No. 782,901. PATENTED FEB. 21, 1905.

J. R. DOLPH.

DRAIN COCK FOR STEAM CYLINDERS.

APPLICATION FILED DEC. 17, 1903.

2 SHEETS—SHEET 1.

Fig. 1.

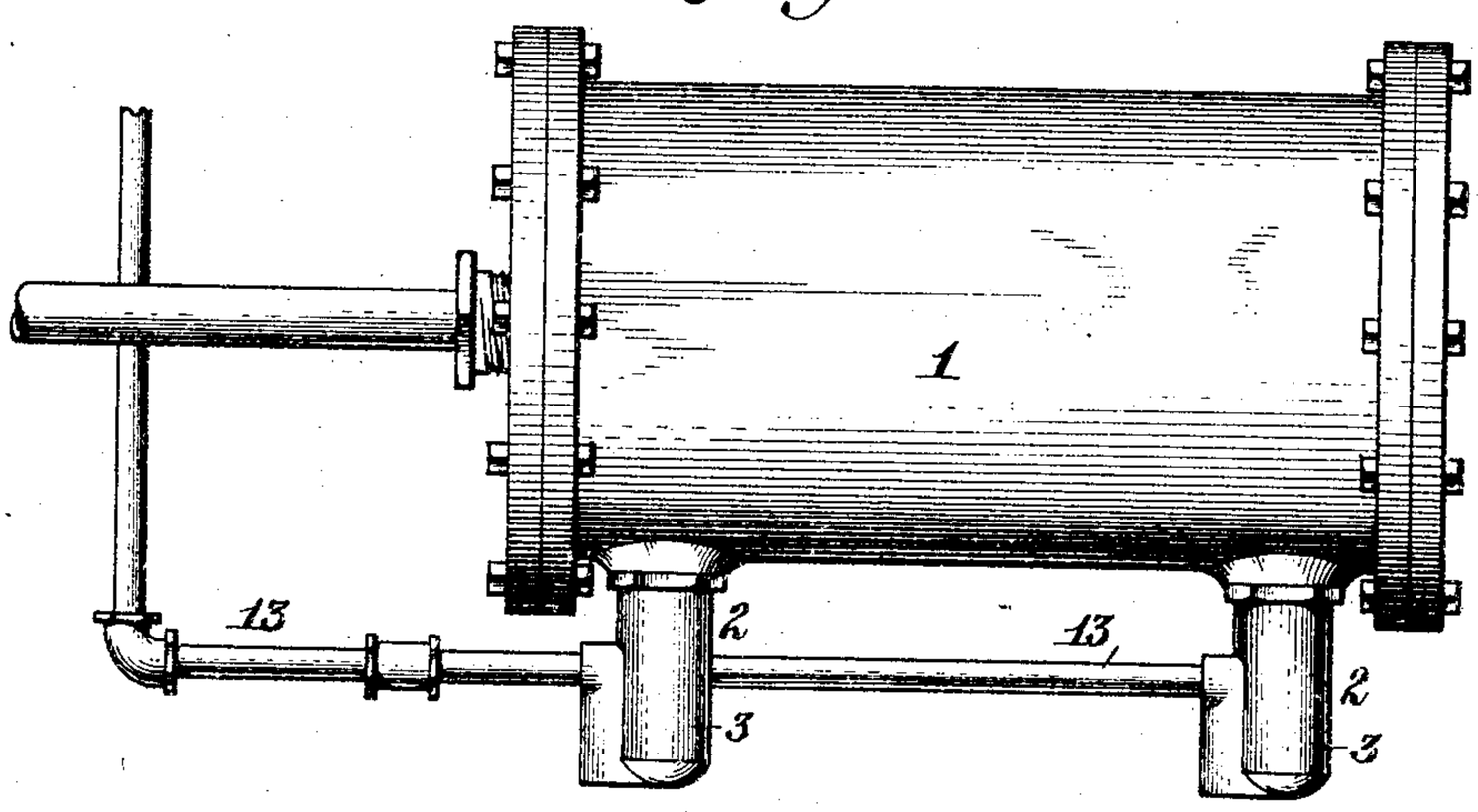


Fig. 2.

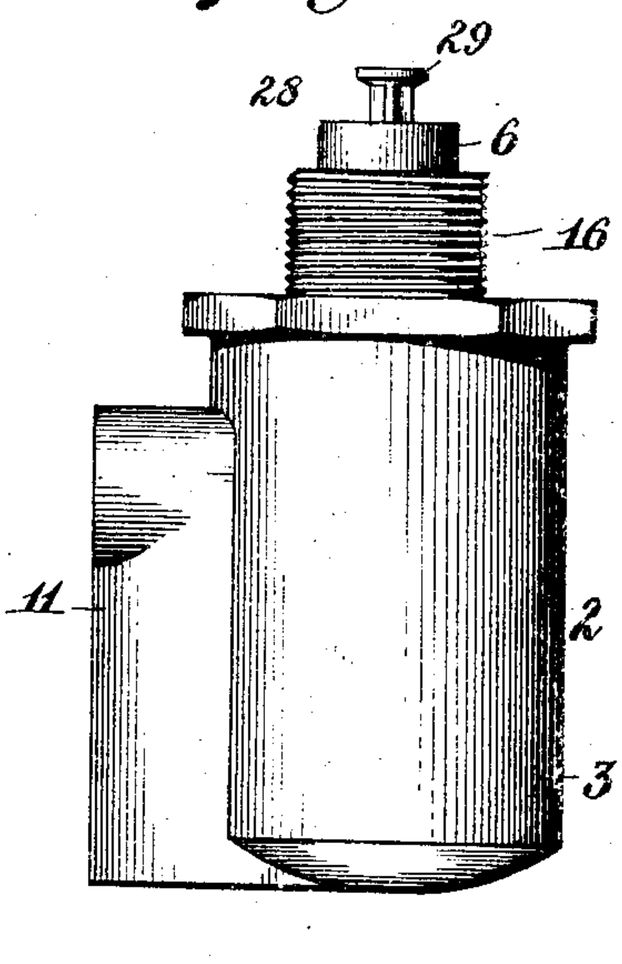
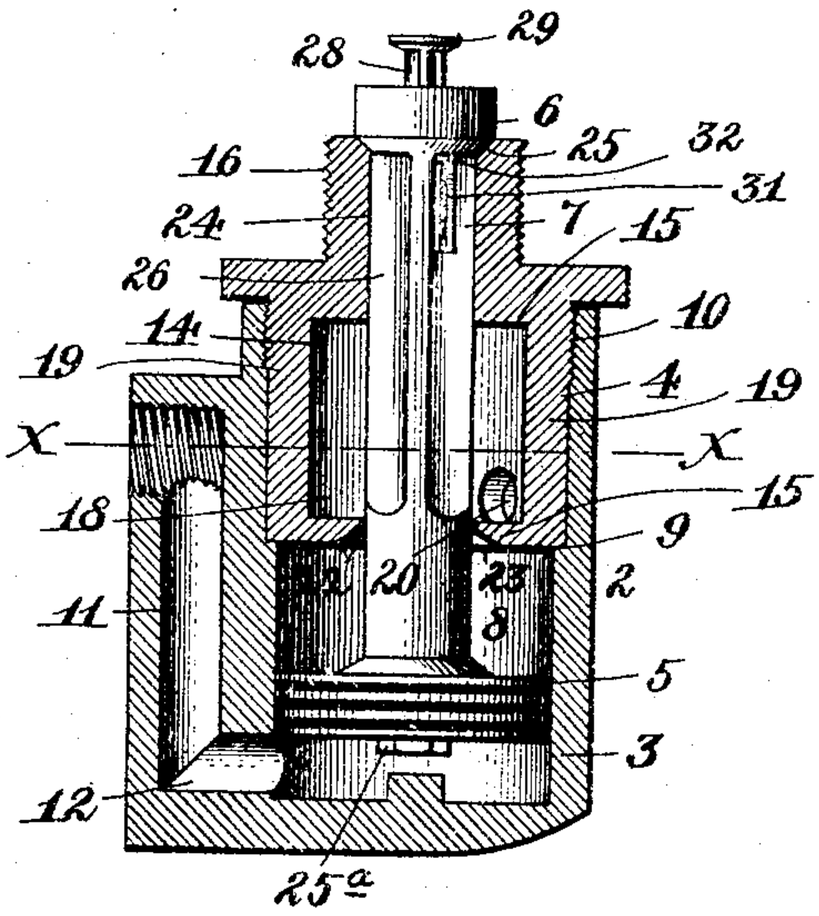


Fig. 3.



Witnesses:

B. Mason

M. Sewert.

James R. Dolph Inventor.

By Heukart & Burkhart

Attorneys.

No. 782,901. PATENTED FEB. 21, 1905.

J. R. DOLPH.

DRAIN COCK FOR STEAM CYLINDERS.

APPLICATION FILED DEC. 17, 1903.

2 SHEETS—SHEET 2.

Fig. 4.

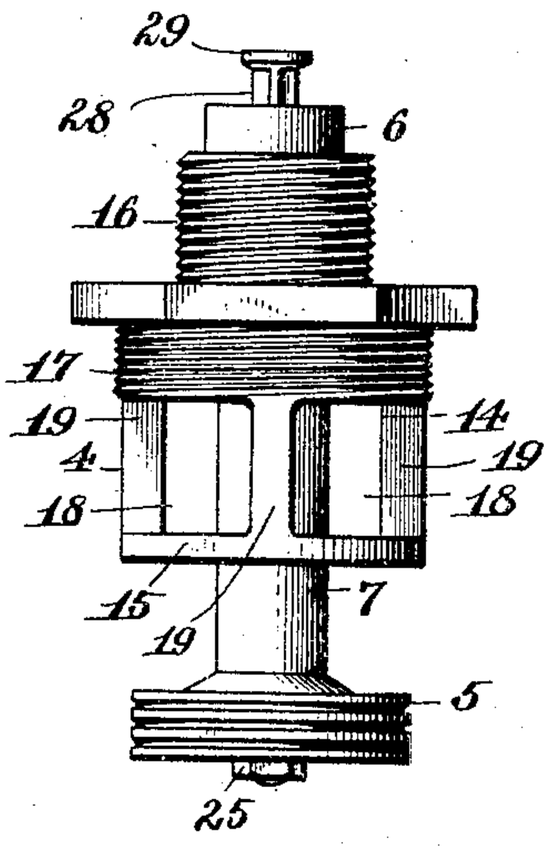


Fig. 5.

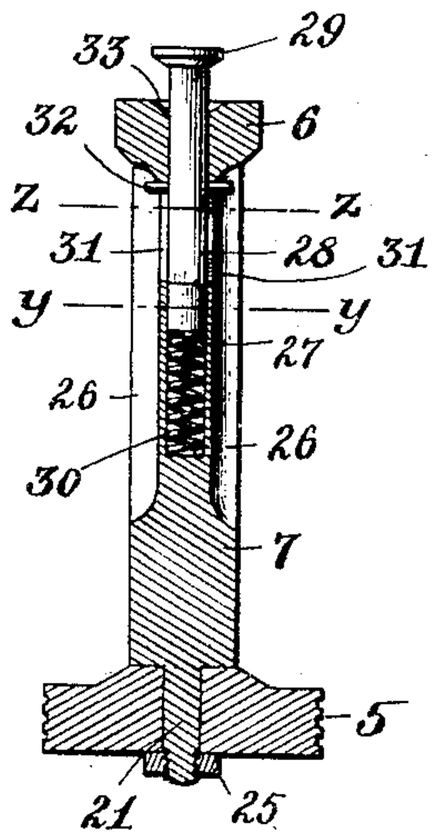


Fig. 6.

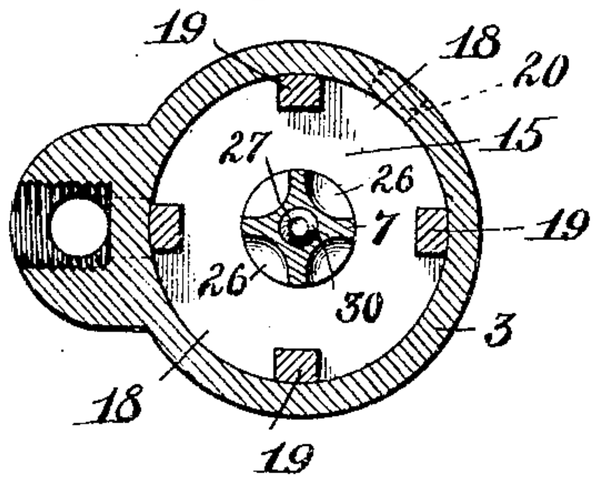


Fig. 7.

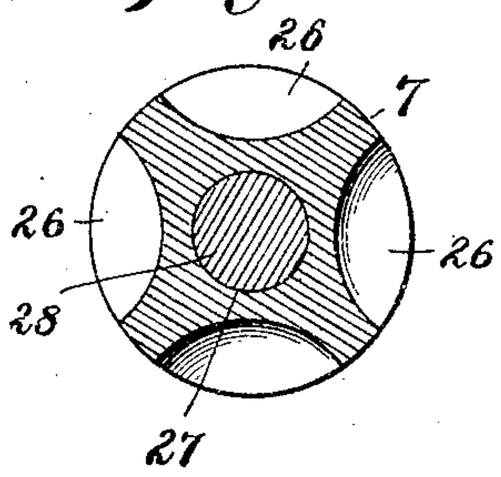


Fig. 8.

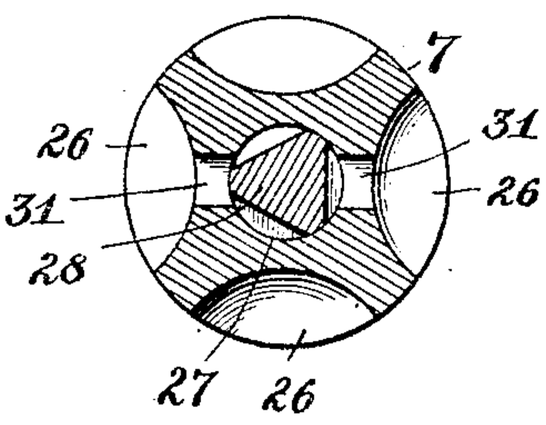
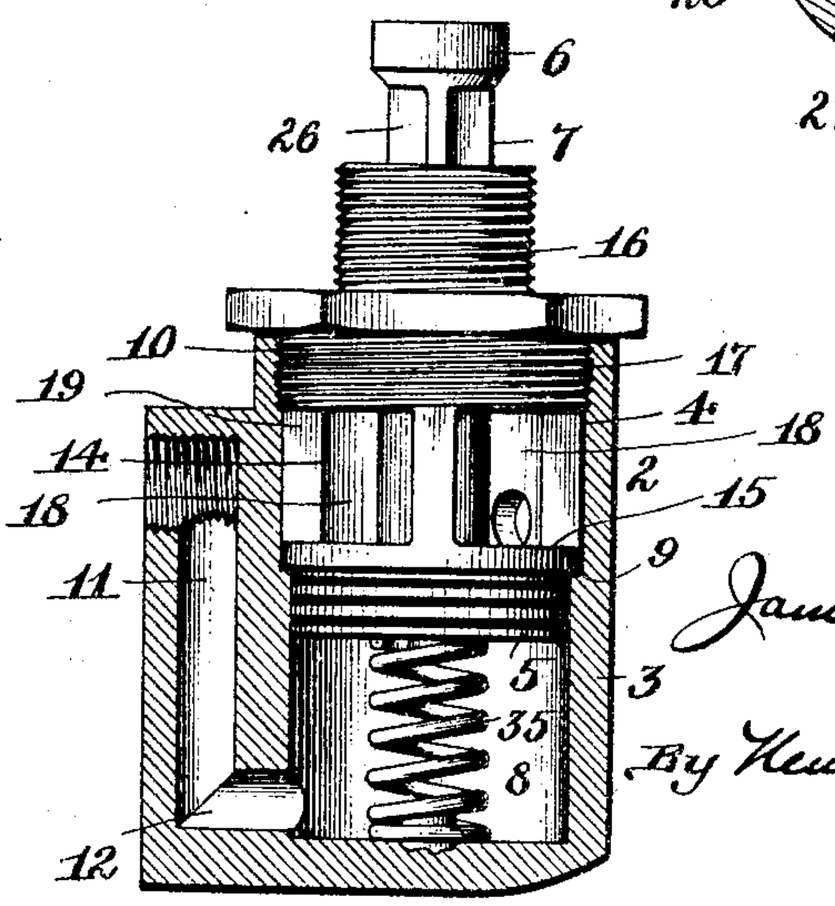


Fig. 9.



Witnesses:

B. Wasow

M. Sewert.

James R. Dolph
Inventor.

By Neuhart & Bucklark
Attorneys

No. 782,901. Patented February 21, 1905.

UNITED STATES PATENT OFFICE.

JAMES R. DOLPH, OF BUFFALO, NEW YORK

DRAIN-COCK FOR STEAM-CYLINDERS.

SPECIFICATION forming part of Letters Patent No. 782,901, dated February 21, 1905.

Application filed December 17, 1903. Serial No. 185,511.

To all whom it may concern:

Be it known that I, JAMES R. DOLPH, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Drain-Cocks for Steam-Cylinders, of which the following is a specification.

This invention relates to improvements in cylinder drain-cocks for locomotives; and it has for its object the production of a drain-cock of simple and durable construction which is efficient in action and automatic under certain conditions, which cannot be effected by the jarring of the locomotive, and which will effectively drain the cylinder of the water of condensation under all conditions and any kind of weather, it being designed to dispense with the rigging, comprising rods, levers, and other connections now in use, and which oftentimes becomes inoperative, due to breakages, twisting of parts, or due to the freezing of the water or moisture at points of connection of the various parts thereof.

Other objects of my invention are to construct my improved drain-cock with a main valve and an auxiliary valve, the latter being automatically operative and the main valve being opened against the steam-pressure in the cylinder by the introduction of air-pressure into the drain-cock, which introduction is controlled by the manipulation of a valve located in the locomotive-cab, which opens or closes an air-supply pipe leading to the drain-cock, and to provide a hollow open-sided inner section or casing which fits into the upper end of the outer section or casing and supports and guides the valve and the piston in their movements, while permitting the water of condensation to pass along the valve-stem, through the open-sided inner casing, and out through an opening in the outer casing.

The invention consists in the peculiar construction, arrangement, and combination of parts hereinafter described, and particularly pointed out in the appended claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a side elevation of a steam-cylinder, showing my improved drain-cocks applied thereto. Fig. 2 is a side elevation of one of my improved drain-cocks. Fig. 3 is a central vertical section of the same. Fig. 4 is a side elevation of the inner casing which forms a valve and plunger support, the valve and plunger being shown as supported therein. Fig. 5 is a central vertical section through the primary valve and the air-controlled plunger secured to the valve-stem. Fig. 6 is a horizontal section taken on line $x\,x$, Fig. 3. Fig. 7 is an enlarged cross-section of the valve-stem, taken on line $y\,y$, Fig. 5. Fig. 8 is a similar view taken on line $z\,z$, Fig. 5. Fig. 9 is a central vertical section of a drain-cock, showing my invention in modified form.

Referring to the drawings in detail, like numerals of reference refer to like parts in the several figures.

The reference-numeral 1 designates the locomotive steam-cylinder, to opposite ends of which my improved drain-cocks 2 are applied.

Each drain-cock consists of a cylindrical outer casing or section 3, closed at its lower end, an open-sided inner casing 4, which is screwed into the upper end of the outer casing, and a piston 5, connected with a valve 6 by means of the valve-stem 7, which passes centrally through said inner section and is guided thereby in its movements, the said valve for convenience of reference being termed the "primary" valve.

The bore or chamber 8 of the outer casing 3 has its upper half slightly enlarged to form a shoulder 9 and the upper end thereof is threaded, as at 10. The said casing is provided with a hollow lateral extension 11, which serves as an air-passage, and the lower end of said hollow extension is connected with the lower end of the chamber 8 by a passage 12. Into the upper end of said hollow extension the air-supply pipe 13 is threaded, and from this point the said pipe is led to the cab of the locomotive, where the air passing therethrough can be controlled by any suitable valve. By means of this construction the air-pipes are elevated above the bottom of the drain-cocks, and the liability of their coming in contact with obstructions in the road is entirely obviated.

The inner casing 4 comprises a cylindrical chamber 14, having its ends closed, as at 15, and provided with a cylindrical exteriorly-

threaded extension 16, which is adapted to enter an internally-threaded opening formed in the bottom of the steam-cylinder. The said inner casing is exteriorly threaded, as at 17, and is adapted to be screwed into the upper internally-threaded end of the outer casing, so that the lower end thereof bears against the shoulder 9, formed in said outer section. The said inner casing is also provided with a hexagonal collar by means of which it can be conveniently connected to or disconnected from the outer casing, and the cylindrical side wall thereof is provided with openings 18, separated by narrow bars 19, so that any one of the said openings may register with an opening 20, formed in the outer casing. By providing a number of openings in the inner casing the wearing of the parts will not affect the efficiency of the device, since the inner casing can be screwed into the outer casing until the lower end thereof is brought tightly against the shoulder 9, and assurance is always had that one of the openings 18 will register with the opening 20 in the outer casing.

The primary valve 6 is advisedly formed integrally with the valve-stem at the upper end thereof, and to the threaded lower reduced end 21 of the said valve-stem the piston 5 is screwed. The valve-stem is guided in an opening 22, formed in the bottom of the inner casing and having its lower edge chamfered, as at 23, and in a bore 24, formed in the cylindrical extension 16. The upper end of said bore is flared, as at 25, to form a valve-seat for the valve 6. A jam-nut 25^a is screwed onto the lower projecting end of the valve-stem and serves to prevent accidental unscrewing of the piston from the latter. The piston is provided with a central elevation corresponding with and being adapted to fit into the chamfered or flaring portion of the opening 22 when the piston is elevated, thereby preventing leakage of water through said opening when the primary valve 6 is open.

The upper portion of the valve-stem is grooved vertically, as at 26, to allow the water of condensation to pass from the steam-cylinder through the bore 24 in the cylindrical extension 16 and into the chamber 14, from which it is discharged through the opening 20 in the outer casing.

The primary valve and its valve-stem are provided with a central longitudinal bore 27, in which the valve-stem 28 of an auxiliary valve 29 is held, and between the lower ends of said bore and said valve-stem a spiral spring 30 is interposed, which serves to keep said auxiliary valve elevated when the locomotive is at a standstill. The valve-stem 7 of the primary valve is provided with opposite openings 31, and passing through and projecting from opposite sides of the stem of the auxiliary valve into said openings is a pin 32, which limits the upward movement of the latter, while permitting the same to be lowered by the steam-pressure in the steam-cylinder.

The upper end of the longitudinal bore 27 in the primary valve and its stem is also flared to form a valve-seat 33 for the auxiliary valve 29, the stem of the latter being triangular in cross-section to permit the water of condensation to pass through the bore in the primary valve and its stem, thence through the opposite openings in the latter into the grooves thereof, from whence it passes into the chamber 14 and out through the opening 20 in the outer casing.

In operation the parts appear as shown in the drawings when the engine is at a standstill. The primary valve is then closed and the auxiliary valve opened by the spiral spring beneath the stem thereof. When the engine is first started and the cold cylinder condenses the steam, the primary valve is opened against the steam-pressure by admitting air into the lower end of the outer casing, which then acts against the piston and elevates the same and necessarily causes the primary valve to open by reason of the valve-stem 7 connecting both. At such times and at all times when steam is admitted into the steam-cylinder the auxiliary valve is closed.

In the modification shown in Fig. 9 I have dispensed with the auxiliary valve and have interposed a spiral spring 35 between the piston 5 and the bottom of the outer casing. The said spring serves to elevate the valve 6 from its seat when the engine is at a standstill or when the steam-pressure in the steam-cylinder is less than the pressure of the spring against the piston, and at such times the water of condensation can be automatically drained from the cylinder.

By constructing a valve having a spring to hold the same normally open when the locomotive is at a standstill and by providing the valve-casing with an air-inlet, through which air may be introduced to open the valve at will and against the steam-pressure in the cylinder, the latter may be relieved of the water of condensation at any time in travel and when at a standstill the water of condensation passes out of the cylinder by reason of the spring 35 acting to elevate the piston and connected valve.

When starting the engine, air is admitted to the outer casing and the piston elevated thereby, which causes the valve to rise against the steam-pressure, the valve being kept open until dry steam is issuing from the drain-cock.

By providing a shoulder in the outer casing the chances of leakage of the water of condensation from the inner casing are reduced to a minimum.

Having thus described my invention, what I claim is—

1. In a drain-cock for steam-cylinders, the combination of a casing having a water-inlet,

a water-outlet, and an air-passage having its outer end terminating about midway between the ends of the casing and its inner end terminating at the bottom of said casing, a piston in said casing, and a valve closing the said water-inlet and being connected to actuate with said piston.

2. In a drain-cock for steam-cylinders, the combination of an outer casing having a shoulder on its inner periphery between its ends, a water-inlet above said shoulder and an air-passage below said shoulder, an inner casing entering said outer casing and bearing against said shoulder with the marginal portions of its bottom, said inner casing having a water-inlet and an opening in its side registering with the water-outlet in the outer casing, a valve closing said water-inlet, a piston in the outer casing beneath the inner casing, and a valve-stem connecting the piston with said valve.

3. In a drain-cock for steam-cylinders, the combination of an outer casing having an air-inlet at its lower end and a water-outlet between its ends, an inner casing having a bottom wall and a top wall provided with a water-inlet and being connected by narrow bars forming a series of side openings, a valve closing said water-inlet, a piston located in the outer casing beneath the inner casing adapted to be elevated by the air admitted through the air-inlet, a valve-stem passing through the inner casing and connecting the piston with said valve, and secondary means for opening the said water-inlet without the introduction of air into the outer casing.

4. In a drain-cock for steam-cylinders, the combination of a casing having an air-inlet, a water-inlet and a water-outlet, a valve guided for movement and adapted to close said water-inlet, a piston having connection with said valve, and a spring serving to hold said piston at one end of its movement to permit the water of condensation to pass out of the steam-cylinder, said air-inlet being arranged to lead compressed air to said piston for actuating the same against the steam-pressure in the cylinder.

5. In a drain-cock for steam-cylinders, the combination of a casing having an air-inlet, a water-inlet and a water-outlet, a piston located in the lower end of the casing, a primary valve closing the water-inlet, a valve-stem connecting the primary valve with said piston and having a central longitudinal bore formed therein, a water-passage in said valve-stem connecting the bore thereof with the interior of the casing, a secondary valve closing the upper end of said bore and having a stem entering the latter, a spring interposed between the lower ends of said bore and stem, and means for limiting the outward movement of said secondary valve.

6. In a drain-cock for steam-cylinders, the combination of a casing having an air-inlet, a water-inlet, and a water-outlet, a piston located in the lower end of said casing, a primary valve closing the water-inlet and having a central bore therein, a valve-stem connecting said valve with the piston and having a central longitudinal bore forming a continuation of the bore in said valve, said stem having also opposite water-passages formed therein which connect said longitudinal bore with the interior of the casing, a spring-actuated secondary valve closing the bore in the primary valve and having a valve-stem extending into the bore of said primary-valve stem, and a pin passing through said secondary-valve stem and projecting from opposite sides thereof into the opposite water-passages in the main-valve stem, said pin serving to limit the outward movement of the secondary valve.

7. In a drain-cock for steam-cylinders, the combination of an outer casing having an air-inlet at its lower end and a water-outlet between its ends, an inner casing comprising a bottom wall having an opening therein chamfered at its lower edge, a top wall provided with a water-inlet, and sides provided with an opening registering with the water-outlet in the outer casing, a valve closing said water-inlet, a piston located in the outer casing beneath the inner casing and having a central elevation corresponding with the chamfered lower edge of the opening in the bottom of the inner casing, and a valve-stem passing through the inner casing and connecting the piston with said valve.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses, on this 24th day of September, 1903.

JAMES R. DOLPH.

Witnesses:

EMIL NEUHART,

BERT MASON.