

No. 746,565.

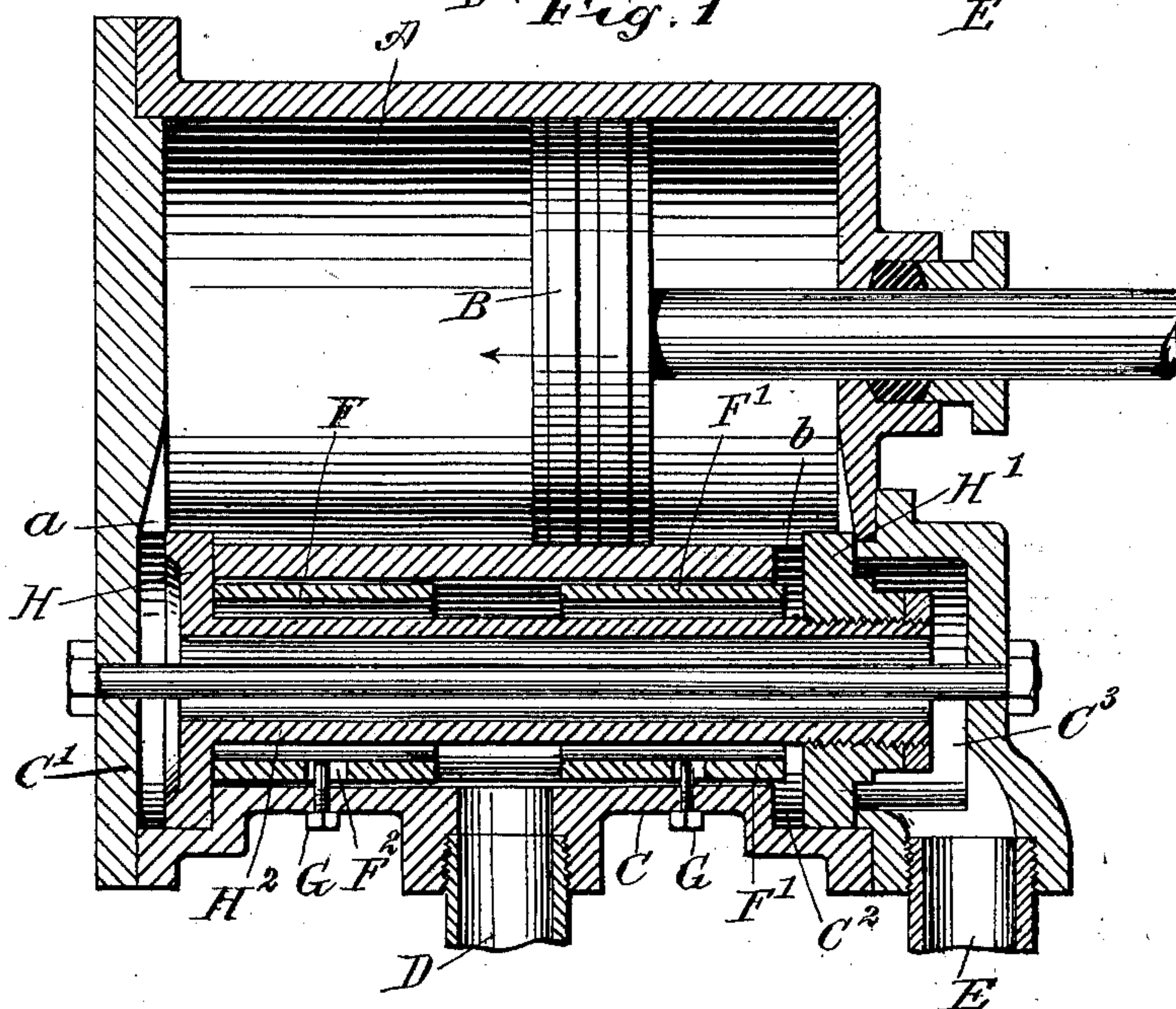
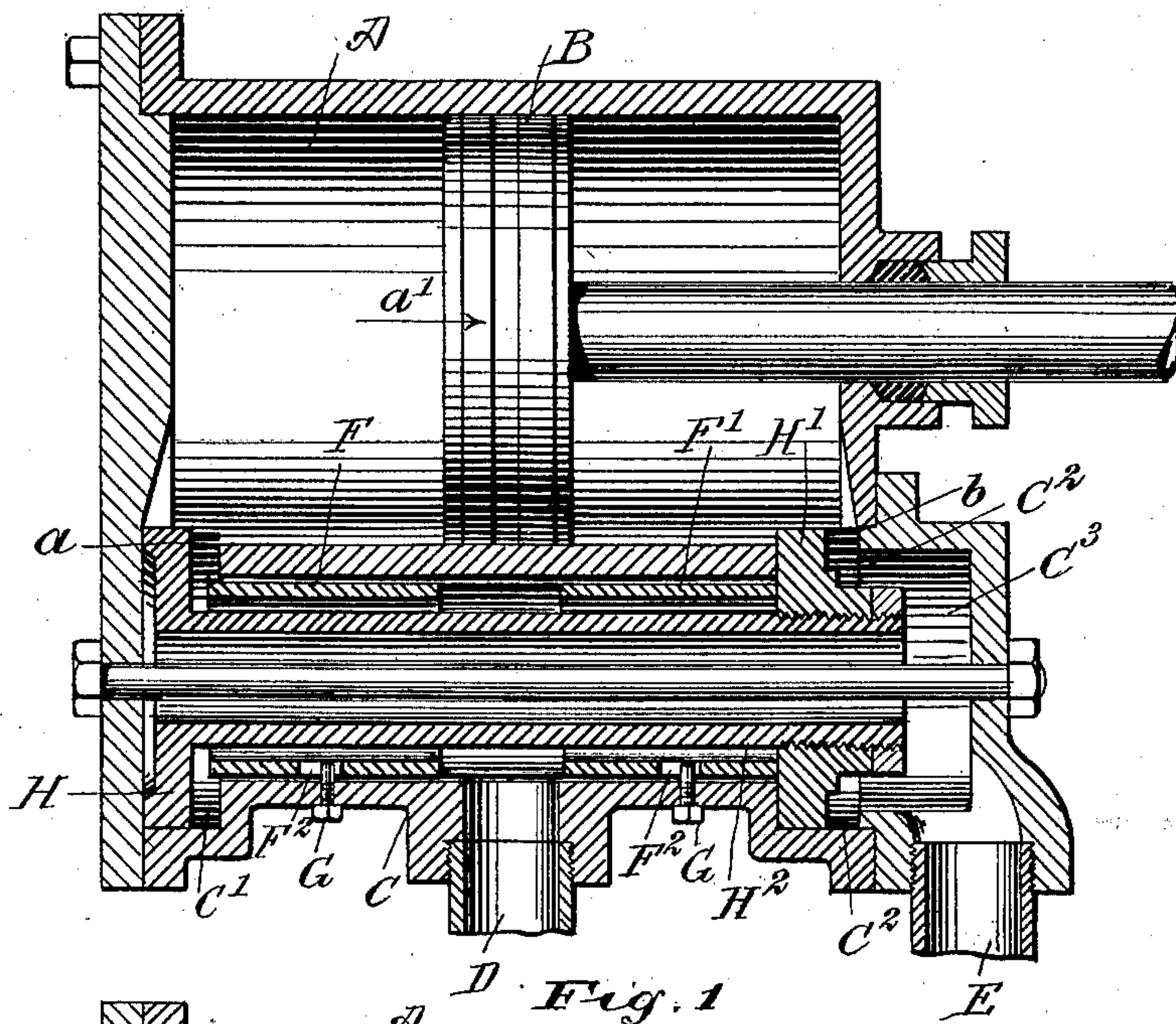
PATENTED DEC. 8, 1903.

H. NIELSEN.
VALVE MECHANISM FOR ENGINES.

APPLICATION FILED FEB. 11, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

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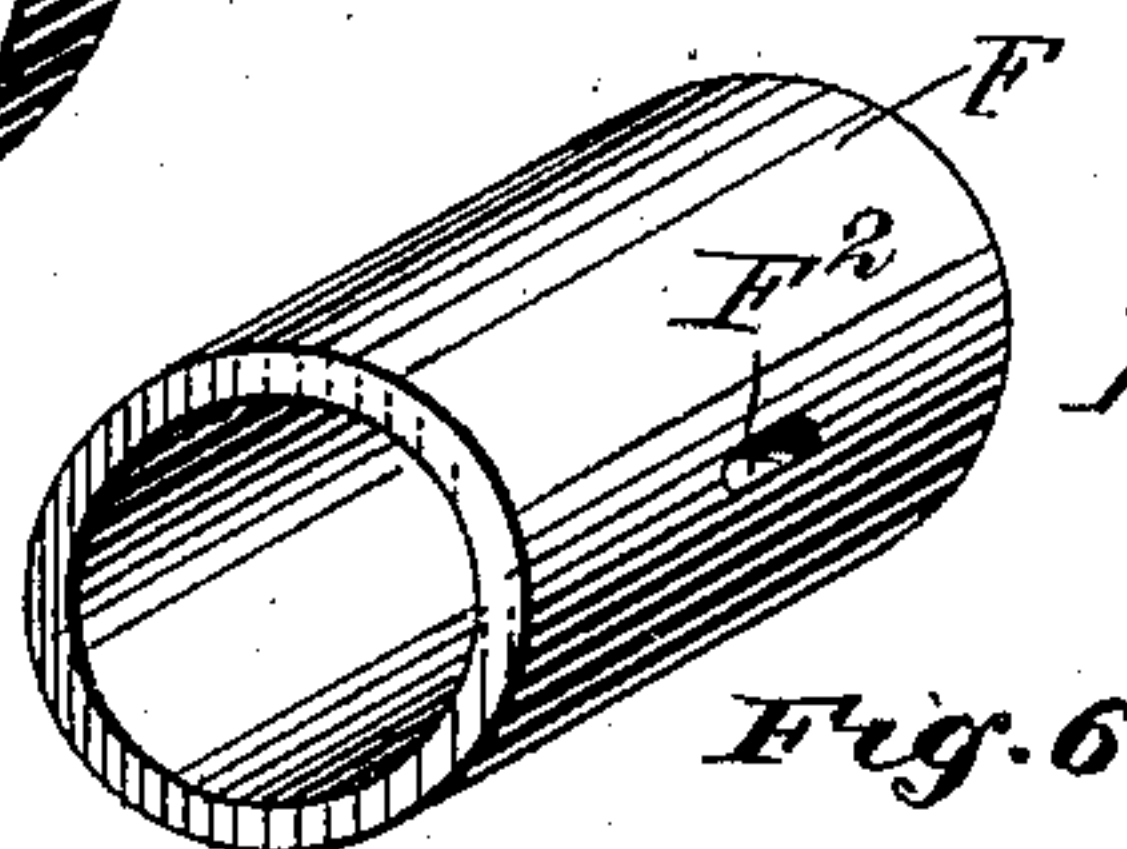
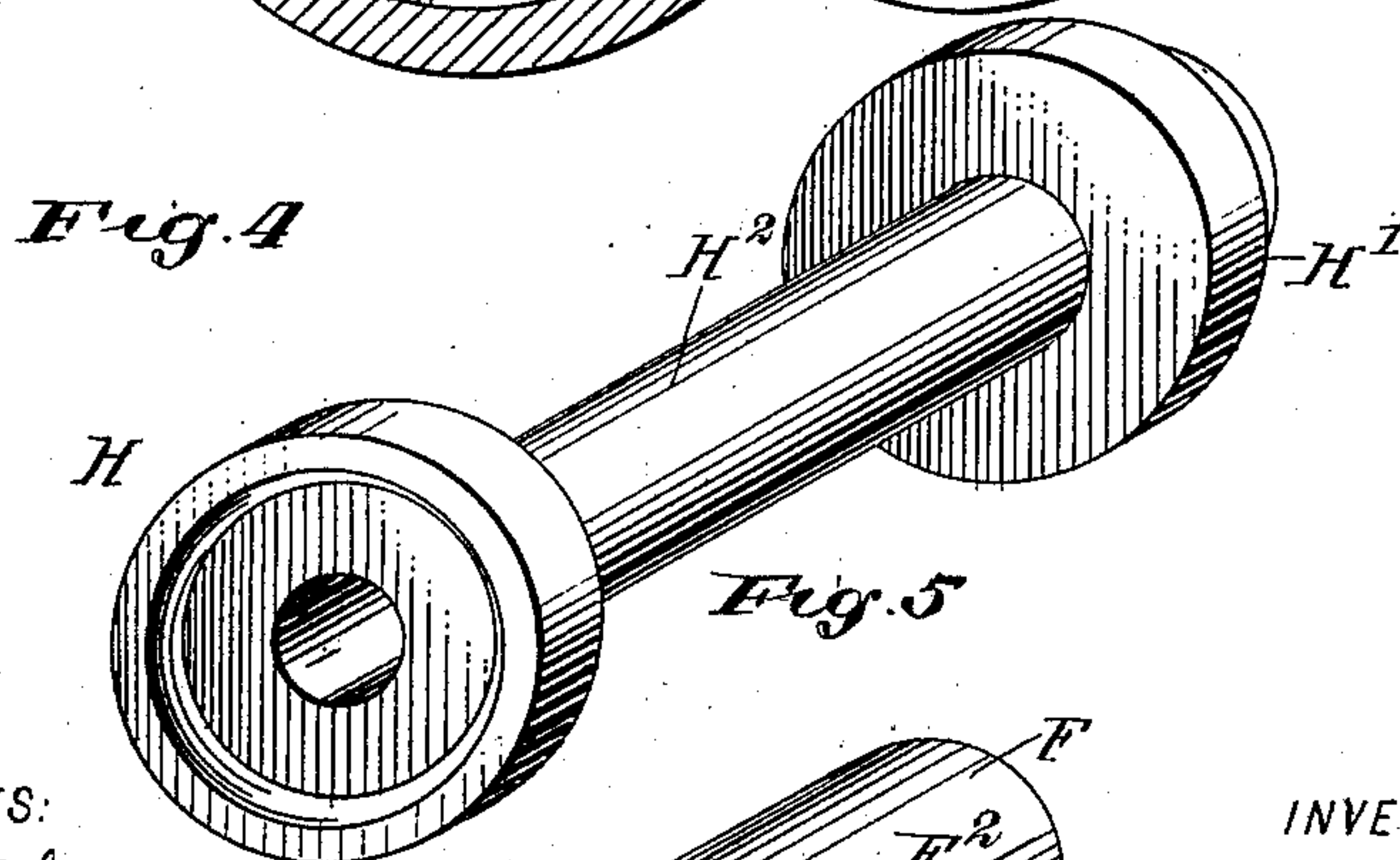
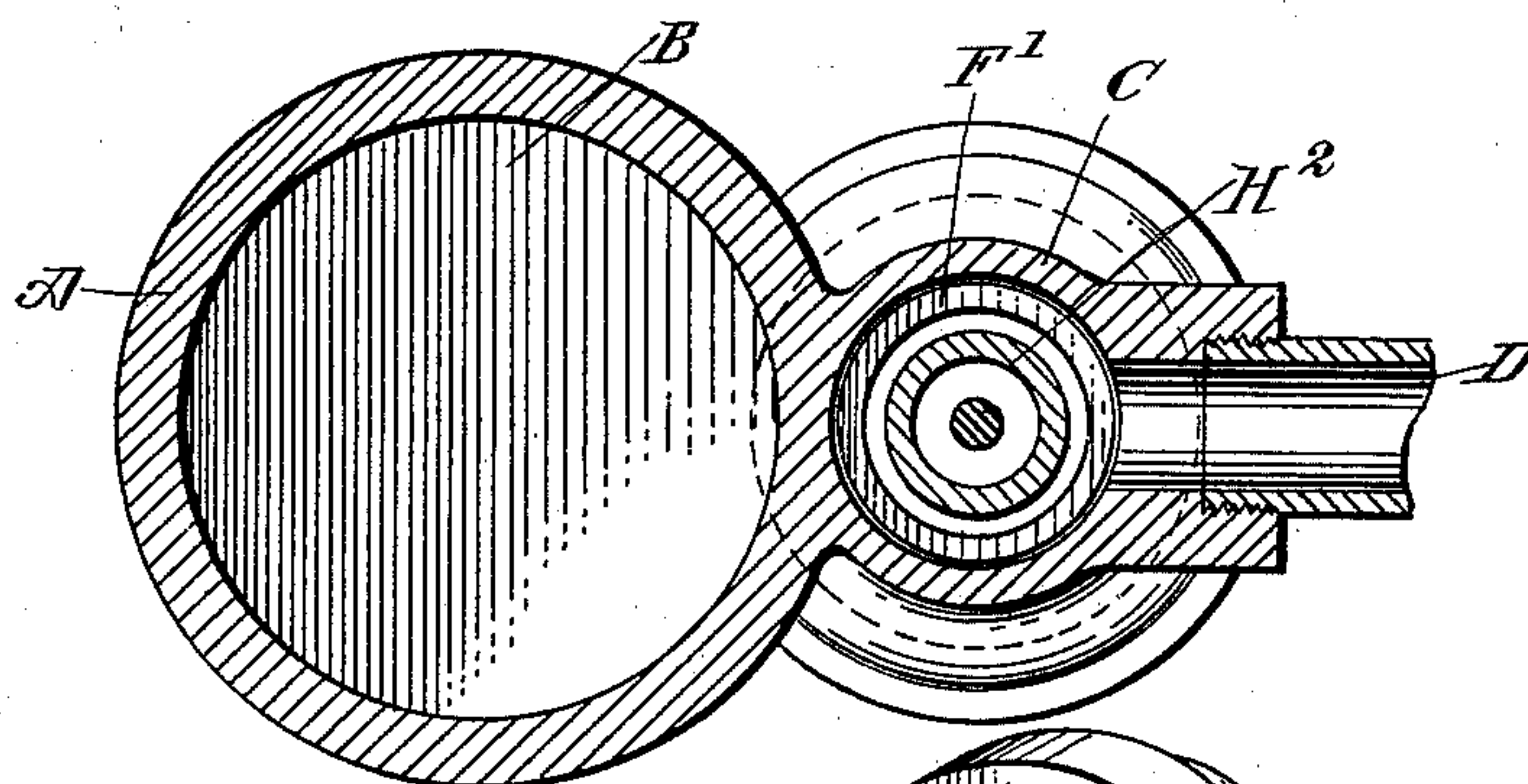
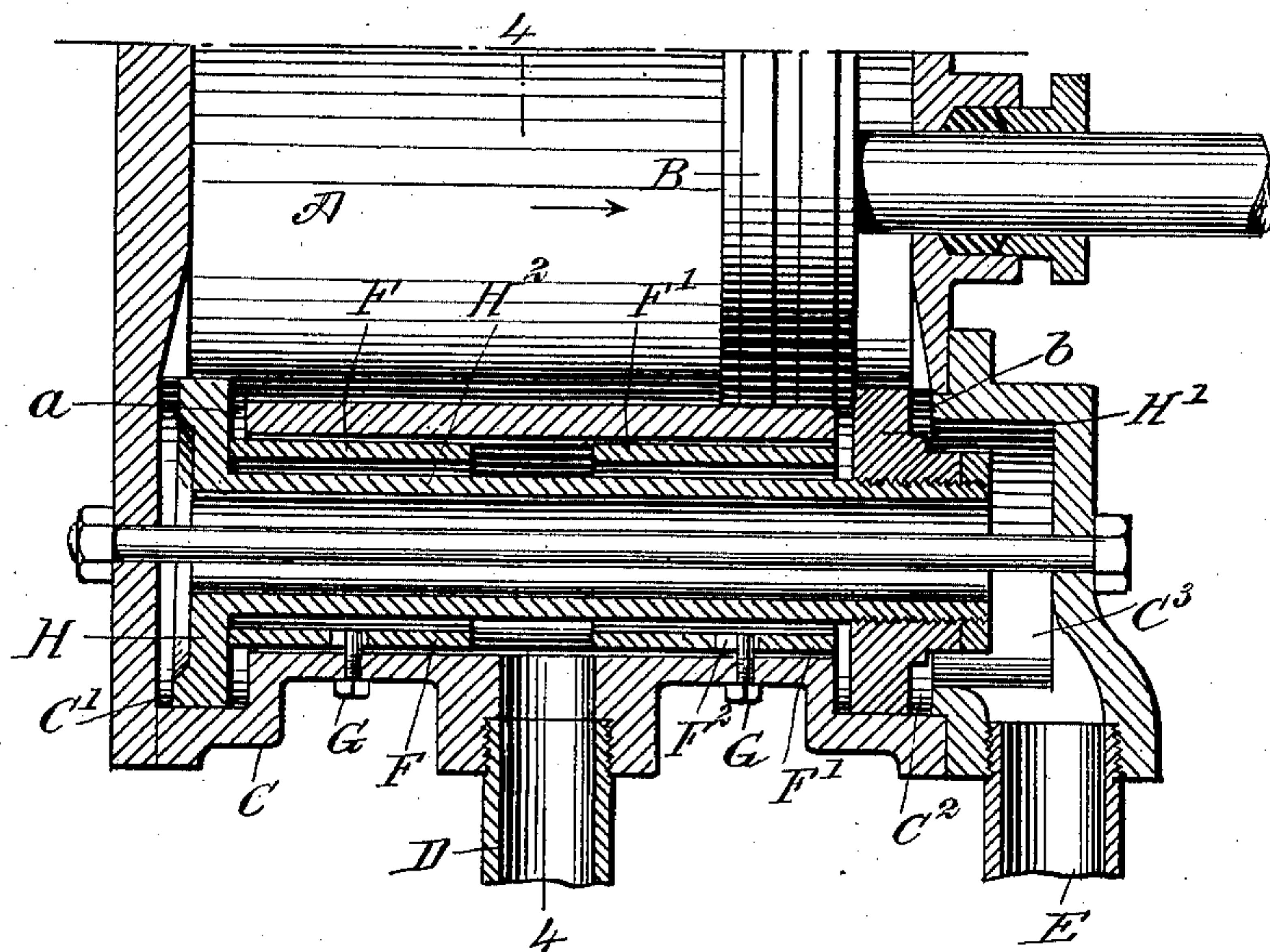
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

HERMAN NIELSEN, OF NEW YORK, N. Y.

VALVE MECHANISM FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 746,565, dated December 8, 1903.

Application filed February 11, 1903. Serial No. 142,862. (No model.)

To all whom it may concern:

Be it known that I, HERMAN NIELSEN, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Valve Mechanism for Engines, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved engine arranged to insure a positive shifting of the engine-valve directly from the piston reciprocating in the cylinder, thus dispensing with complicated valve-gear, the arrangement being such that waste and leakage of the motive agent are reduced to a minimum, and the motive agent is utilized to the fullest advantage, so as to render the engine particularly well adapted for use as a pumping-engine.

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

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a sectional plan view of the improvement. Fig. 2 is a like view of the same, showing parts in a different position. Fig. 3 is a similar view of the same, showing the engine-valve in an intermediate position. Fig. 4 is a transverse section of the same on the line 4-4 of Fig. 3. Fig. 5 is a perspective view of the engine-valve, and Fig. 6 is a like view of one of the cut-off sleeves.

In the steam-cylinder A is mounted to reciprocate a piston B, and the ends of the cylinder are connected by ports *a* and *b* with enlarged valve-chambers C' and C², formed in the ends of a steam-chest C, secured to or formed on the cylinder A. The steam-chest C is provided at or near its middle with an inlet-pipe D, connected with a boiler or other motive-agent supply and one end of a valve-chamber. As shown, the valve-chamber C² connects with an exhaust-chamber C³, having an exhaust-pipe E for carrying off the exhaust-steam. The inlet-pipe D discharges the motive agent into the steam-chest C between the spaced inner ends of cylindrical

compensating sleeves F and F', fitted to slide longitudinally in the steam-chest and having their outer ends adapted to extend into the valve-chambers C' and C², as plainly indicated in Figs. 1 and 2. The sliding motion of the sleeves F and F' is limited by set-screws G, screwing in the wall of the steam-chest and projecting into elongated slots F², formed in the said sleeves, as plainly shown in Figs. 1, 2, and 3.

In the valve-chambers C' and C² are mounted to slide longitudinally the cylindrical valve-heads H and H' of the engine-valve employed for controlling the admission and exhaust of the motive agent to and from the cylinder A, and the said heads H and H' are rigidly connected with each other by a tubular valve-stem H², extending loosely through the sleeves F and F' and the chest C and forming a passage for the exhaust-steam from the valve-chamber C' to the exhaust-chamber C³ and the exhaust-pipe E.

The valve-chambers C' and C² and the valve-heads H and H' intersect at the ports *a* and *b* with the cylinder A, so that the piston B moves alternately in contact with the inner faces of the valve-heads to shift the engine-valve for the proper admission and exhaust of the motive agent, as hereinafter more fully described.

The heads H and H' of the engine-valve are so arranged that when the head H' is seated against the inner end of its chamber C², as shown in Fig. 1, then the other head H is seated against the outer end of its chamber C', and hence the live motive agent passes from the middle of the chest C by way of the sleeve F into the chamber C' and by the port *a* into the cylinder to drive the piston B in the direction of the arrow *a'*. The exhaust in front of the piston B now passes by way of the port *b* into the valve-chamber C² and exhaust-chamber C³ to the exhaust-pipe E. The piston B in its travel in the direction of the arrow *a'* finally comes in contact with that portion of the inner face of the valve-head H' projecting into the cylinder, so that the piston and the valve-head H' form a steam-tight joint, and the piston in its onward movement now carries the head H along and with it the entire engine-valve until the valve-heads H and H' are both unseated, (see Fig.

3,) and as the pressures on both faces of the valve-head H are now alike and the pressure of the live motive agent on the inner face of the valve-head H' exceeds that of the exhaust-pressure on the outer face of the said head H' it is evident that the preponderance of pressure on the inner face of the valve-head H' causes the latter to move to the right and with it the entire valve until the head H' is seated at its outer face against the outer or exhaust end of the chamber C², and the head H is seated with its inner face against the inner or live end of the chamber C', as shown in Fig. 2. The live motive agent now passes from the chest C by way of the sleeve F' and port b into the right-hand end of the cylinder A to act on the piston B to drive the same in the inverse direction of the arrow a', as indicated in Fig. 2. When the piston B nears the end of its stroke, it moves in contact with the piston-head H and carries the same along a short distance—that is, until the piston-heads H and H' are unseated from their respective ends of the chambers C' and C², and then the live motive agent quickly shifts the engine-valve farther to the left to bring the engine-valve back to the position shown in Fig. 1. Thus from the foregoing it will be seen that the piston B starts the engine-valve when it nears the end of its stroke, but the live motive agent completes the stroke of the valve.

By reference to the drawings it will be noticed that the inner ends of live-steam seats in the chambers C' and C² are somewhat less in area than the outer or exhaust ends thereof, so that the valve remains seated by pressure of the live steam until the piston has nearly completed its travel and shifts the valve by contact with the corresponding valve-head H or H', as above explained.

From the foregoing it will be seen that the tight contact made by the piston B with a valve-head H or H' does not allow escape of steam from the corresponding chamber C' or C², and hence the steam-pressure on the inner face of the head causes shifting of the valve to final position, as above explained.

The sleeves F and F' are slidable longitudinally in the chest C to form auxiliary valve-chests for the inner faces of the heads H and H', instead of the inner ends of the chambers C' and C², in case of irregular expansion of the valve-stem H², especially as it is necessary for the heads H and H' to be properly seated alternately on the inner and outer ends or seats of the valve-chambers C' and C².

The arrangement described is very simple and durable in construction, is not liable to easily get out of order, and renders an engine equipped with this valve especially serviceable for use as a pumping-engine.

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

1. An engine having a cylinder, a piston reciprocating therein, a steam-chest provided

with valve-chambers at the ends, each having an inlet and an exhaust end, the said valve-chambers intersecting with the cylinder, to form cylinder-ports, and a valve having valve-heads mounted to slide in the said valve-chambers and extending into the cylinder through the said cylinder-ports, to be engaged by the piston therein, as set forth.

2. An engine having a cylinder, a piston reciprocating therein, a steam-chest having valve-chambers at the ends, intersecting with the cylinder, to form cylinder-ports, the valve-chambers being provided with live-steam seats and exhaust-steam seats, and a valve having valve-heads mounted to slide in the said valve-chambers and extending through said cylinder-ports into the cylinder, to be engaged by the piston therein, for starting the valve, the said heads being alternately seated on the live-steam seats and exhaust-steam seats of the said chambers, for the purpose set forth.

3. An engine having a cylinder, a piston reciprocating therein, a steam-chest having valve-chambers at the ends, intersecting with the cylinder, to form cylinder-ports, the valve-chambers having live-steam seats and exhaust-steam seats, and a valve having valve-heads mounted to slide in the said valve-chambers and extending through said cylinder-ports into the cylinder, to be engaged by the piston therein, for starting the valve, the said heads being alternately seated on the live-steam seats and exhaust-steam seats of the said chambers, the stem of the valve being hollow, to connect the exhaust ends of the valve-chambers with each other, as set forth.

4. An engine having a cylinder, a piston reciprocating therein, a steam-chest having valve-chambers at the ends, intersecting with the cylinder, to form cylinder-ports, a valve having valve-heads mounted to slide in the said valve-chambers and extending into the cylinder, to be engaged by the piston therein, for starting the valve, the said chambers having live-steam seats and exhaust-steam seats on which the said heads are alternately seated, the stem of the valve being hollow, to connect the exhaust ends of the valve-chambers with each other, and an exhaust-chamber having an exhaust-outlet, in communication with the exhaust end of one of the said valve-chambers, as set forth.

5. An engine having a cylinder, a piston reciprocating therein, a steam-chest having valve-chambers at the ends, intersecting with the cylinder, to form cylinder-ports, a valve having a stem provided with valve-heads mounted to slide in the said valve-chambers and extending through said cylinder-ports into the cylinder, to be engaged by the piston therein, for starting the valve, the said heads being alternately seated on the live-steam seats and exhaust-steam seats of the said chambers, and sleeves mounted loosely on the valve-stem and having a limited sliding mo-

tion in the said steam-chest, and adapted to extend into the said valve-chambers, to be engaged by the valve-heads, as set forth.

6. An engine having a cylinder, a piston reciprocating therein, a steam-chest provided at its ends with valve-chambers having inlet and exhaust ends, the valve-chambers intersecting the cylinder to form cylinder-ports, an exhaust-chamber connected with the exhaust end of one of the valve-chambers and having an exhaust-outlet, and a valve having valve-heads connected by a hollow valve-stem and mounted to slide in the said valve-chambers and extending into the cylinder to be engaged by the piston, the said hollow valve-stem connecting the exhaust ends of the valve-chambers with each other, as set forth.

7. An engine having a cylinder, a piston reciprocating therein, a steam-chest having valve-chambers at the ends, intersecting with the cylinder, to form cylinder-ports, the valve-chambers having live-steam seats and exhaust-steam seats, and a valve having valve-heads mounted to slide in the said valve-chambers and extending through the cylinder-ports into the cylinder, to be engaged by the piston therein, for starting the valve, the said heads being alternately seated on the live-steam seats and exhaust-steam seats of the said chambers, the live-steam seat of each chamber being less in area than the exhaust-steam seat, as set forth.

8. An engine having a cylinder, a piston reciprocating therein, a steam-chest having valve-chambers at the ends intersecting with the cylinder to form cylinder-ports, the valve-chambers having oppositely-arranged valve-seats, and a valve having valve-heads mounted to slide in the said valve-chambers and alternately engaging the said valve-seats, the said valve-heads extending through the cylinder-ports into the cylinder in the path of the piston, as set forth.

9. An engine having a cylinder, a piston reciprocating therein, a steam-chest having valve-chambers at its ends intersecting with the cylinder to form cylinder-ports, the valve-chambers each having an inner or steam-inlet

end and an outer or exhaust end, a steam-supply communicating with the steam-inlet ends of the valve-chambers, a valve having valve-heads mounted to slide in the said valve-chambers and alternately seated on the live-steam seats and the exhaust-steam seats, the said valve-heads extending loosely through the cylinder-ports into the cylinder to be engaged by the piston to unseat the valve-heads, a hollow valve-stem for the valve-heads connecting the exhaust ends of the valve-chambers, and an exhaust-chamber communicating with the exhaust end of one of the valve-chambers and having an exhaust-outlet as set forth.

10. An engine comprising a cylinder, a piston reciprocating therein, a steam-chest having valve-chambers at the ends intersecting with the cylinder to form cylinder-ports, the said valve-chambers having inlet and exhaust ends, a valve having valve-heads mounted to slide in the said valve-chambers and extending loosely through the cylinder-ports into the cylinder in the path of the piston, the said valve-heads controlling the inlet and exhaust from the cylinder, a hollow valve-stem for the valve-heads connecting the exhaust ends of the valve-chambers, cylindrical sleeves mounted loosely on the valve-stem and having a limited sliding movement in the steam-chest the said sleeves being spaced from each other at their inner ends, the outer ends of the sleeves being adapted to extend into the valve-chamber to be engaged by the inner faces of the valve-heads, a steam-inlet pipe discharging into the steam-chest between the spaced inner ends of the sleeves, and an exhaust-chamber connected with the exhaust end of one of the valve-chambers and having an exhaust-outlet, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HERMAN NIELSEN.

Witnesses:

SAMUEL F. TAGGART,
WILLIAM T. MANLEY.