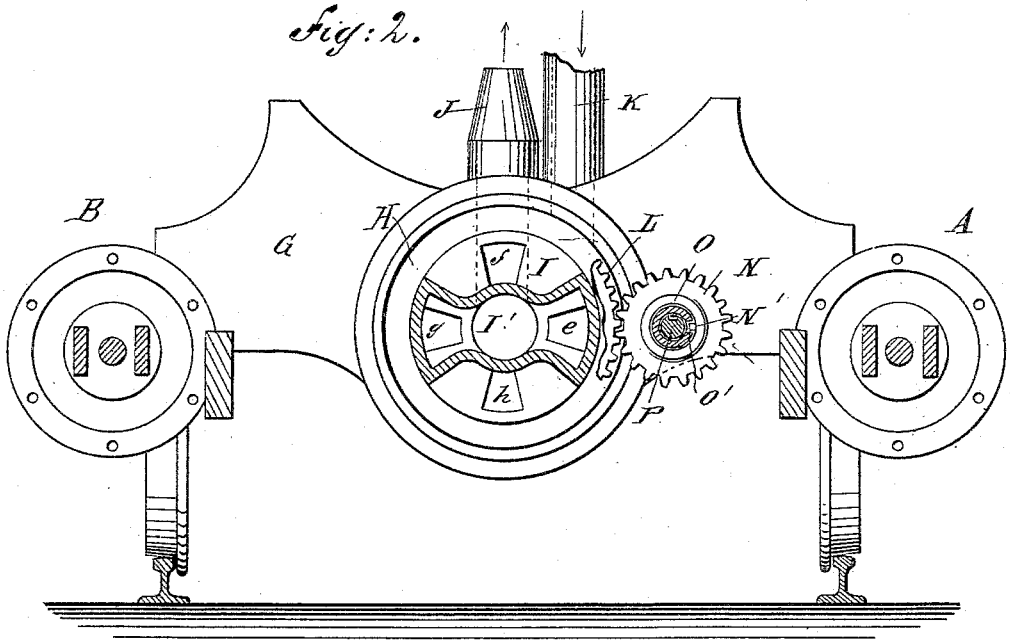
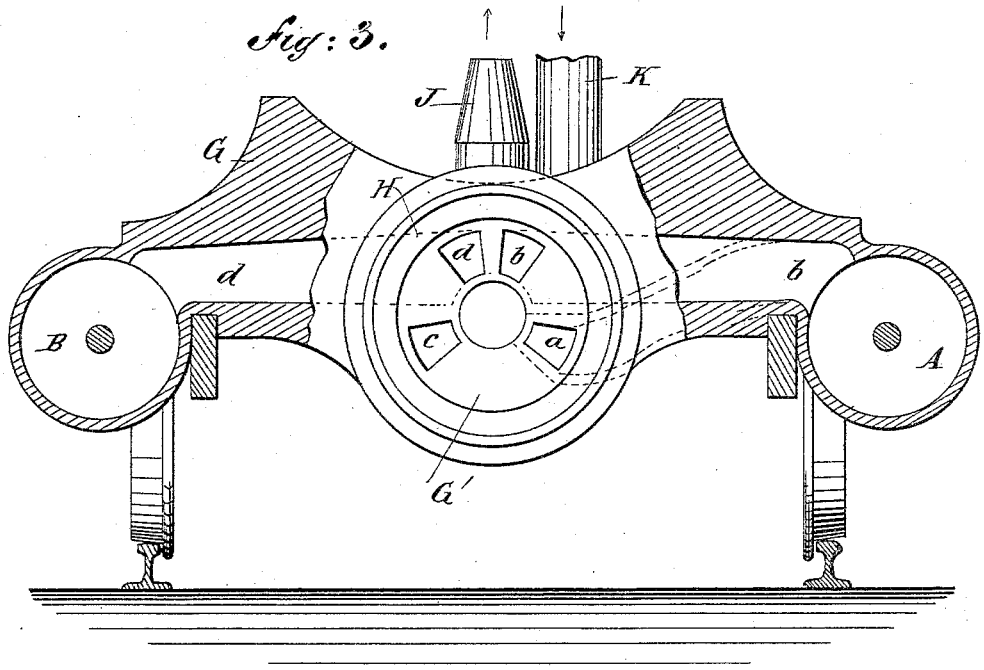



Fig: 3.




WITNESSES:

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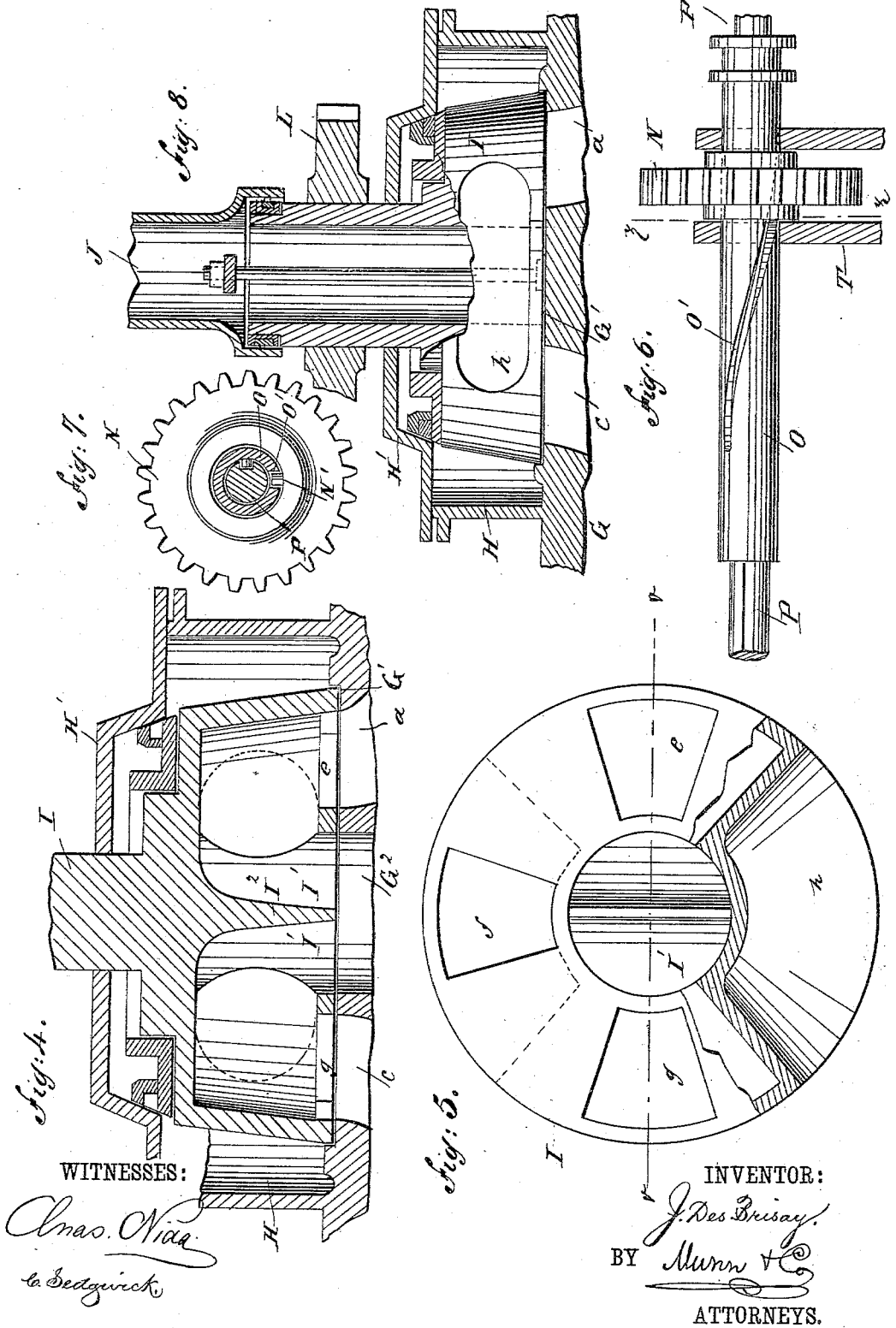
(No Model.) 4 Sheets—Sheet 3.

# J. DES BRISAY.

## VALVE GEAR.

No. 381,678. Patented Apr. 24, 1888.

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(No Model.) 4 Sheets—Sheet 4.

# J. DES BRISAY.

## VALVE GEAR.

No. 381,678. Patented Apr. 24, 1888.

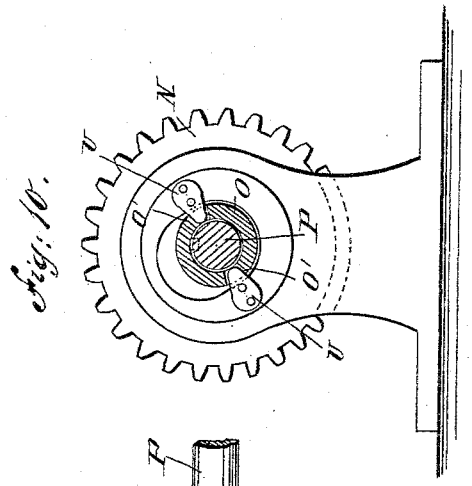


Fig. 10.

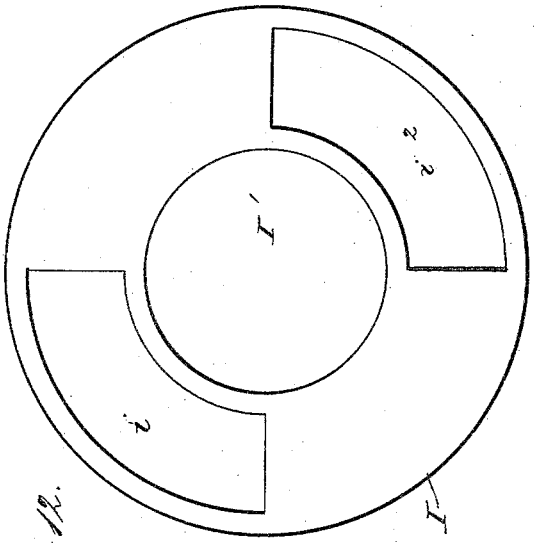


Fig. 12.

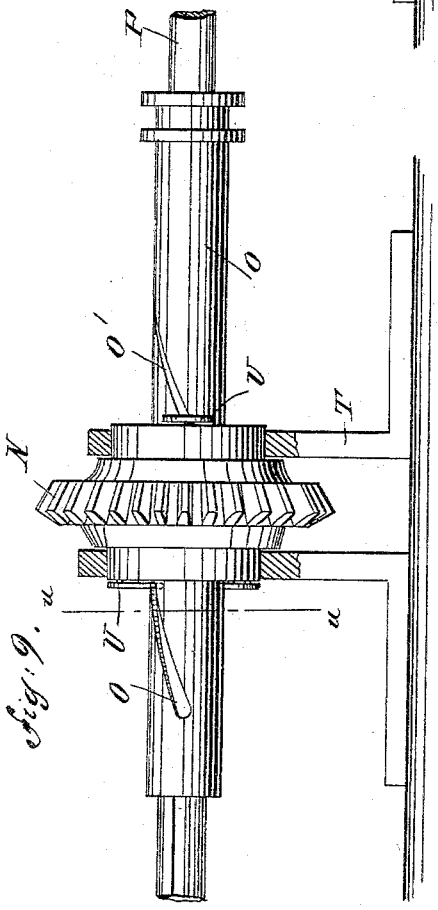


Fig. 9.

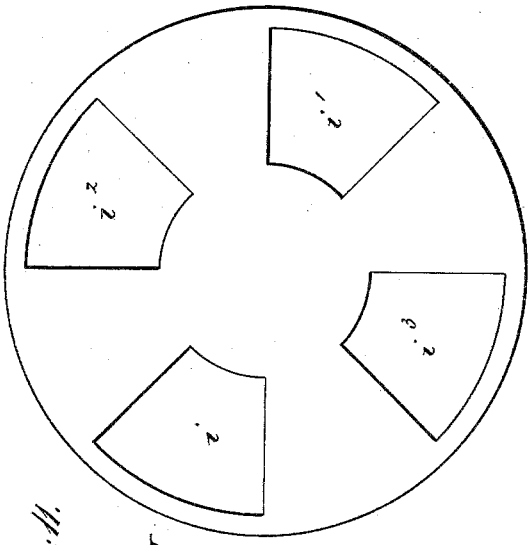


Fig. 11.

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# UNITED STATES PATENT OFFICE.

JAMES DES BRISAY, OF KAMLOOPS, BRITISH COLUMBIA, CANADA.

## VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 381,678, dated April 24, 1888.

Application filed August 2, 1887. Serial No. 245,923. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES DES BRISAY, of Kamloops, in the county of Yale, Province of British Columbia, and Dominion of Canada, have invented a new and Improved Valve-Gear for Steam-Engines, of which the following is a full, clear, and exact description.

The object of my invention is to provide a new and improved valve-gear for steam-engines by which one, two, or more cylinders are controlled by a single rotating valve, so that my improvement is specially adapted for locomotive-engines.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional plan view of my improvement as applied to locomotive-engines. Fig. 2 is a vertical cross-section of the same on the line *x x* of Fig. 1. Fig. 3 is a similar view of the same on the line *y y* of Fig. 1. Fig. 4 is an enlarged sectional plan view of the rotary valve and its connections. Fig. 5 is a face view of the same with parts in section. Fig. 6 is an enlarged side elevation of part of the reversing mechanism. Fig. 7 is a sectional end elevation of the same on the line *z z* of Fig. 6. Fig. 8 is a sectional plan view of a modified form of my improved rotary valve. Fig. 9 is a side elevation of part of the reversing mechanism of a modified form. Fig. 10 is a sectional end elevation of the same on the line *u u* of Fig. 9, and Figs. 11 and 12 are face views of rotary valves of modified forms.

My improved valve-gear can be adapted to nearly all classes of steam-engines, but is principally intended for locomotive-engines, in connection with which I have illustrated it in the drawings.

The steam-cylinders A and B are provided with the usual pistons, C and D, respectively, connected by the usual means with the main driving-shaft E in such a manner that their crank-pins F and F′ stand at right angles to each other. Into the cylinders A and B open, respectively, the ports or channels *a b* and *c d*, formed in the saddle G, connecting the cylinders A and B and serving as a rest for one end of the locomotive-boiler, and at the same time carrying the steam-chest H.

The ports *a b c d* terminate at the valve-seat G′, on which the inner face of the rotary valve I is held, said valve being placed horizontally and having its bearings on the cover H′ of the steam-chest H. The valve I is held on its seat G′ by suitable means of any approved construction. The openings of the ports *a b c d* in the seat G′ are arranged radially to the axis of the valve I and at right angles to each other, so that the opening of the port *a* stands at right angles to the opening of the port *b*, and the opening of the port *c* stands at right angles to the opening of the port *d*, as illustrated in Fig. 3.

The valve I is provided on its inner face with four ports or openings, *e f g h*, placed at equal distances and diametrically opposite each other, as illustrated in Fig. 2. The two opposite openings, *e* and *g*, lead to the exhaust-opening I′, formed centrally in the valve I, and leading to the opening $G^2$ in the saddle G, and into this opening $G^2$ leads the exhaust pipe J. The other two opposite ports or openings, *f* and *h*, lead to the interior of the steam-chest H, which is provided with the steam-inlet pipe K.

The valve I receives a rotary motion from the main driving-shaft E by carrying on its valve-stem a gear-wheel, L, meshing into a pinion, N, held to rotate on a sleeve, O, by a pin, N′, engaging a spiral groove, O′, formed on said sleeve O. The latter turns with and is held to slide on the shaft P, carrying the bevel gear-wheel Q, meshing into the bevel gear-wheel R, secured to the main driving-shaft E. The sleeve O is connected with the usual reversing-lever, S, so that the latter on being shifted causes the sleeve to slide on the shaft P, whereby the spiral groove O′ of the sleeve engaging the pin N′ causes the pinion N to rotate, thus changing the position of the valve I, and thereby reversing the engine. The pinion N is held in the forked bracket T, so as to prevent it from moving laterally on the sleeve O.

The operation is as follows: The steam passes from the boiler through the inlet-pipe K into

the steam-chest H, and from the latter through the ports or openings *f* and *h* alternately into the ports *a*, *b*, *c*, and *d*, so that steam alternately enters the two cylinders A and B at their respective ends in the usual manner, thereby imparting a rotary motion to the main driving-shaft E, as is now done in such engines. The exhaust of the cylinders A and B takes place alternately through the respective ports *a*, *b*, *c*, and *d*, which open alternately into the ports *g* and *e*, which connect with the central opening, I′, leading to the opening $G^2$, connected with the exhaust-pipe J. Thus it will be seen that the rotary motion of the valve I controls both cylinders A and B in the same manner as if two valves were used, one for each cylinder. It will further be seen that the valve I makes only one revolution to two revolutions of the main shaft on account of the gear-wheels L and N being of different sizes, so that the above-described effect is obtained—that is, steam is admitted alternately in the respective ends of the two cylinders A and B with the corresponding exhaust. The engines are reversed by shifting the reversing-lever S, so that the sleeve O slides on the shaft P, with which it turns, whereby the groove O′, engaging the pin N′, rotates the pinion N sufficiently to change the positions of the ports *e f g h* to the next following respective port *a*, *b*, *c*, or *d*.

In order to prevent the exhaust from the two cylinders A and B from interfering with each other, I provide the valve I with a central partition, $I^2$, as illustrated in Fig. 4, so that the exhaust from the respective ports is directed into the central opening, $G^2$, of the saddle G. Instead of having the opening $G^2$ in the saddle G, I may make the stem of the valve I hollow, as shown on Fig. 8, and then connect the exhaust-pipe J with the outer end of the stem, so that the exhaust-steam from the cylinders A and B passes into the valve I and out through its hollow stem into the exhaust-pipe J.

The valve I, as illustrated in Fig. 11, can be used for a single steam-cylinder, so that two opposite ports, *i i′*, permit the steam to enter the ends of the cylinder alternately, while the ports $i^2$ and $i^3$ exhaust alternately. The valve as illustrated in Fig. 12, which is for the same purpose, is provided with only two ports, *i* and $i^2$, of which one is an inlet-port and the other an exhaust-port.

The mechanism for reversing the engine can be made in different ways, and a separate form is illustrated in Figs. 9 and 10, in which the hub of the pinion N is provided with the lugs U, engaging the grooves O′, formed in the sleeve O. The two grooves O′ are alike in shape, and hence act the same on the projections U as does the central groove, O′, above described, on the pin N′.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the cylinders A B, the saddle G, provided on its inner end with the valve-seat G′, and the ports *a b* and *c d*, leading, respectively, from the said cylinders to the said seat, and the steam-chest H on the inner end of the saddle and provided with a steam-inlet and the cover H′, of the rotary valve having a horizontal axis opposite exhaust-ports *e g*, leading from the face of the valve inward to the central exhaust-passage, and the opposite inlet-ports, *f h*, leading from the face of the valve to opposite points in its periphery and communicating with the steam-chest, substantially as set forth.

2. The combination, in a locomotive valve-gear, of the cylinders A B, the saddle G, having the valve-seat G′, steam-chest H, ports *a b* and *c d*, leading from opposite ends of the cylinders through the rear face of the saddle, the rotary valve I within the steam-chest, and having a rearward-extending horizontal axis provided with gear L, and having the ports *e g f h*, with the shaft P, parallel with the axis of the rotary valve and driven from the main drive-shaft, the slotted sleeve O, sliding on said shaft P and turning therewith, and the gear N, meshing with gear L, having a pin entering the slot in the sleeve, substantially as set forth.

3. In a valve-gear for locomotives, the rotary valve I, having a central recess, I′, and partition $I^2$, the exhaust-ports leading from the face of the valve to said recess from opposite sides of the partition, and the inlet-ports leading from the periphery of the valve *e* through its face, substantially as set forth.

JAMES DES BRISAY.

Witnesses:
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CHAS. S. KEITH.