No. 722,872. PATENTED MAR. 17, 1903.

J. N. MOWERY.

AUTOMATIC CYLINDER COCK.

APPLICATION FILED SEPT. 29, 1902.

NO MODEL.

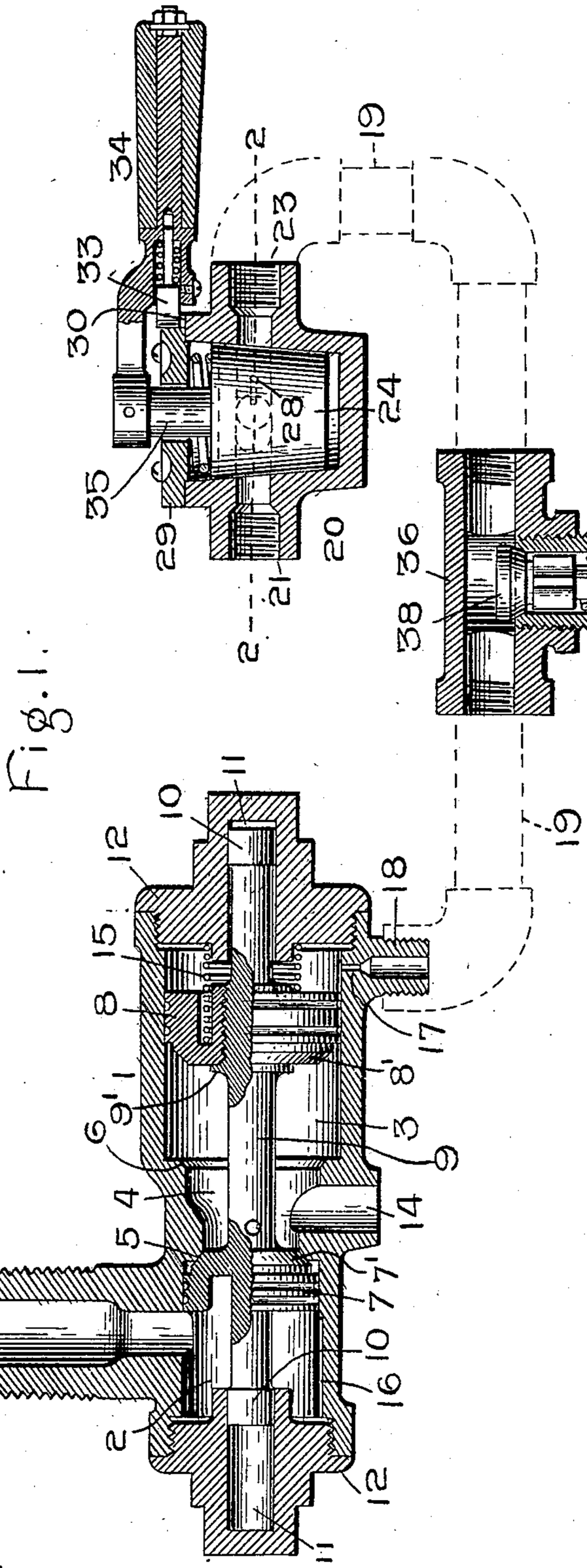

Fig. 1.

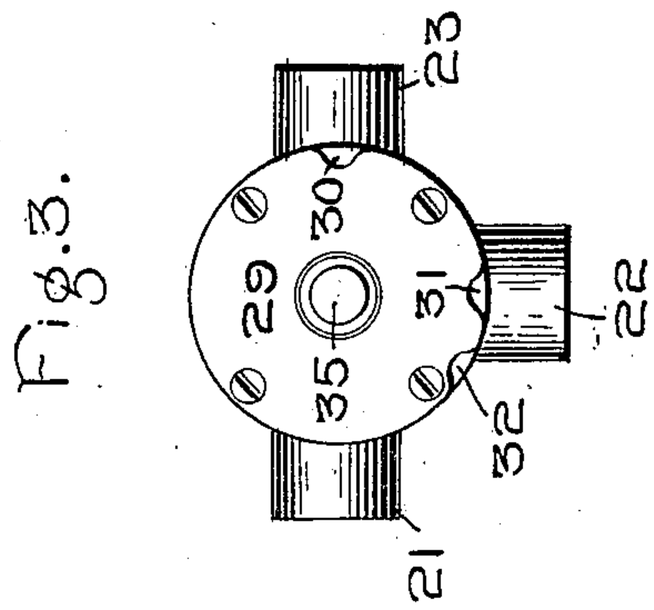

Fig. 3.

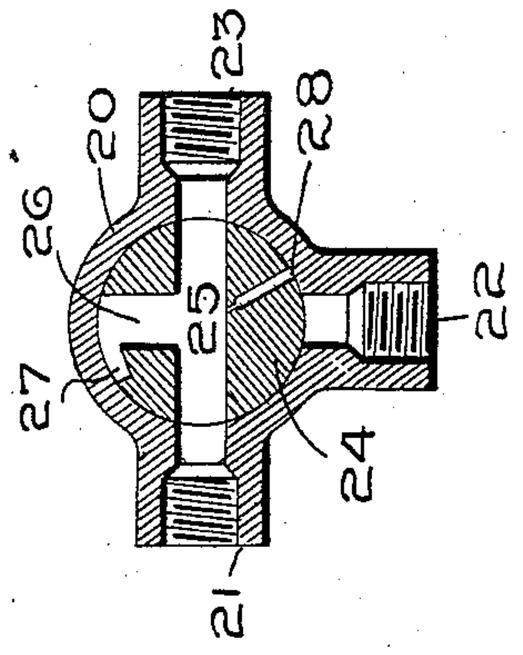

Fig. 2.

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UNITED STATES PATENT OFFICE.

JOHN NORRIS MOWERY, OF SCHENECTADY, NEW YORK.

AUTOMATIC CYLINDER-COCK.

SPECIFICATION forming part of Letters Patent No. 722,872, dated March 17, 1903.

Application filed September 29, 1902. Serial No. 125,205. (No model.)

To all whom it may concern:

Be it known that I, JOHN NORRIS MOWERY, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Automatic Cylinder-Cocks, of which the following is a specification.

This invention relates to steam-engines; and its object is to provide a cylinder-cock which will open automatically when steam is not being used in the cylinder and can be positively opened by the engineer from a distant point without the use of mechanical connections.

It is well understood that a cylinder-cock is used to relieve a cylinder of condensed steam or water which may be carried into the cylinder by means of priming or foaming of the boiler. The water due to condensation collects after steam is shut off and comes from the steam remaining in the cylinders and steam-passages, and in compound engines the amount of water thus formed is so great that care must be exercised both in the design of the cylinder-cock and cylinder-cock rigging, as well as care on the part of the engineman to operate the same. The modern engine presents problems in the design of cylinder-cock rigging for the solution of which no ideal system of levers can be found, and the best is often so springy that when steam is being used in the cylinders the cocks fail to open. In view of these facts it is seen that the ideal cylinder-cock should be one which can be operated without a system of levers, and, second, one which will automatically open at those intervals when steam is not being used in the cylinders.

My invention therefore consists in a cylinder-cock capable of fulfilling these conditions, as hereinafter set forth, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 shows my improved cylinder-cock, controlling-valve, and drip-valve in sectional elevation. Fig. 2 is a cross-section of the controlling-valve on the line 2 2, Fig. 1; and Fig. 3 is a top plan view of said valve with the handle removed.

The cylinder-cock comprises a case or body 1, containing two cylinders 2 3, the latter being of greater diameter than the other. The two cylinders are connected by a passage 4, at the ends of which are the valve-seats 5 6. In the body 1 is a differential piston comprising a smaller piston 7 in the cylinder 2 and a larger piston 8 in the cylinder 3, the latter being preferably made separate from the common piston-rod 9 and attached thereto, as by screwing it upon a screw-threaded hub against a shoulder 9′. On each piston is a valve-face 7′ 8′ to fit the seats 5 6. The ends of the piston-rod constitute plungers 10, which move in sockets 11, formed in the caps 12, which close the outer ends of the two cylinders 2 3.

The cylinder 2 has a passage 13 to connect it with the engine-cylinder, said passage being wider than the piston 7, so that it will not be blocked by the latter in its travel. The passage 4 between the cylinders communicates by an exhaust-port 14 with the atmosphere. Between the cap of the larger cylinder 3 and the piston 8 is a helical spring 15, which moves the piston-valve face 8′ against its seat 6 when there is no steam in the engine-cylinder. In this position the cock is open—that is, there is a free passage-way from the engine-cylinder through the passage 13, the smaller cylinder 2, the passage 4, and the exhaust-port 14.

In the bottom of the smaller cylinder 2 is a longitudinal groove 16, extending to a point beyond the piston when the cock is open to permit the escape of any water which may be behind the piston when it passes the passage 13 in opening and pockets whatever steam or moisture may be at that end of the cylinder 2. Near the other end of the larger cylinder 3 is a small port 17, surrounded by a boss 18 for the attachment of a small pipe 19, which connects the cylinder-cock with the controlling-valve, which is located at some point convenient to the engineer. This valve is, in effect, a three-way plug-valve and comprises a body 20, having three bosses 21 22 23 for pipe connections, and a plug 24, having a transverse passage 25 and a lateral passage 26 communicating therewith and provided with a somewhat wider mouth 27 than the passage 25. At a suitable place a small port 28 opens opposite to the passage 26. The cap 29 of the valve has three notches 30 31 32 in its periph-

ery, with which engages a spring-stop 33 on the handle 34, attached to the stem 35 of the plug.

The boss 21 connects the valve-body with a source of fluid-pressure, either water, air, or steam, or any gas under pressure. The boss 22 opens to the atmosphere, and the boss 23 is connected to the pipe 19, leading to the cylinder-cock.

With the stop in the notch 30 the passage 25 connects the bosses 21 23, and the fluid-pressure is admitted to the cylinder 3, the passage 26 and the port 28 being blocked, as shown in Fig. 2. When the handle is moved to let the stop enter notch 31, the cylinder 3 is opened to the air through the boss 22, the pressure-supply pipe being blocked. When the handle is moved still farther until the stop engages with notch 32, the port 28 communicates with the boss 21, while the wide-mouthed passage 26 is still in communication with the cylinder-cock. If steam is used as the source of fluid-pressure, a small amount will flow into the pipe 19 and cylinder 3 and keep them from freezing in cold weather. If some other fluid-pressure than steam is used, this heating-port 28 may be omitted.

The drip-valve is an automatic valve placed in the lowest point of the system of piping used with the cylinder-cock in order that the water of condensation from the steam used in operating the cock may escape. It consists of a body 36 and a plug or valve-seat 37, which screws into the body 36 and contains a valve 38. This valve remains on its seat at such times as the pressure in the pipe-line overcomes the pressure from the spring 39. When the pressure of the pipe-line becomes somewhat less than that of the spring, the valve rises as far as permitted by the cotter or pin 40.

The operation is as follows: When the engine is not running, the spring 15 keeps the piston 8 pressed against its valve-seat 6, having a free passage-way from the engine-cylinder to the atmosphere, so that all water of condensation can escape. The controlling-valve is in release position, or in the heating position if there is danger of freezing, the drip-valve being open to let out any water which may form in the pipe and the surplus steam which passes through the heater-port 28, if that is in use. When steam is admitted into the engine-cylinder, the total pressure on the piston 8 is greater than that on the piston 7 and is sufficient to compress the spring and move the pistons to the position shown in Fig. 1, tightly closing the passage 4 and preventing the escape of steam through the exhaust-port 14. The pistons will not move rapidly, as the plungers 10, working in the sockets 11, act as dash-pots. If the engineer wishes to open the cocks while there is steam in the engine-cylinders, he throws the handle of the controlling-valve into the position for application, the stop engaging with the notch 30 and the valve standing as shown in Figs. 1 and 2. The fluid-pressure thus admitted into the pipe 19 closes the drip-valve and passes slowly through the small port into the larger cylinder 3 behind the piston 8. As soon as the pressure per square inch on the piston 8 equals that on the opposite side of the piston 7 the latter being the smaller will be forced off its seat, and as soon as it opens the passage 13 the water and steam can escape from the engine-cylinder. In moving to this position the piston 7 uncovers the end of the groove 16, thus permitting the escape of any water at that end of the cylinder. Moreover, the total pressure on piston 7 becomes a balanced pressure, so that the total pressure on the larger piston is available to move it to and hold it against its seat 6. When it is desired to close the cock, the handle of the controlling-valve is turned to the release position with the stop in the notch 31, thus cutting off the supply of fluid-pressure and connecting the larger cylinder with the atmosphere. Since in the open position the pressure on the smaller piston is balanced, the total pressure on the larger piston is available to close the cock. This condition obtains until the piston 7 has reached the end of the groove 16, at which period the pressures acting on piston 8 are the atmospheric pressure on the one side and the spring 15 on the other. The total pressure on the piston 7 is then the atmospheric pressure on one side and the steam-pressure in the engine-cylinder on the other, thus forcing it to its seat 5. When the pressure is cut off from the pipe, the drip-valve opens and permits any accumulated water to drain out.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. An automatic cylinder-cock comprising a differential piston.

2. An automatic cylinder-cock having a differential piston arranged to close the cock when fluid-pressure is turned into the cylinder.

3. An automatic cylinder-cock having a differential piston to close it under pressure, and a spring to open it when the pressure is shut off.

4. An automatic cylinder-cock having two cylinders connected by a passage, with a valve-seat at each end of said passage, and a differential piston adapted to close on one of said seats at each end of its travel.

5. An automatic cylinder-cock having two cylinders connected by a passage, with an exhaust-port leading from said passage and a passage to connect one of said cylinders with the engine-cylinder, and a differential piston in said cylinders, adapted to connect and disconnect said passages.

6. An automatic cylinder-cock having two cylinders, one of which has a longitudinal groove along a portion of its lower side, and a differential piston one of whose heads is adapted to cover and uncover said groove.

7. A cylinder-cock, provided with means

for automatically holding it open and arranged to close when pressure is admitted to the engine-cylinder, a pipe connecting said cock with a source of fluid-supply, and a controlling-valve for said pipe.

8. An automatic cylinder-cock comprising a differential piston operating to automatically close the cock when pressure is admitted to the engine-cylinder, and means for admitting fluid-pressure behind the larger piston to open the cock when there is pressure in the engine-cylinder.

9. The combination with a cylinder-cock comprising a differential piston operating to automatically close the cock when pressure is admitted to the engine-cylinder, of a pipe for admitting steam behind the larger piston, a controlling-valve for said pipe, and an automatic drip-valve in said pipe.

10. The combination with a cylinder-cock comprising a steam-actuated piston, of a pipe for conveying steam to said cock, means for admitting a small quantity of steam to said pipe to prevent freezing, and an automatic drip-valve in said pipe adapted to remain open under such circumstances but closing when full steam-pressure is admitted.

In witness whereof I have hereunto set my hand this 26th day of September, 1902.

JOHN NORRIS MOWERY.

Witnesses:
J. F. DEEMS,
W. S. STOTHOFF.