

(No Model.)

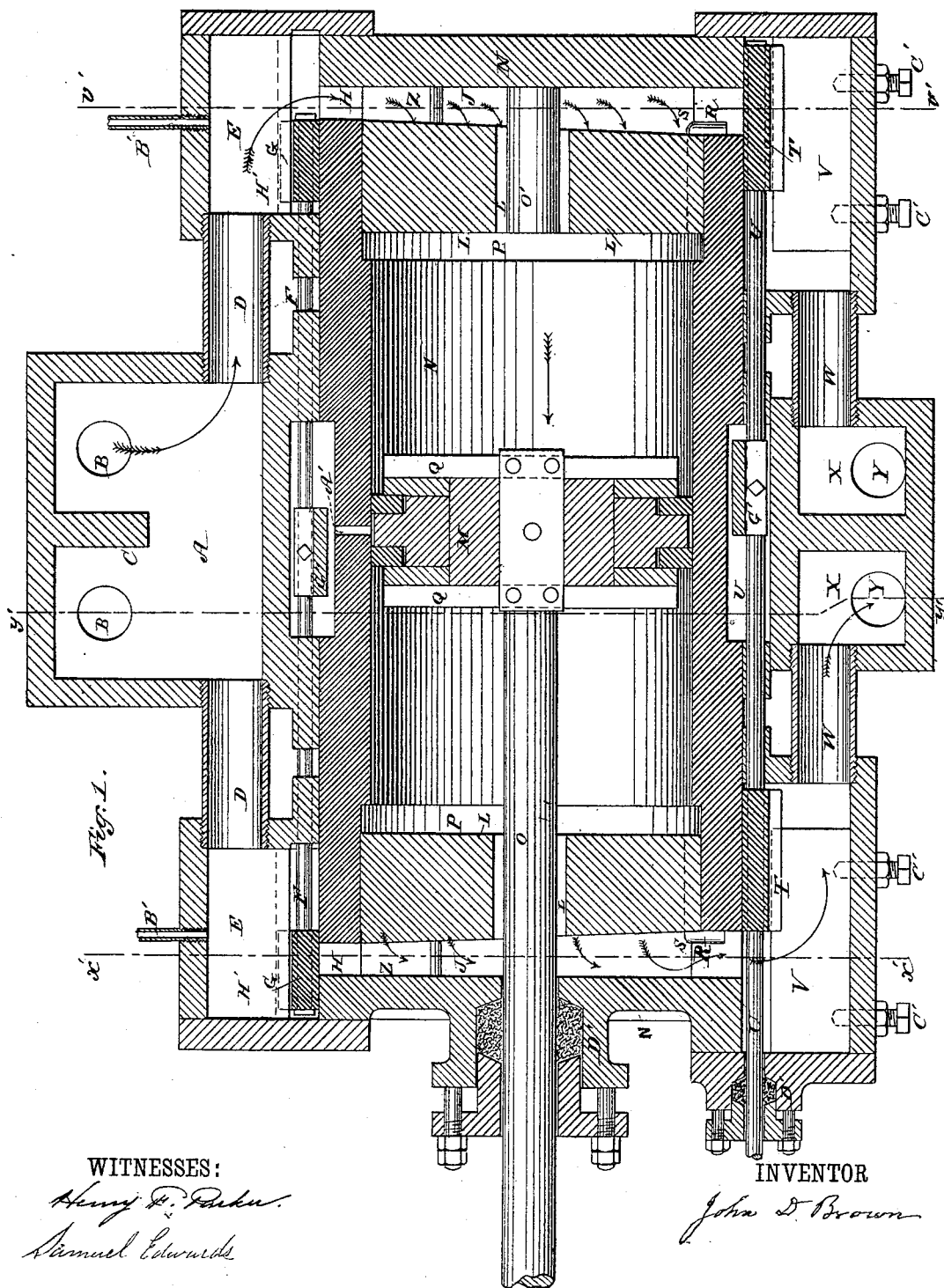
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J. D. BROWN.

STEAM ENGINE.

No. 266,672.

Patented Oct. 31, 1882.



WITNESSES:
Henry D. Parker.
Samuel Edwards

INVENTOR
John D. Brown

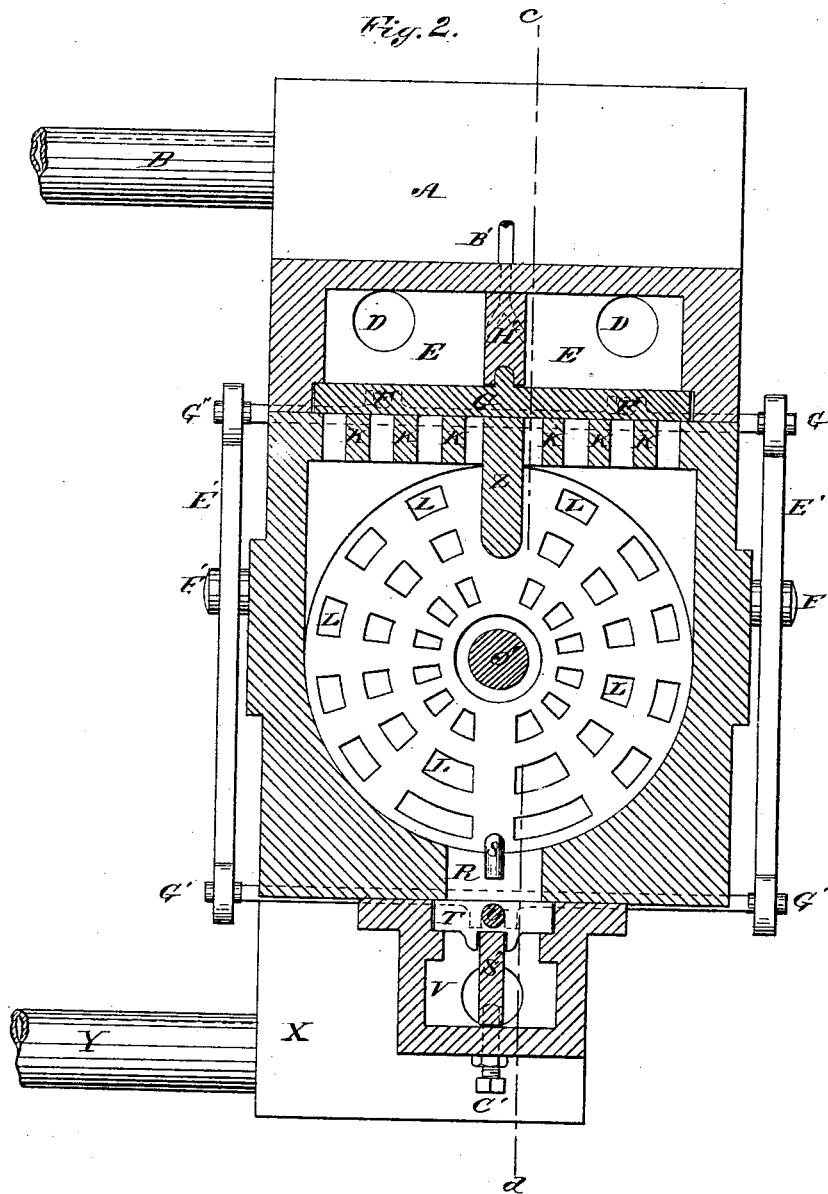
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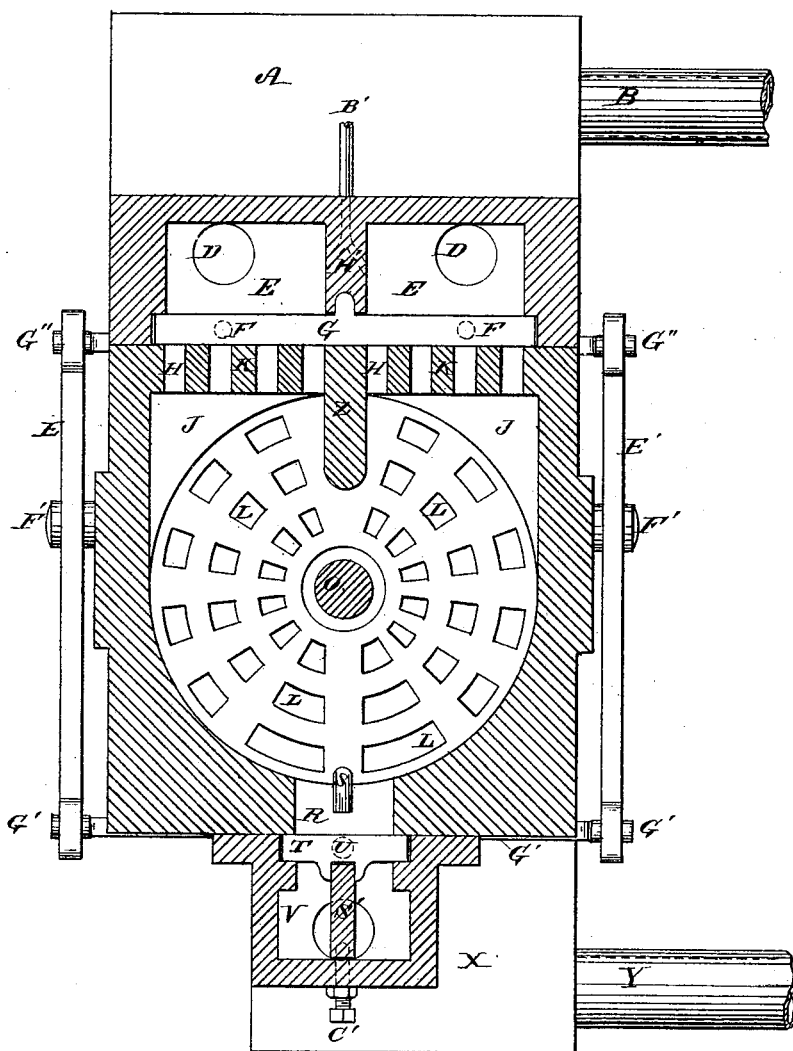
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Fig. 3.



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Fig. 5.

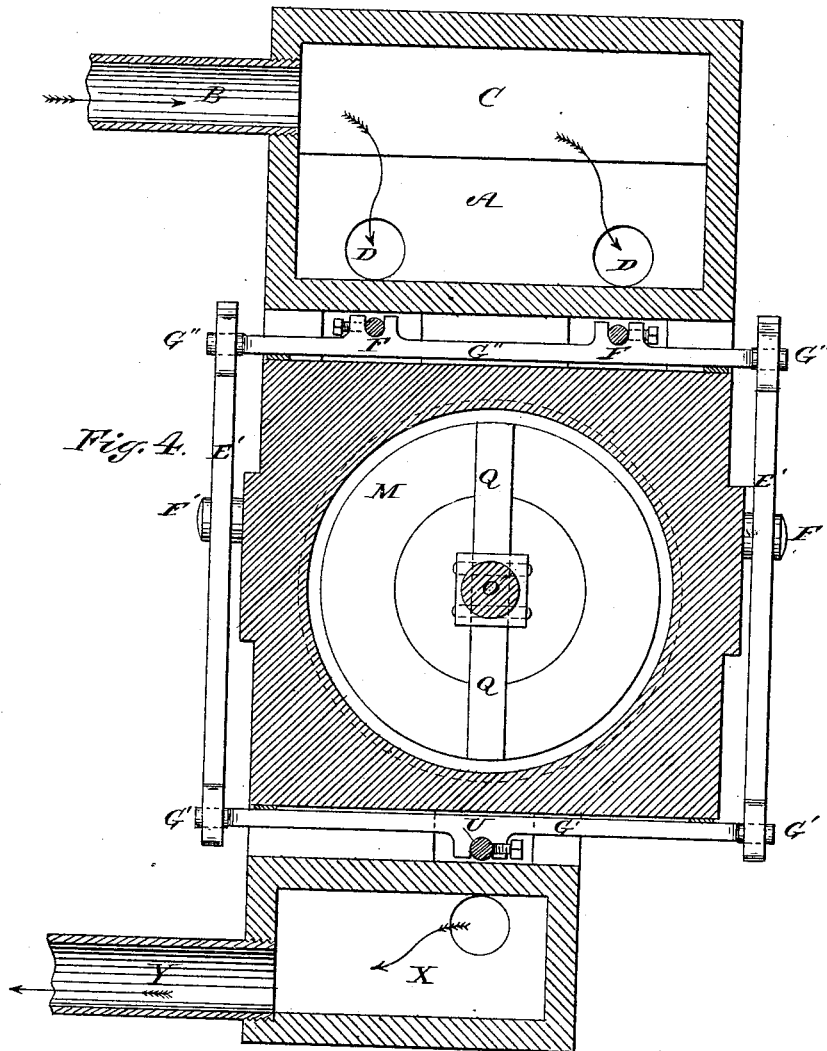
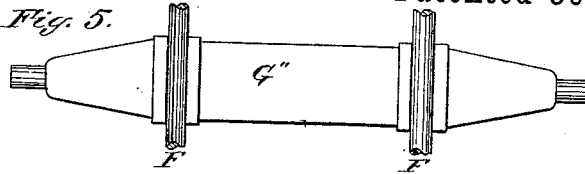
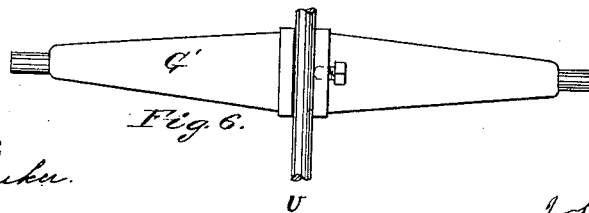


Fig. 4.

Fig. 6.



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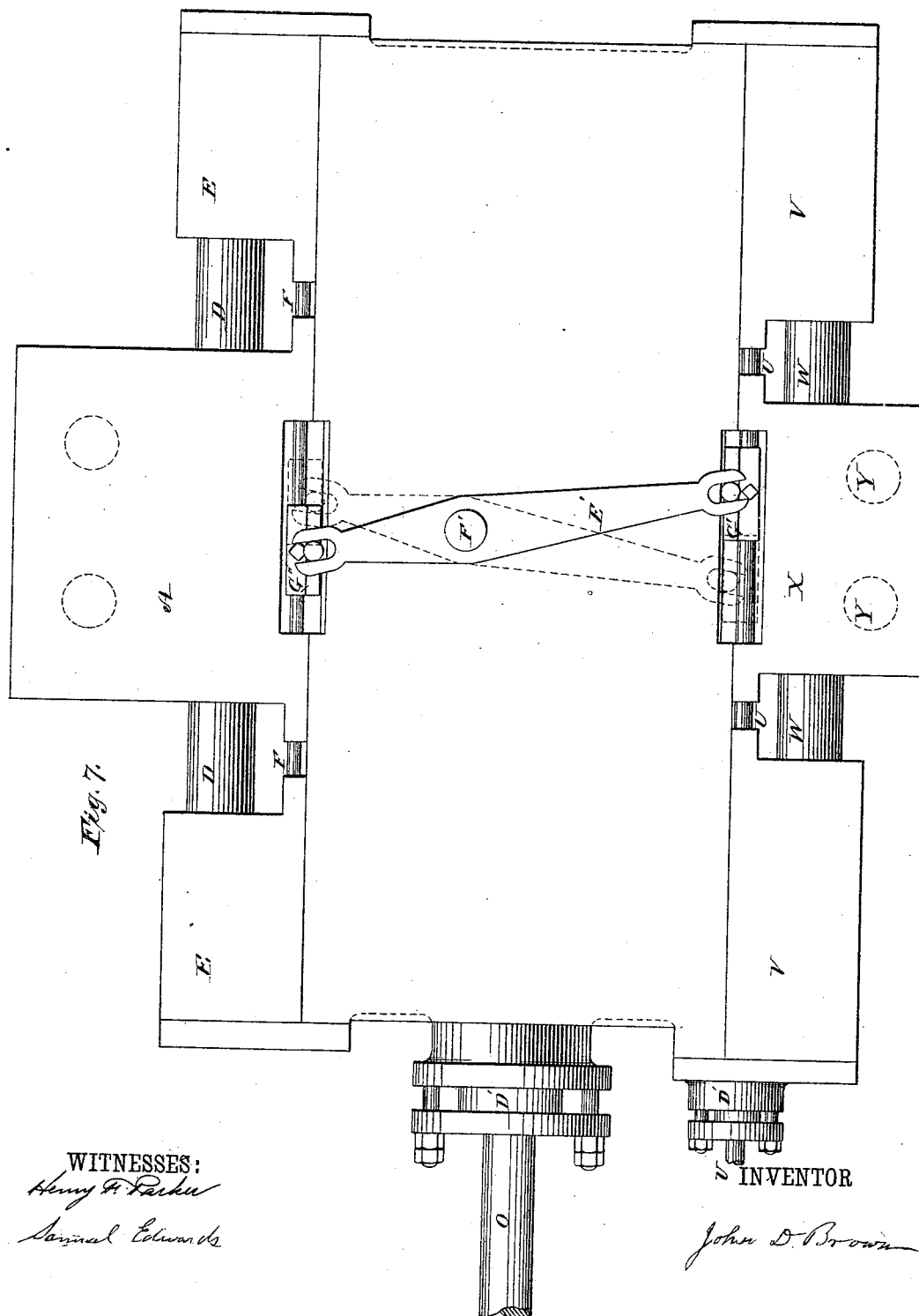
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Fig. 8.

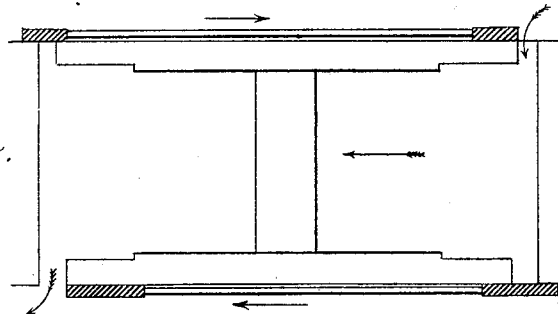


Fig. 9.

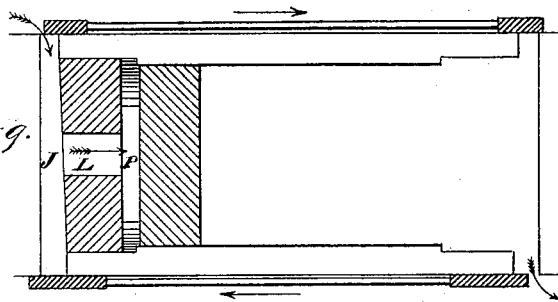


Fig. 10.

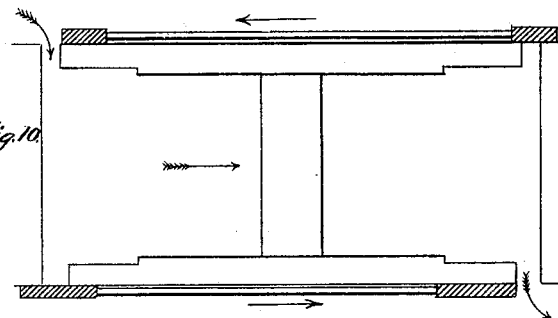
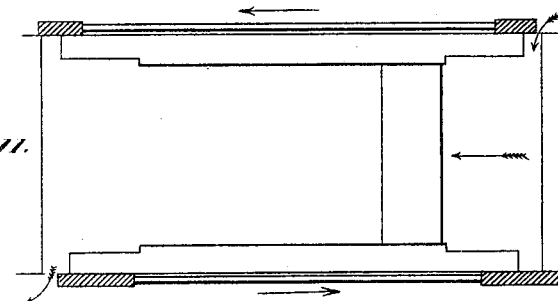


Fig. 11.



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UNITED STATES PATENT OFFICE.

JOHN D. BROWN, OF NEW YORK, N. Y.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 266,672, dated October 31, 1882.

Application filed March 13, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. BROWN, of the city, county, and State of New York, have invented certain new and useful Improvements in Steam-Engines, of which the following is a specification.

The object of my invention is to equalize and proportion the distribution or flow of steam or other elastic vapor in its passage from the main reservoir or boiler through the chests, cylinders, and pipes through which it must pass to accomplish the work intended on its way to the open air or condenser.

Figure 1 of the accompanying drawings is a longitudinal vertical section of cylinder and steam-chest in the line C D of Fig. 2, in which the various parts are represented as follows: A, main steam-chest; B B, steam-pipes leading from boiler; C, partial partition of upper part of main steam chest A; D D, steam-pipes leading to secondary steam-chests; E E, auxiliary or secondary steam-chests; G G, valves; F F, valve-rods; H H, steam-ports; J J, clearance-spaces; N N, cylinder-heads; N', cylinder; L L, flues leading from clearance-space; M, piston-head; O, piston-rod; O', section of secondary piston-rod; P P, secondary clearance-spaces at each end of cylinder-bore; Q Q, wings or keys attached to piston-head; R R, exhaust-ports; S S, pipes for carrying off condensed steam from cylinder; T T, exhaust-valves; U, exhaust-valve rod; V V, exhaust-chests; W W, exhaust-pipes; X X, secondary exhaust-chests; Y Y, secondary exhaust-pipes; Z Z, partial partition in clearance-spaces J J; A', oil-tube for cylinder; B' B', oil-tubes for valves; C' C', screws for tightening exhaust-valves; D' D', stuffing-boxes.

Fig. 2 is a cross-section in the line X' X' of Fig. 1, looking from front end of cylinder, showing grates K K within steam-ports H of Fig. 1; also partition H' in secondary steam-chests E E of Fig. 1, and supporting-partition S' in exhaust-chest V.

Fig. 3 is a similar cross-section in the line V' V' of Fig. 1, looking from back end of cylinder.

Fig. 4 is a cross-section in the line Y' Y' of Fig. 1, showing keys or wings Q and piston-head M of Fig. 1; also valve-levers E' E', working on pivots F' F' on either side of cylinder-casting.

Figs. 5 and 6 are detailed views of the cross-arms G'' G'' and G' G' of Fig. 4, carrying the valve-rods F F and U.

Fig. 7 is a side elevation of cylinder and steam-chest, showing valve-rod lever E'.

Figs. 8, 9, 10, and 11 are diagrams showing different relative positions of piston-head and valves at various portions of the stroke.

Similar letters of reference designate similar parts in the several above-described drawings.

The action of the steam or elastic fluid, with the operation and construction of the valves, pipes, and chests intended for its distribution, is as follows: The steam enters the main steam-chest A (which is of greater capacity than the valve-chest, and prevents the reaction of the steam, upon being admitted to the valve-chest, from affecting the water in the boiler and causing foaming therein) through the pipes B B, blowing directly across the upper section of the chest formed by the partition C. From thence it passes downward into the common reservoir, A; thence through the four pipes D D into the secondary steam or valve chests E E. The secondary steam-chests are divided by the partition H', (shown in Figs. 2 and 3,) in which partition a groove is placed to hold and steady the upper side of the valve G, which valve is also steadied by being held in a groove at either side of steam-chest. The purpose of the partition C is to carry the steam over to that end of the steam-chest most remote from the boiler, in order that the pressure of the steam entering the farther end of the port may be as great as the pressure at the near end, or the end nearest the boiler. The purpose of the partition H' is to prevent a commingling of the near and far currents prior to their entrance into the ports, while the purpose of holding the valves in grooves is to prevent any upward movement thereof during the period of compression as the piston-head nears the end of its stroke. The further purpose of the main and auxiliary steam-chests is to prevent too great a reaction on the water in the boiler by the sudden opening and closing of the valves, the reaction being checked by the constant current passing through the pipes D D.

The secondary steam or valve chests E E are placed directly over the ends of the cylinder-castings, the ports H H leading therefrom

opening directly into J, the main clearance-space below. Each of the ports is one and six-tenths inch in width, and a fraction longer than the diameter of the cylinder-bore. If entirely open and unobstructed, the admission of steam at each stroke would be greater than required, and while the above width of port must be maintained to harmonize with the stroke and lap of valve its unnecessarily large area is decreased by the introduction of the grates K K, as shown in Figs. 2 and 3. These gratings not only act in cutting off the entrance of a full port of steam, but the steam in passing through the same will be projected nearer the bottom of the cylinder or clearance-space than it otherwise would if entering *en masse*; and to further aid in producing this effect, which is essential, the central grate is extended downward into and across the clearance-space to a point just above the center of the cylinder, as shown at Z in Figs. 1, 2, and 3, thus projecting the full force of the steam to points opposite the bottom and sides of the cylinder within the clearance-space J. From this space the steam passes at right angles through the flues L, which flues are intended to give a direction to the steam and to equalize its distribution over the head of the piston; the distribution of the steam being effected by placing the flues in positions which will mainly command and cover the sides and bottom of the piston-head, as shown in the drawings. When the piston-head is ready to commence its stroke its position with reference to the flues is that shown in Fig. 9, there being a small space, P, between it and the flue-sheet, the diameter of which is greater than the diameter of the cylinder-bore. The purpose of this space is to allow the steam after leaving the flues to expand and cover the whole surface of the head, or, at least, the bottom and sides thereof, for when the head is in this position the space P, just mentioned, becomes partitioned by the wing or key Q in Fig. 1, attached to the head and moving with it. The purpose of such partitioning is to concentrate the pressure of the steam over the two sides of the head until the same has moved a short distance away, when, of course, the pressure becomes uniform all over the head to the end of the stroke, this concentration of force taking place at the time when the piston must be moved from its most difficult position. As the piston-head is moving forward the exhaust-valve at the end of the cylinder toward which it is moving is gradually opening, releasing the steam in the cylinder which had previously impelled it. This steam passes into the exhaust-chest V, thence through the pipe W into the chamber X, and thence through the pipe Y into the open air, or, if intended, as for locomotives, for urging the fire in the furnace, the pipes Y Y are brought up to the base of the stack or smoke-box, where the steam is discharged in the usual manner. If the exhaust-steam is intended to be condensed, the pipes

Y Y are closed and the chambers X X are extended downward into a common reservoir, forming a receptacle similar to the main steam-chest A. Both the exhaust and steam valves above mentioned continue to open until the piston-head has reached the center of the maximum admission of steam, (usually seventy-five per cent. of the stroke,) when they both commence to close and continue to do so until the piston-head has reached the end of the maximum admission of steam, at which point the steam-port has of course closed, the valve commencing to lap the port and continuing its lap until the piston-head has reached the end of its stroke, the exhaust-valve at piston end of cylinder closing a little in advance, so that the exhaust-steam thus retained within the tubes or flues and clearance-spaces acts as a cushion to the advancing piston-head as it terminates its stroke, without admitting live steam for that purpose. After the piston-head has reached the end of its stroke the valve, still continuing its travel in the direction above described, has opened the steam-port nearest the piston-head for the admission, which will project it backward in the same manner as it had been projected forward, as just described.

The pipe S, placed at the bottom of the cylinder, and extending through the flue-space L into the clearance-space P, is intended, if the cylinder is worked horizontally, to dispose of any condensed steam within the cylinder which may have accumulated while the engine is at rest by allowing it to pass outward with the exhaust in the early revolutions of the wheel.

The valves are intended to be actuated by a connection made between the eccentric arm working on the shaft of the wheel and the exhaust-rod. To the central portion of the exhaust-rod, underneath the cylinder, is attached the cross-arm G', Fig. 6, placed at right angles thereto, and extending a little beyond the cylinder-casting on either side thereof. On either side of the cylinder-casting, and attached thereto and a little above the center, is a pivot, F', Fig. 4, over which is placed the valve-levers E' E', containing a slot at each end, the slot on the lower end holding the cross-arm G', projecting from and fastened to the exhaust-rod U, as above described, while the upper end holds a similar arm, G'', extending across the cylinder beneath the main steam-chest A. To this arm G'' are fastened the arms or rods F of the steam-valves, which pass through the castings of the base of the steam-chests, and are fastened to the valves G G, covering the steam-ports. The pressure on the exhaust-valves is necessarily upon their backs, and the tendency will be to drive or press them away from their seats, producing leakage as the valves become worn. To overcome this I have placed set-screws C' C' in the partition or central bearing, S', by which the wear of the valves can be taken up at any time when it becomes necessary.

The heads of the exhaust-chests and of the

auxiliary steam-chests containing the valves can be readily removed at any time for the inspection of the same.

The sectional area of the exhaust-ports R is
5 fifty per cent. greater than the admission-area of the steam-ports. The throw of the exhaust-valves T T is also fifty per cent. greater than
10 the throw of the steam-valves G, to allow of the more rapid exit of the exhaust-steam from the cylinder. In establishing the greater throw
15 for the exhaust-valves I secure a leverage upon the steam-valves, in consequence of the fulcrum or pivoting-point F' being above the center line of the cylinder, by reason of which a uniform
and steady motion is imparted to the steam-valves.

The oiling of the valves is accomplished, when the steam is closed off, by opening the tubes B' B' on either auxiliary steam-chest, allowing the oil to fall below both upon the steam
20 and exhaust valves. For oiling the cylinder the oil is admitted through the tube or opening A' by means of a pipe leading therefrom, provided with a cock in the usual manner; and if
25 advantage is taken of the engine when at rest with the piston-head in the center of the cylinder the oil may be inserted between the expansion-rings, where it will act as a constant lubricant for some length of time.

The projecting rod O' in Fig. 1 is inserted
30 in head of cylinder only, for the purpose of creating a uniformity between the two ends, such as there would be if the rod were attached to the head and moving through a stuffing-box, as is sometimes practiced.

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

1. In a steam or other engine, the central
40 steam-chest, A, having the two steam-pipes B B entering on opposite sides of central partition, C, and having exit-pipes D D, all arranged substantially as and for the purposes herein set forth.

45 2. In a steam or other engine, the central steam-chest, A, in combination with the pipes D D and auxiliary steam or valve chests E E, all arranged substantially as and for the purposes herein set forth.

50 3. In a steam or other engine, the central steam-chest, A, in combination with the pipes B B, partition C, pipes D D, and auxiliary steam or valve chests E E, all arranged substantially as and for the purposes herein set forth.

55 4. In a steam or other engine, the partition H', in combination with the steam or valve chests E E, all arranged substantially as and for the purposes herein set forth.

60 5. In a steam or other engine, the grates K K

and partition or central grate, Z, in combination with the steam-valve G, all arranged substantially as and for the purposes herein set forth.

6. In a steam or other engine, the steam-
65 port H, valve G, and flues or openings L, in combination with the clearance-space J and secondary clearance-space P, all arranged substantially as and for the purposes herein set forth.

7. In a steam or other engine, the wings or
70 keys Q Q, in combination with the piston-head M and flues or openings L, arranged substantially as and for the purposes herein set forth.

8. In a steam or other engine, the condenser-
75 tube S, in combination with the flues or openings L and exhaust-port R, all arranged substantially as and for the purposes herein set forth.

9. In a steam or other engine, the exhaust-
80 chest V, in combination with exhaust-port R, clearance-space J, flues or orifices L, exhaust-valve T, and rod U, all arranged substantially as and for the purposes herein set forth.

10. In a steam or other engine, the exhaust-
85 chest V, in combination with pipe W and chamber X, all arranged substantially as and for the purposes herein set forth.

11. In a steam or other engine, the chamber
90 X, in combination with pipe Y and exhaust-pipe W, all arranged substantially as and for the purposes herein set forth.

12. In a steam or other engine, the projec-
95 tion O' from cylinder-head N, in combination with clearance-space J and flues or openings L, all arranged substantially as and for the purposes herein set forth.

13. In a steam or other engine, the exhaust-
rod U, in combination with cross-arm G' and valve-lever E', all arranged substantially as
100 and for the purposes herein set forth.

14. In a steam or other engine, the steam
valve-rods F F, in combination with cross-arms G'' and valve-levers E' E', all arranged substantially as and for the purposes herein set forth.

15. In a steam or other engine, the pivots
105 F' F', in combination with valve-levers E' E' and cross-arms G' G' and cross-arms G'' G'', all arranged substantially as and for the purposes herein set forth.

16. In a steam or other engine, the adjust-
110 able supporting-partitions S', in combination with the valves T, having a groove in the back thereof, all arranged substantially as and for the purposes herein set forth.

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JOHN H. BERDAN.