(No Model.) 2 Sheets—Sheet 1.

R. G. HARRIS.

STEAM ENGINE.

No. 349,275. Patented Sept. 14, 1886.

Fig. 1

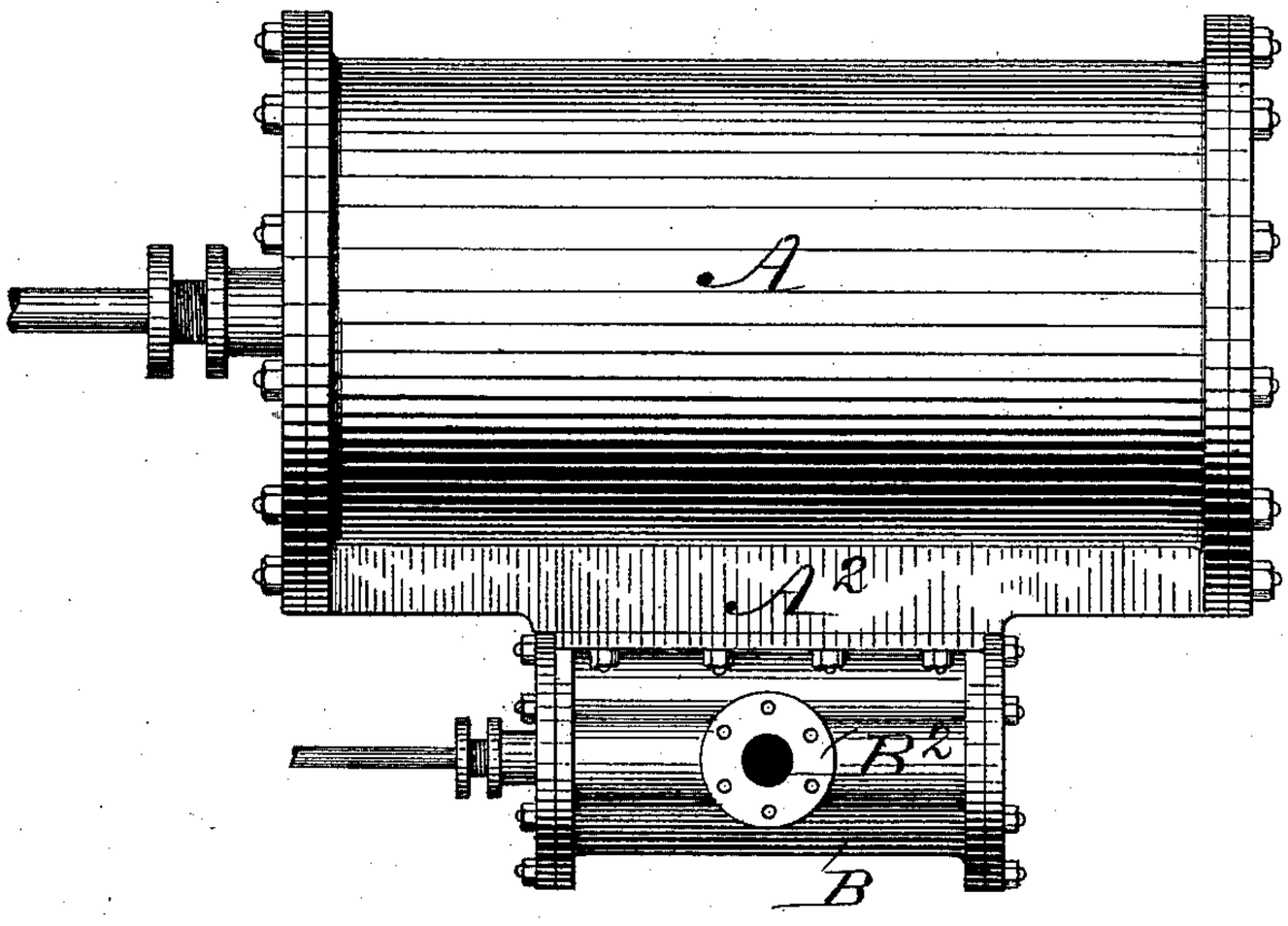


Fig. 2

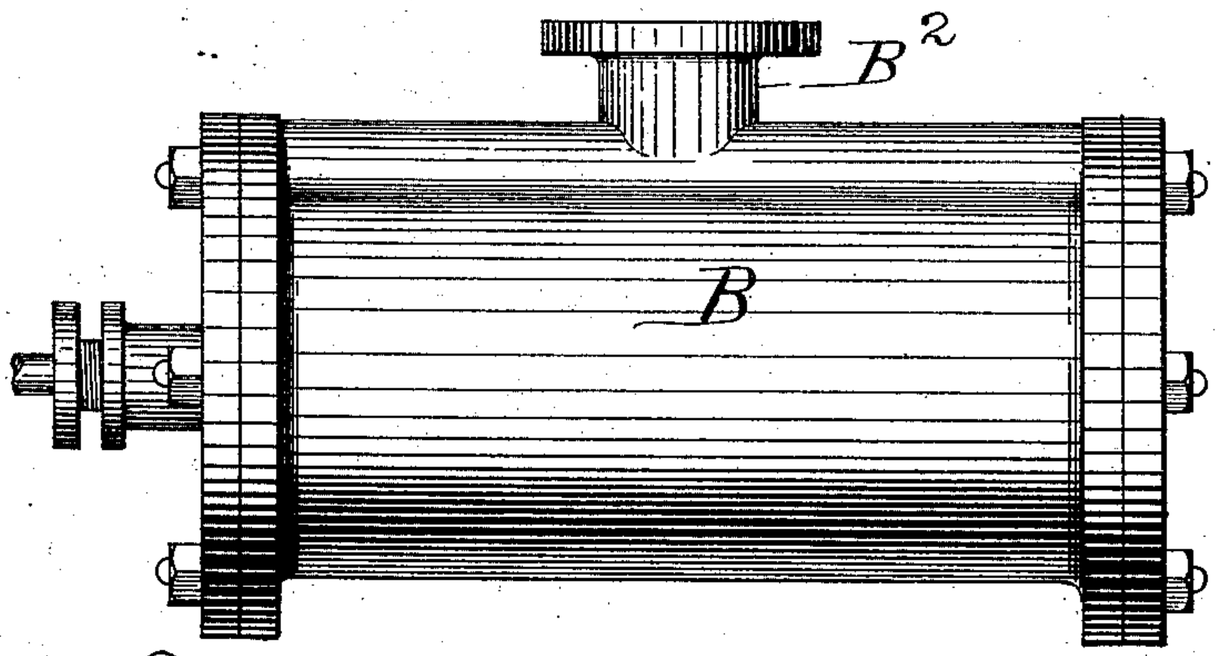
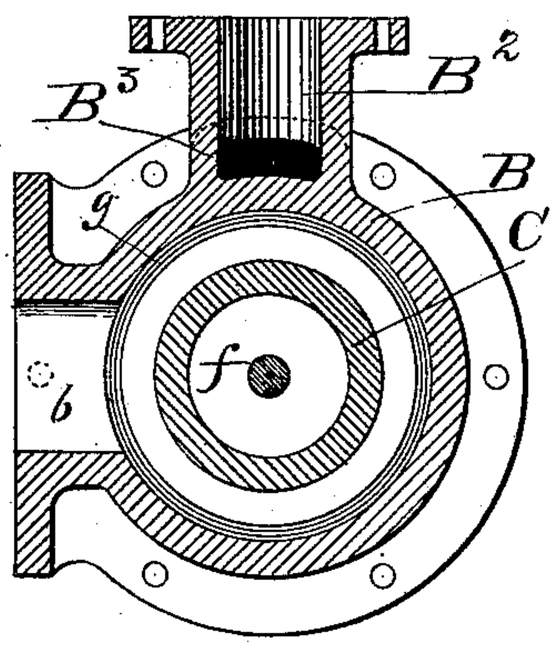


Fig. 3



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By Thomas G. Orwig, Atty.

(No Model.)

2 Sheets—Sheet 2.

R. G. HARRIS.

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Fig. 4

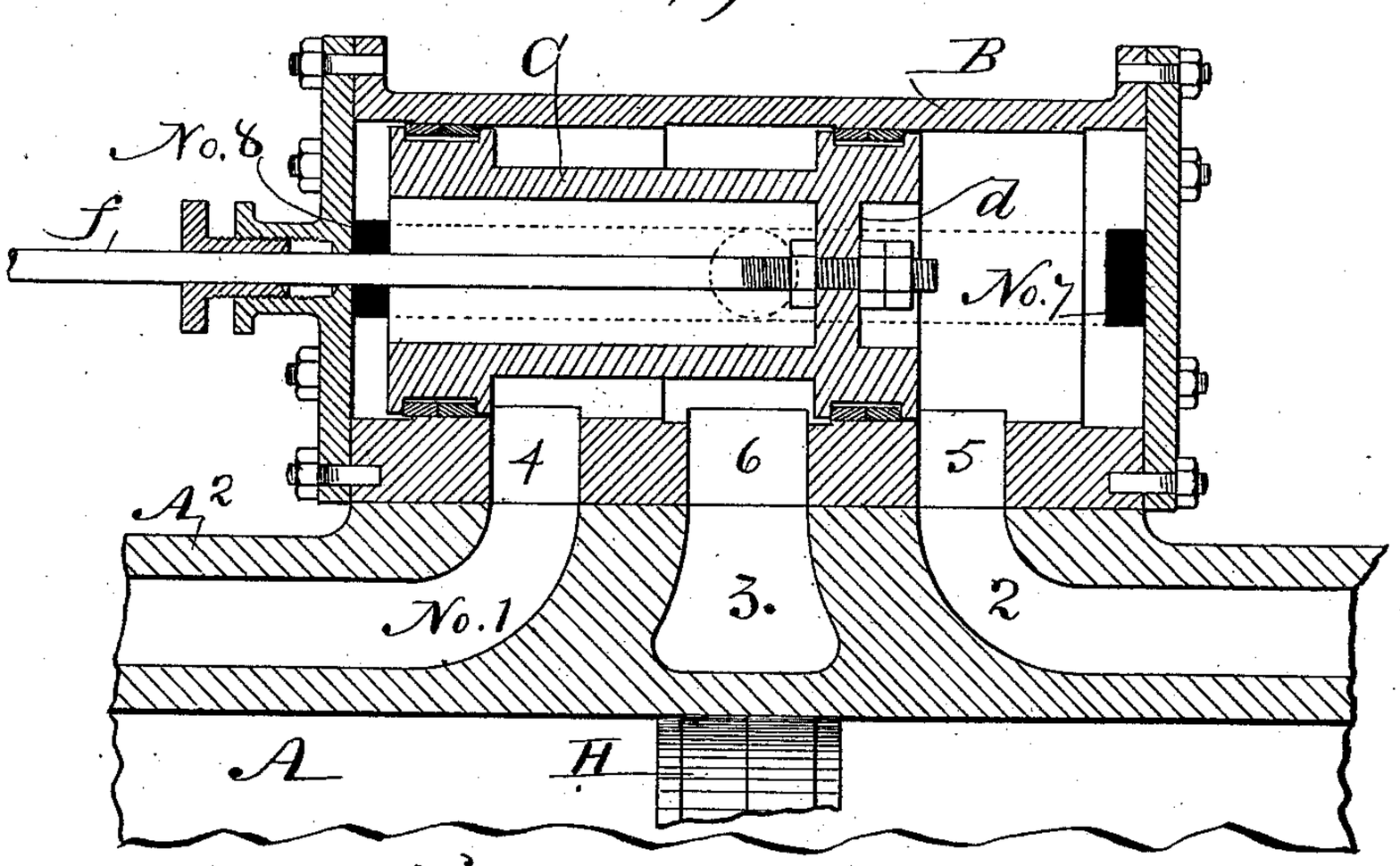


Fig. 5

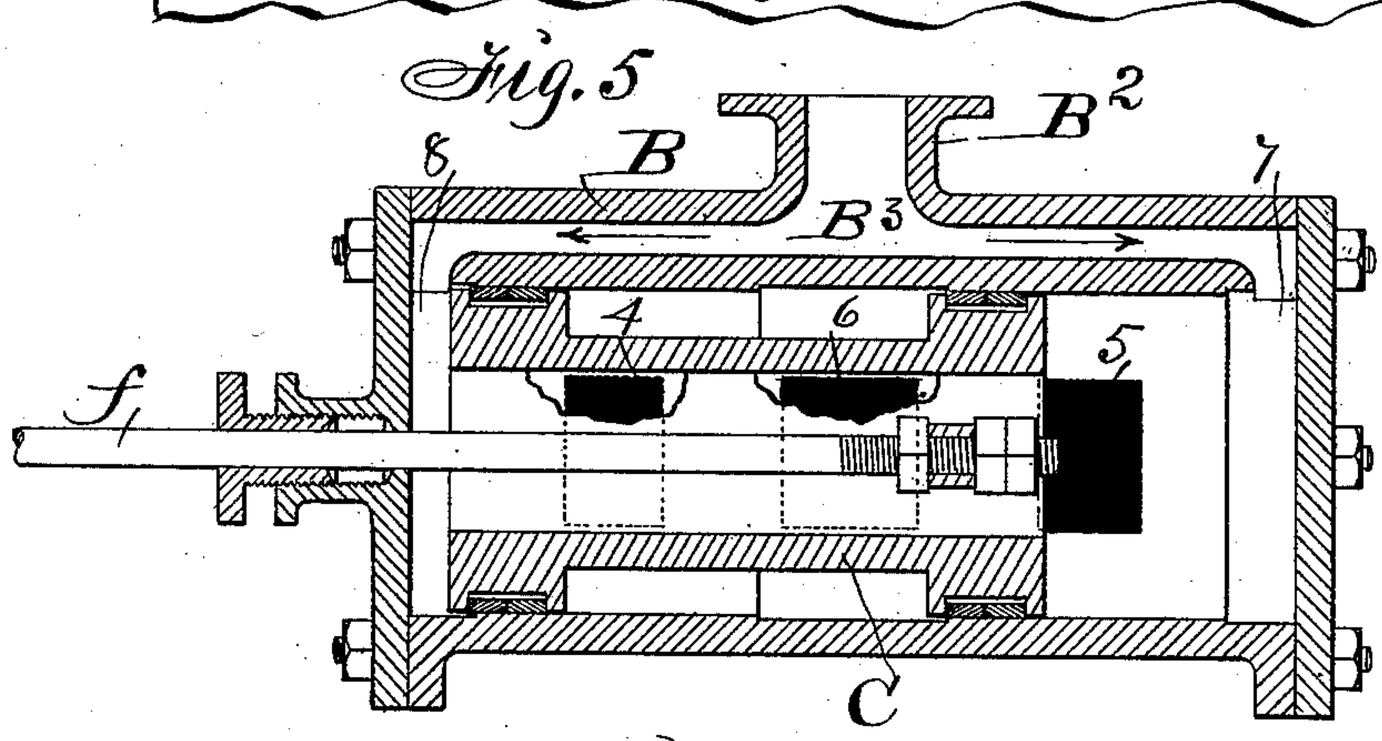


Fig. 6

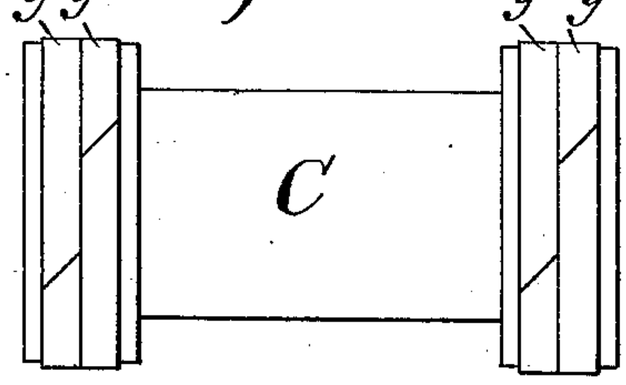
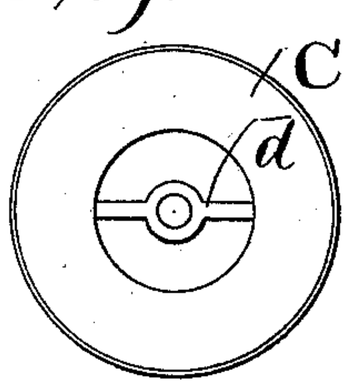


Fig. 7



Witnesses:
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R. H. Orwig.

Inventor:
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UNITED STATES PATENT OFFICE.

RICHARD G. HARRIS, OF BOONSBOROUGH, IOWA, ASSIGNOR OF TWO-THIRDS TO WILLIAM FISHER, OF SAME PLACE, AND LORAN W. REYNOLDS, OF BOONE, IOWA.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 349,275, dated September 14, 1886.

Application filed January 25, 1886. Serial No. 189,649. (No model.)

To all whom it may concern:

Be it known that I, RICHARD G. HARRIS, a citizen of the United States of America, and a resident of Boonsborough, in the county of Boone and State of Iowa, have invented a new and useful Improvement in Steam-Engines, of which the following is a specification.

Heretofore a valve-chest has had a cylindrical valve-chamber provided with two series of ports located in circles extending around the end portion of the chamber to admit steam from the chest to press upon all sides of a valve, having concave ends and a concave annular groove in its center, fitted in the valve-chamber.

My object is to simplify the construction, reduce the cost, and to equalize the pressure of steam upon a valve by admitting it to pass continuously and with equal volume and force from the ends of the valve by admitting the steam to pass continuously and with equal volume and force from the ends of the valve-chamber only, and from thence through the open ends of the valve to the steam-cylinder, as hereinafter set forth, pointed out in the claims, and illustrated in the accompanying drawings, in which--

Figure 1 is a top view showing my valve-chamber and steam-cylinder combined. Fig. 2 is an enlarged side view of the valve-chamber detached from the cylinder. Fig. 3 is a sectional view through the vertical center of Fig. 2. Fig. 4 is a central longitudinal and horizontal sectional view of the valve and valve-chamber combined with a section of the steam-cylinder. Fig. 5 is a central longitudinal and vertical section of the same valve and valve-chamber. Fig. 6 is a side view, and Fig. 7 an end view, of the tubular valve.

A represents a steam-cylinder of common form, provided with an integral seat, A^2, specially adapted to receive my cylindrical valve-chamber.

Nos. 1 and 2 are induction-ports extending from the face of the seat to the opposite ends of the cylinder. No. 3 is an exhaust-port midway between the ports 1 and 2.

B is the valve-chamber, consisting of a cylindrical case and heads, and a stuffing-box corresponding in form with the steam-cylinder A, but smaller in size. It has a plain side face and flanges, through which top-bolts are passed to secure it to the seat A^2 of the cylinder A. Ports Nos. 4, 5, and 6, coinciding with the ports Nos. 1, 2, and 3, extend inward from the plain face of the chamber, as clearly shown in Fig. 4.

B^2 is a branch extending at right angles from the center of the case, to be connected with a steam-generator by means of a tube in a common way. A steam passage-way, B^3, extends in opposite directions from the branch, and terminates in induction-ports Nos. 7 and 8, that communicate with the bore of the valve-chamber to admit steam continuously at both ends of the chamber, as required, to keep the valve balanced within the chamber by equal pressure upon all parts of its inner and outer surfaces when in operation.

C is the tubular sliding-valve, fitted in the chamber B. It has an integral cross-bar *d* at one end, to which a valve-stem, *f*, is secured, by means of nuts, as shown, or in any suitable way. *g g* are metal packing-rings on the enlarged ends of the valve, that can be readily replaced when too much worn, and can be used without said rings, also.

H (shown in Fig. 4) represents a piston in the center of the cylinder A, while the port No. 1 is closed and the port No. 2 open relative to the supply, and the valve C in position, as required, to allow live steam to pass from within the valve-chamber, and also from within the valve into and through the open port No. 2 to the one end of the cylinder A, to press the piston toward its opposite end to expel the exhaust-steam therefrom through the port No. 1 into the annular space at the central portion of the valve, and from thence through the coinciding exhaust-ports, 3 and 6. The valve-stem *f*, connected with a rotating-shaft by means of a crank in a common way, then imparts motion to the valve, as required, to reverse the motion of the piston, and as required to produce successive strokes and a continuous reciprocating motion.

The port No. 3 in the cylinder A may be dispensed with, and the exhaust-steam dis-

charged from the annular space that is maintained around the central part of the sliding-valve through the port No. 6, and that port may be located at any portion of the circumference of the valve-chamber desired.

It is obvious that steam admitted continuously at the opposite ends of the valve-chamber to fill that chamber, and also the bore of the valve, will be at an equilibrium at all times relative to the reciprocating valve, and hence exert no force upon it in any direction, and consequently no lateral pressure or friction that will produce wear and consume power; but will retain the valve perfectly poised so that very little power will be required to impart a reciprocating longitudinal movement thereto, and consequently without much friction or wear of the valve-gear employed to actuate the valve.

By my construction great economy in manufacture and facility in cleaning are secured. The cylinder and its passages being constructed together and practically in line, the exterior may be of the same diameter from end to end, thus materially lessening the cost, while ready access to the interior being had by simply removing the heads from the direction of the passages, they may easily be cleaned from one end to the other; but the chief advantage resides in having the steam-passages straight and extending to the heads, so that, when the cylinder is a small one, the passages may be bored, while, when it is a large one and the passages are formed in casting, the core employed may easily be removed.

I claim as my invention—

1. The combination, in a steam-engine, of the valve-chamber provided with the removable heads, and with a steam-passage extending to the heads and terminating in the induction-ports, substantially as described.

2. An open-ended tubular and cylindrical valve, in combination with a chamber provided with the removable heads, and with the steam-passages leading to said heads and terminating in induction-ports, and the exhaust-port in the middle, and eduction-ports on the opposite sides of the exhaust-port, substantially as described.

RICHARD G. HARRIS.

Witnesses:
LORAN W. REYNOLDS.
WM. FISHER.