(No Model.) 2 Sheets—Sheet 1.

S. EIDE.

STEAM ENGINE VALVE.

No. 554,506. Patented Feb. 11, 1896.

Fig 2

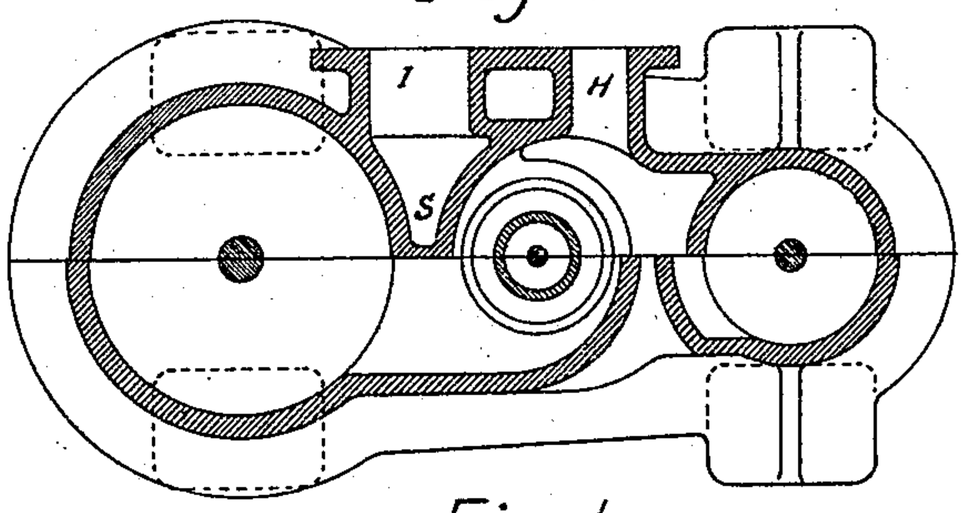


Fig 1

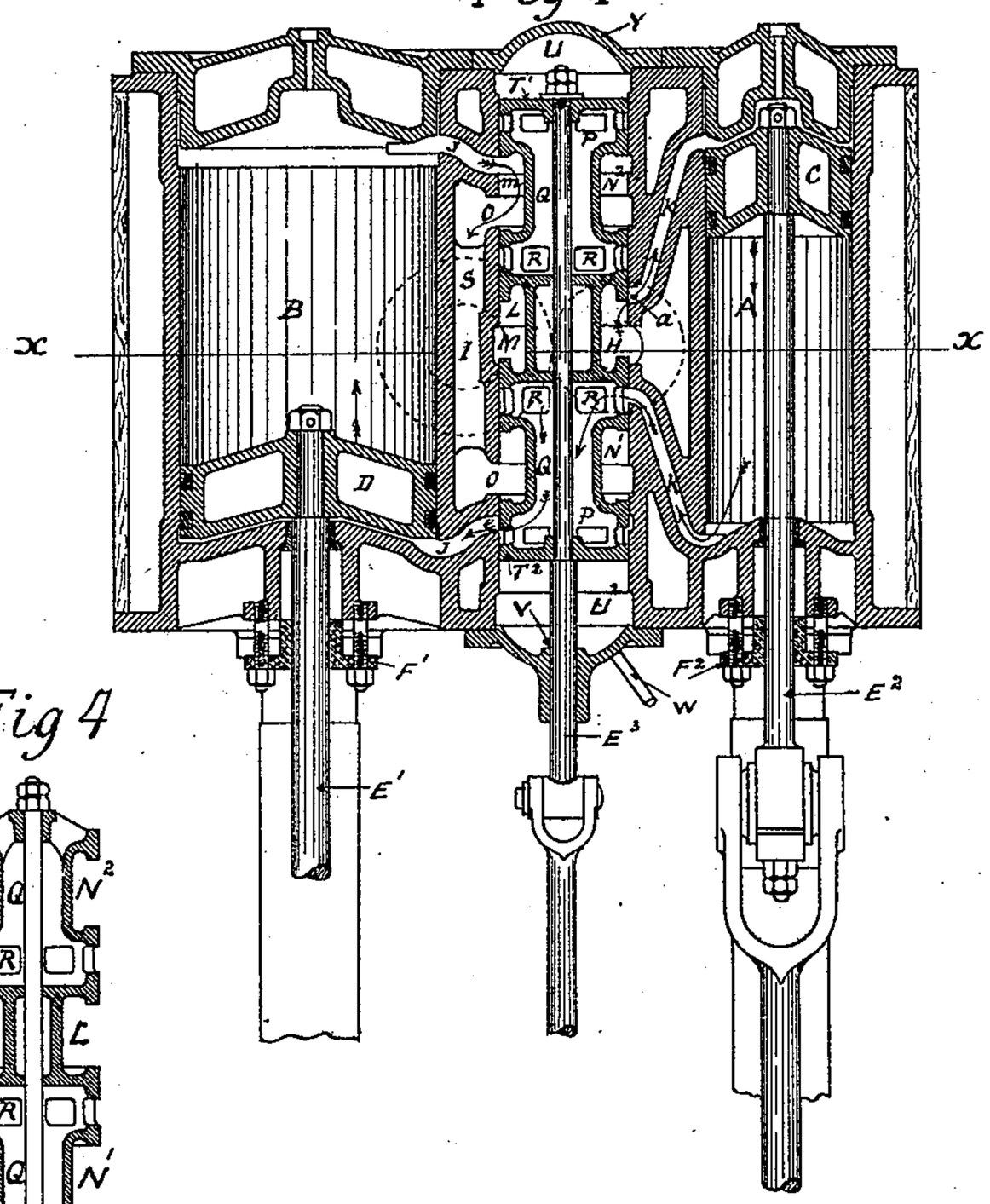


Fig 4

Fig 3

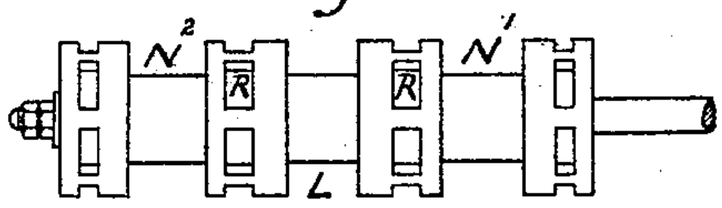
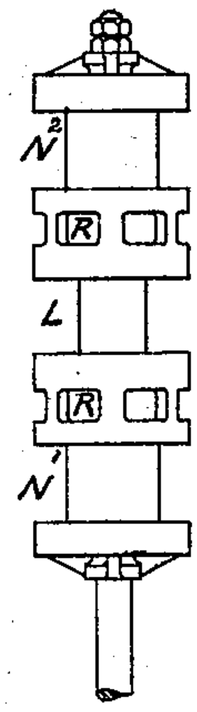


Fig 5



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(No Model.) 2 Sheets—Sheet 2.

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STEAM ENGINE VALVE.

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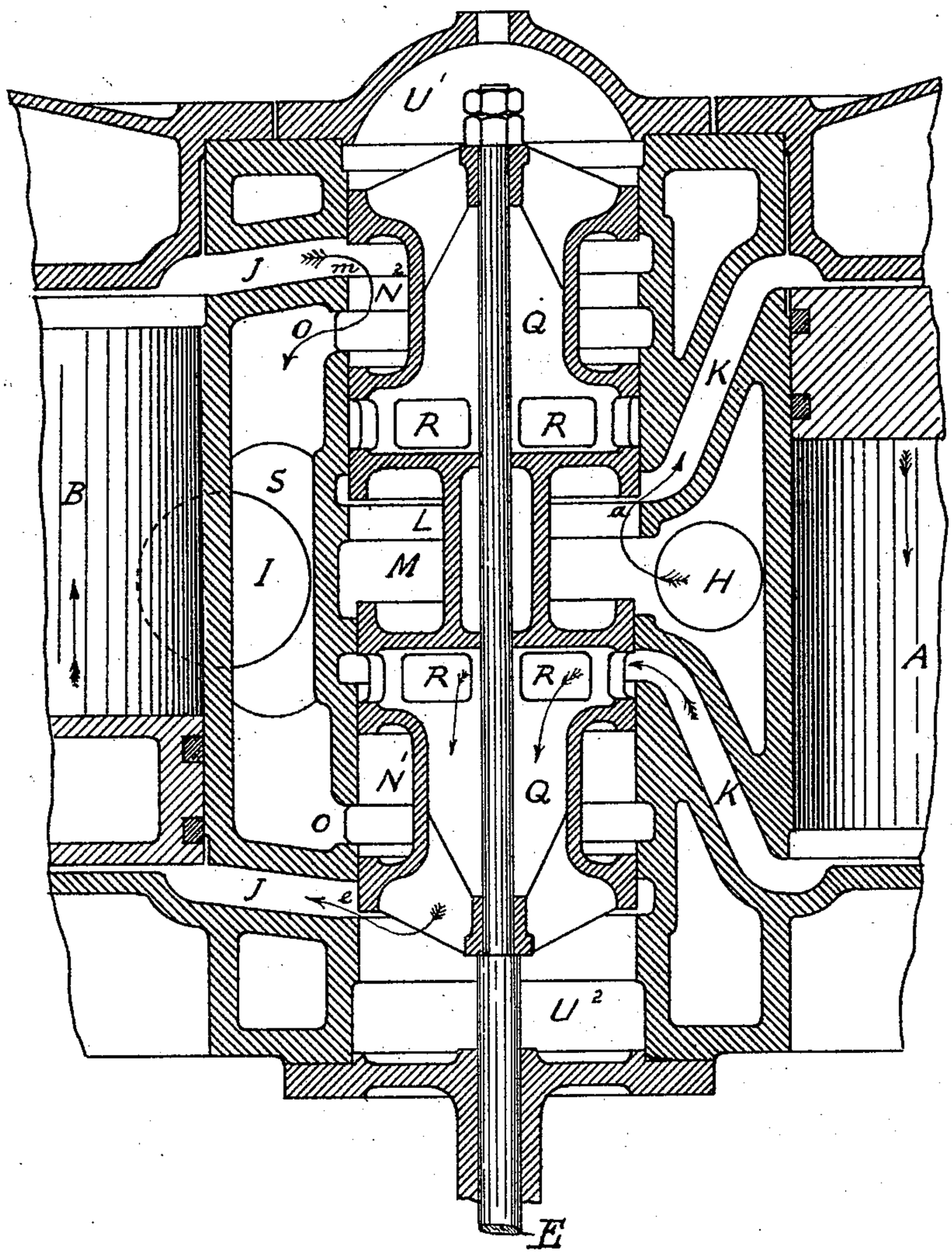
FIG 6



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SÖREN EIDE, OF SAN FRANCISCO, CALIFORNIA.

STEAM-ENGINE VALVE.

SPECIFICATION forming part of Letters Patent No. 554,506, dated February 11, 1896.

Application filed December 1, 1893. Serial No. 492,494. (No model.)

To all whom it may concern:

Be it known that I, SÖREN EIDE, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Steam-Engine Valves; and I hereby declare the following specification and the drawings therewith, forming a part of the same, to be a full and exact description of my invention and the manner of its application.

My invention relates to compound steam-engines in which the steam is employed consecutively in two cylinders, and to a single valve of the piston kind for performing steam distribution to both cylinders.

My improvement consists in constructing such valves with a central open annular steam-chamber in constant communication with the initial steam-pressure, the inner rims or lips of which form the induction or admission edges of the valve, two other intermediate annular chambers that perform the release or exhaust function for the second or low-pressure cylinder, and two perforated end chambers, communicating with the hollow interior of the valve, that perform the office of transferring steam from the initial or high-pressure cylinder to the second or low-pressure one, so that these several functions will follow in accurate predetermined sequence, the same as if independent valves were employed for these purposes.

Referring now to the drawings forming part of this specification, Figure 1 is a central section through axes of the two cylinders and valve of a compound steam-engine constructed according to my improvements. Fig. 2 is a transverse section on line *x x* of Fig. 1. Fig. 3 is a side elevation of one of my improved valves constructed as it appears in section in Fig. 1. Fig. 4 is a longitudinal section, and Fig. 5 an elevation of the same valve with the end plates omitted. Fig. 6 is an enlarged vertical section through one of my improved valves, the ends being open in the same manner as shown in Figs. 4 and 5, but arranged to operate in all respects the same as when the ends are closed as they are in Figs. 1 and 3.

Similar letters of reference indicate corresponding parts in the different figures of the drawings.

A is the initial or high-pressure cylinder, and B the low-pressure one.

C and D are the steam-pistons, E′ and E² the piston-rods, F′ F² packing-glands, and E³ the valve-rod. H is the inlet for initial steam, and I the exhaust-way for waste steam.

K K are passages or ports of the high-pressure cylinder A, and J J the ports of the low-pressure cylinder.

The valve consists of a central annular chamber L communicating constantly with the steam inlet-port M and alternating with the ports K K of the initial steam-cylinder A as the valve is moved up and down by the stem E³. Equidistant above and below this chamber L are two other annular chambers, N′ N², communicating with and connecting the ports J J of the low-pressure cylinder B with the exhaust-passages *o o* and the waste-pipe I.

Beyond and within the chambers N′ N² are two other chambers, P P, perforated, as shown in Figs. 1 and 3, or open, as shown in Figs. 4, 5, and 6, communicating with the hollow portions Q Q of the valve. Perforations R R communicate with the passages or ports K K of the initial cylinder and permit the transfer of steam from the first to the second or low-pressure cylinder, B, as indicated by arrows in the lower set of ports leading to the bottom of the two cylinders A and B. Thus the steam distribution is made plain with the valve in one position, which is chosen at the point of admitting initial steam to the high-pressure cylinder at *a*, and admitting the transfer steam to the low-pressure cylinder at *e*, as indicated by the arrows. At the same time the exhaust-steam is released from the top of the low-pressure cylinder at *m*, passing from the passage J, through the port O, to the exhaust-chamber S and the waste-pipe I. On the downward or outward stroke of the valve all these conditions are reversed, and the corresponding opposite flow of steam takes place for the return stroke of the pistons C and D.

The ends of the main valve can be closed, as shown in Figs. 1 and 3, by the plates T′ T², so that steam will not escape into the chamber U′ U², and no packing be required around the valve-stem at V, or the ends can be open, as shown in Figs. 4, 5, and 6, in which case the valve-stem F³ requires a packing-gland at V;

otherwise the action of the valve is the same as when arranged as shown in Figs. 1 and 3.

Any water escaping into the chamber U^2 is led off by a waste-pipe W.

The sections of the valve from the central chamber L upward are made larger in diameter than the lower corresponding sections, so there will be, by reason of this difference in area of the two ends of the chamber L, an upward thrust, by reason of the steam-pressure equal to the weight of the valve and its connected reciprocating parts. This enlargement of the upper sections also facilitates the removal of the valve, which can be drawn out with the stem E^3 by removing the cover Y.

I have for convenience of notation described the valve as in a vertical position; but it will be evident that its operation is the same when applied to horizontal engines or at any angle.

Having thus described the nature and objects of my invention and the method of constructing and applying the same, what I claim as new, and desire to secure by Letters Patent, is—

1. In a compound-engine valve, a central steam-filled chamber whose inward projecting rims or lips perform admission and release for the initial cylinder; two other annular recesses forming inward release-ways for exhaust-steam, in combination with interior chambers at the ends of the valve; provided with inlets or perforations through which steam may pass, through the interior of the valve, from the high-pressure to the low-pressure cylinder, in the manner substantially as described.

2. In an engine-valve, a central annular chamber constantly filled with initial steam whose inward projecting rims or lips perform admission and release for the initial cylinder said central chamber having an increased area at its top end so that the weight of the valve and its connected parts when set in a vertical position will be balanced by the steam-pressure, the two annular chambers forming release-ways for the exhaust-steam, and the interior chambers within the valve provided with inlets or perforations through which steam may pass through the interior of the valve, substantially as described.

3. In a compound-engine valve, the combination of a central, annular chamber communicating constantly with the steam-admission inlet and having inwardly-projecting lips or rims performing admission and release for the initial cylinder, hollow extensions formed integral with the central chamber and having external, annular recesses or chambers, which form release-ways for the exhaust-steam, and having also interior chambers at each end of the valve, which chambers are provided with perforations or inlets at the ends thereof, so that steam may pass through the interior of the valve from the high-pressure to the low-pressure cylinders, all the parts of said valve being formed integrally in a single piece, so that the valve is removable from the chamber in which it slides, substantially as described.

4. In a compound-engine valve, the combination of a central, annular, steam-filled chamber, whose inwardly-projecting rims or lips perform admission and release for the initial cylinder, two other annular recesses or chambers forming release-ways for the exhaust-steam, two interior chambers at the ends of the valve provided with end inlets, through which steam may pass into and through the said interior chambers from the high-pressure to the low-pressure cylinders, said end inlets being located at the extremities of the valve, and at points in the face of the valve between the central, annular chamber and the other two chambers, the whole valve being formed integrally in a single piece, substantially as described.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

SÖREN EIDE.

Witnesses:
ALFRED A. ENQUIST,
WILSON D. BENT, Jr.