T. J. PARADINE.

Safety-Valves and Cocks for Steam-Cylinders.

No. 203,493. Patented May 7, 1878.

Fig: 1.

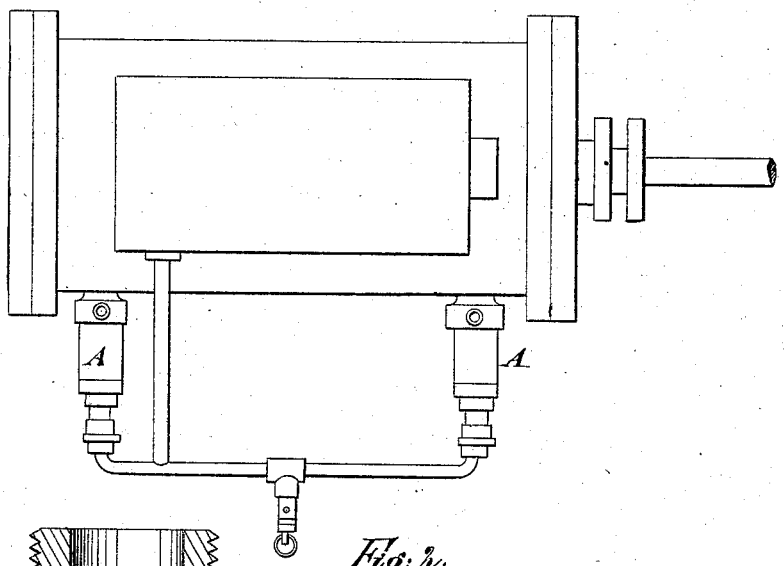


Fig: 2.

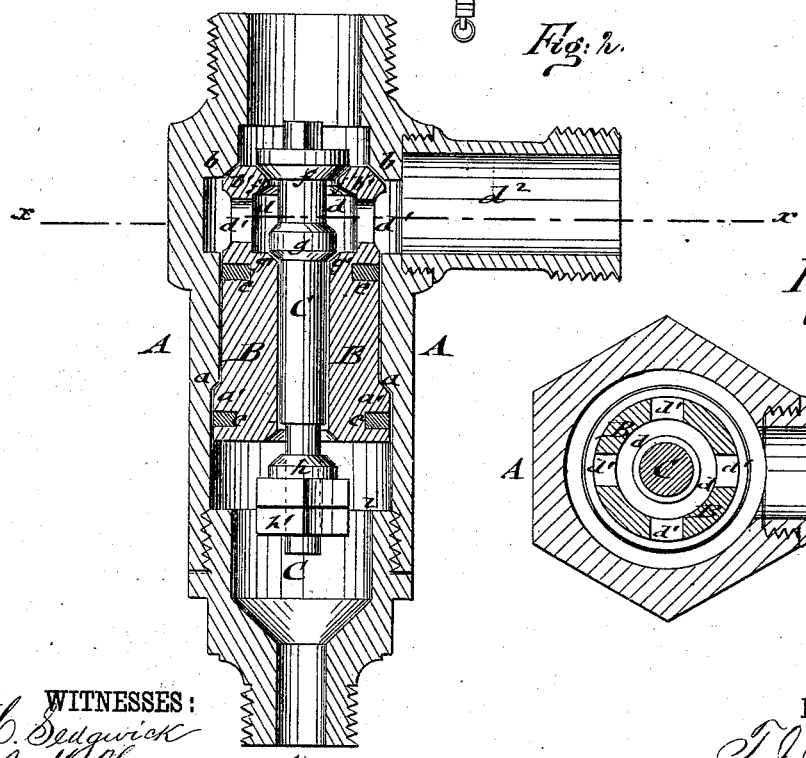
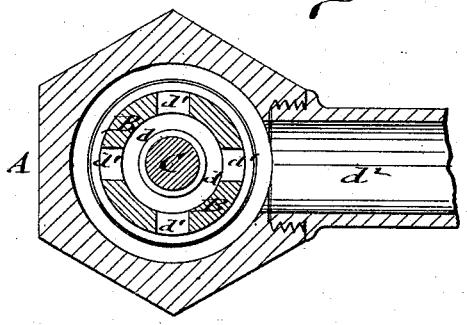


Fig: 3.



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THOMAS J. PARADINE, OF ERIE, PENNSYLVANIA.

IMPROVEMENT IN SAFETY VALVES AND COCKS FOR STEAM-CYLINDERS.

Specification forming part of Letters Patent No. **203,493**, dated May 7, 1878; application filed February 18, 1878.

To all whom it may concern:

Be it known that I, THOMAS J. PARADINE, of the city and county of Erie, and State of Pennsylvania, have invented a new and Improved Safety Valve and Cock for Steam-Cylinders, of which the following is a specification:

In the accompanying drawings, Figure 1 represents a side elevation of a steam-cylinder with my improved safety valves and cocks arranged thereon; and Figs. 2 and 3 are, respectively, a vertical central section and a horizontal section on line *x x*, Fig. 2, of the combined safety-valve and exit-cock.

Similar letters of reference indicate corresponding parts.

This invention is designed to furnish for steam-cylinders of locomotives and other engines an improved safety valve and cock combined, by which the water of condensation may be let out of the cylinder in perfect manner without the least waste of steam, and by which the bursting of cylinders, owing to the accumulation of condensed water in the same, may be fully obviated.

The device has the further advantage that it is considerably cheaper than the present cylinder-cock rigging, and not as liable to wear out as the same. The device also opens automatically when the engine is not running, so as to drain the cylinder and pipes in perfect manner.

The invention consists of a safety-valve and exit-cock arranged in a casing connected to the cylinder, and by a pipe to the steam-chest. The safety-valve bears against seats of the casing, and is only opened when the pressure of the water of condensation in the cylinder overcomes the steam-pressure on the bottom of the valve. The valve guides centrally a spindle or cock, with three valves bearing on corresponding seats at the interior of the valve, two at the upper part serving to close the exit-openings, and one at the lower part to bear against the lower seat of the valve when the spindle is raised for the exit of the water during the exhausting of the cylinder.

Referring to the drawing, A represents the cylindrical casing; B, the safety-valve, and C the cock or spindle, which is guided in a central perforation of the valve B. The casing A is screwed by its threaded and larger upper end into the steam-cylinder of a locomotive or other engine, while the smaller lower end is connected to the steam-chest by a small pipe, as shown in Fig. 1.

The inside of case A is provided with a bore having three different diameters. At the junction of the lower wider bore and the middle bore is a bevel-seat, *a*, and at the junction of the middle and the uppermost smaller bore is a second seat, *b*, against which corresponding conical portions *a'* and *b'* of the valve B bear, so as to form steam-tight joints therewith. Below the upper seat *b* is arranged, in the upper part of the safety-valve, a hollow chamber, *d*, with outlet-openings d^1 for the water, the outlets connecting with an exit-spout, d^2, at right angles to the case A.

The safety valve or plug B is provided at the middle and lower part with annular grooves *e*, that are turned into the same and filled with cotton wicking, so as to prevent grit from working into and around the plug.

The central perforation of the safety-valve B forms a guide for the cylinder cock or spindle C. At the upper end of the spindle next to cylinder is an enlarged beveled portion, *f*, and below it a second smaller bevel, *g*, which form steam-tight joints with the corresponding interior seats *f'* and *g'* of the safety-valve.

When the valves of the cock are seated on the safety-valve the steam is prevented from passing from cylinder to the outside. At the bottom of valve B is a seat, and at the lower end of cock C a screw-thread with adjustable valve *h* and check-nut *h'*, by which the lift of the cock may be regulated and the steam prevented from passing from the lower part of the case to the cylinder.

The safety-valve B opens downward and the cylinder-cock upward, or into the cylinder, the former when the pressure in the cylinder becomes greater than the steam-pressure on the lower part of the valve, while the cock opens when there is less pressure in cylinder than steam-pressure.

The opening of the cock takes place whenever the engine is exhausting, and admits thereby the water of condensation to pass through the upper chambered part of the valve and the exit-spout to the outside, relieving

thus the cylinder of the high pressure caused by the compression of water between the piston and cylinder-head after the exhaust-port is closed.

In case there is more water in the cylinder than the clearance space will contain, the valve will be forced open against the steam, pressing on the bottom surface, as otherwise the cylinder-head or other parts would break or get injured. The opening of the safety-valve allows the water to pass out through the spout.

When the steam is shut off the valve will drop down on a shoulder, *i*, at the lower part of the case by its own weight, and by the action of the piston, and thereby the drain-cock of the pipe that connects case A and steam-chest opened by its spring, so as to prevent freezing in winter. This drain-cock is held closed by the pressure of the steam when the engine is working.

In warm weather the drain-cock may be closed permanently by a tightening-nut.

The combined safety valve and cock forms thus an automatically-working safety device for steam-cylinders, by which a superior drainage, and consequently less damage to the cylinder-heads or piston-rods, is produced.

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

1. The safety-plug B, having the circumferential grooves *e e* filled with cotton wicking, as and for the purpose described.

2. The combination of case A, plug B, and spindle C, the plug having projections *a' b'* that fit against shoulders *a b* of the case A, and seats that receive the valves *f g h*, on the spindle, as and for the purpose specified.

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Witnesses:
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