F. B. SCOVELL.
Safety-Valve.

No. 221,194. Patented Nov. 4, 1879.

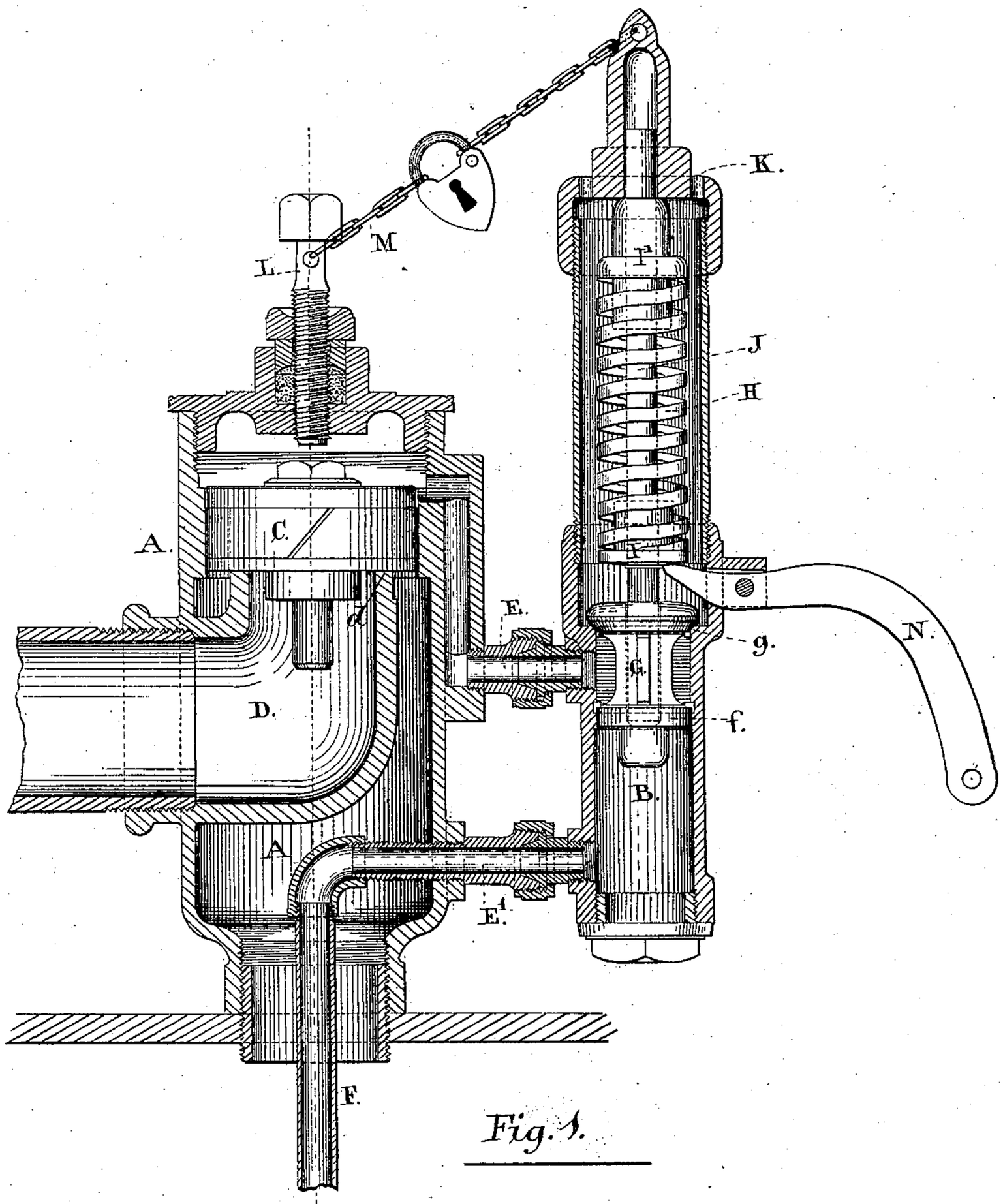

Fig. 1.

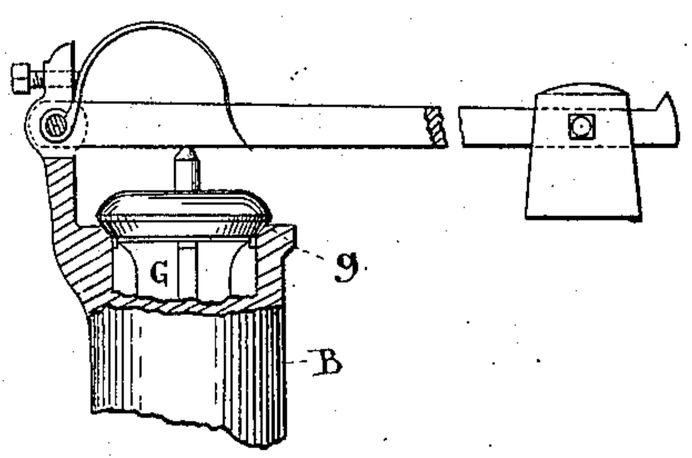

Fig. 2.

Witnesses:
Louis W. Stuart
Fordon Aird

Inventor:
Frank B. Scovell
by Ridout Aird & Co.
Atty's

UNITED STATES PATENT OFFICE.

FRANK B. SCOVELL, OF WATERFORD, ONTARIO, CANADA.

IMPROVEMENT IN SAFETY-VALVES.

Specification forming part of Letters Patent No. **221,194**, dated November 4, 1879; application filed May 5, 1879.

To all whom it may concern:

Be it known that I, FRANK BENNER SCOVELL, of the town of Waterford, in the county of Norfolk, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Safety-Valves, of which the following is a specification.

The object of the invention is to provide a sensitive safety-valve combining the advantages of quick relief, durability, and compactness, and may be described in brief as follows:

Two cylindrical valve-chambers, one of which is supplied with a piston-valve seated on an elbow-pipe, are so arranged that the steam in the chamber cannot escape to the outside atmosphere until the valve is raised from off its seat. The other cylinder is also provided with a peculiarly-made valve, and is supplied with steam from the boiler by a pipe passing, preferably, through the lower part of the main chamber, thence into the boiler. This pipe should be conducted to some part of the boiler remote from the opening into the main chamber. The duty of this pipe is to supply the auxiliary valve with the actual boiler-pressure and not with the pressure near the opening of the main chamber, which may fluctuate with the opening and closing of the piston-valve.

The valve referred to in the auxiliary-valve chamber is loaded by a spring or weight, which can be suitably adjusted to carry any desired pressure in the boiler. When this pressure is exceeded the auxiliary valve rises from its seat, which action opens communication between the atmosphere and the main chamber above the piston-valve.

As the steam cannot enter or leak through the auxiliary valves to the top of the piston-valve as rapidly as it can escape into the atmosphere through the seat of the auxiliary valve, the consequence is that the opening of the auxiliary valve causes the pressure on the piston-valve to diminish, and the steam-pressure beneath the piston-valve forces the valve away from its seat and allows the steam to escape from the boiler into the atmosphere, and relieves the boiler. As soon as the pressure of the boiler is slightly diminished the spring or weight again forces the auxiliary valve to its seat, thereby closing the escape of steam to the atmosphere and causing it to again accumulate on top of the piston-valve, forcing it back to its seat on the top of the elbow-seat within the main chamber. The top of the piston-valve has more surface exposed to the pressure of the boiler than the surface beneath, as that portion of the lower surface which covers the elbow-pipe is mostly exposed only to the atmosphere. When the valves are closed the pressure in both chambers is equal, and the same pressure as that of the boiler, but as soon as the auxiliary valve opens the pressure will diminish above the piston-valve and the piston portion of the auxiliary valve, as will be easily understood by reference to the drawings.

Figure 1 is a sectional elevation of my improved safety-valve. Fig. 2 is a detail, showing weight and lever applied to auxiliary valve.

In the drawings, A is the main safety-valve chamber, and B the auxiliary-valve chamber. The piston-valve C fits the valve-chamber A, and is seated on the elbow escape-pipe D. The chamber B is connected to the chamber A by a passage through E″ leading from the bottom of the chamber B to the steam-pipe F, which enters the boiler, as indicated. The passage through E enters the chamber B between the seat *g* and the piston end *f* of the auxiliary valve G, and leads from there to the main chamber A, above the piston-valve C.

The spring H rests on the collar I, secured to the spindle J, which is supported by the valve G.

The perforated cap K allows the steam to escape from the auxiliary chamber B into the atmosphere. It is screwed on the chamber B and bears against the loose collar I′. The resistance of the spring H can be increased or decreased at will by screwing or unscrewing the cap K, as will be understood by reference to the drawings.

The set-screw L passes, as indicated, through the top cap of the chamber A, and is used for regulating the lift of the piston-valve C.

As it is often desirable that a valve should not be altered or tampered with, a chain, M, is used to connect the cap K and set-screw L with a lock or seal, thereby preventing the set-screw or spring from being changed by those not authorized to do so.

It is not necessary to enter into a further explanation than already presented. There are, however, certain points which I wish to draw attention to. It will be noticed that the chamber A is bored out where the piston-valve C fits, but is cored larger than the diameter of the finished part below the seat on the escape elbow-pipe D. The same provision is made in the chamber B below that portion which is bored or finished, and, nearly opposite or slightly below the top of the pistons, the surface of the walls of each chamber is recessed or enlarged for the purpose of allowing both of the pistons or valves to rise in comparatively open space, thereby preventing any binding that might otherwise occur; and, with a view of further increasing safety, two or even more of these auxiliary valves can be connected to the main chamber and set at the same or different pressures.

The valve-seat *g* is formed above the passage E, and is steam-tight. The piston-shaped part *f* of the auxiliary valve is a good fit in chamber B; but in some instances I slightly enlarge the wall of the chamber B at the point which surrounds the piston-shaped part *f* to increase the supply of steam to the chamber above the main piston-valve; but the diameter of the piston-shaped part *f* should always be kept as near the inside diameter of the seat *g* of auxiliary valve as possible and work freely.

The steam, as before stated, leaks through both valves C and G to form a counter pressure on the top or upper part of piston-valve C.

In operation the steam enters the chamber A, leaking around the piston-valve C into that portion of the chamber above the piston-valve. The steam also enters through the pipe F into the chamber B, and, leaking through the valve G at *f*, circulates through the two chambers, but cannot escape to the atmosphere, as the passages are effectually closed by the valve-seat at *d* and *g*.

As soon as the pressure in the boiler exceeds the resistance of the spring H the valve G is raised from its seat, thereby forming a passage or communication from the chamber A above the piston-valve C, through the passage E and auxiliary-valve seat *g*, to the atmosphere, escaping through the perforated cap K. The steam having thus escaped from the chamber above the piston-valve, the force below the piston-valve C raises it off its seat, when the steam from the boiler escapes through the elbow-pipe D into the atmosphere, and the boiler is relieved.

Among the advantages of my invention I may mention that although the auxiliary valve G may not open much more than a common safety-valve, the piston-valve C will open to its full extent. At the same time I may say that the valve G will open more than an ordinary valve, as the pressure on the bottom of *f* is the same as the boiler-pressure whether opened or closed. As it is advisable to occasionally open a safety-valve by hand, to ascertain whether it is in working order, I provide a trip-lever, N, connected to and entering the chamber B, as indicated, so that the valve C may be raised but not held down.

I do not confine myself to any particular material, shape, or size of my improved valve, nor is it necessary that the auxiliary valve G should be placed in the exact position shown.

In some instances it may be necessary to place the auxiliary valve G some distance away from the main chamber, and the auxiliary valve can be separately connected to the boiler; but the opening from the auxiliary-valve chamber to the main-valve chamber must be made at some point between the seat *g* of the auxiliary valve and the piston-shaped portion *f* of it, and the opening in the main chamber must extend to a point above the piston-valve C. For instance, the main chamber A may be placed on the dome of a locomotive and the auxiliary-valve chamber B located in the cab, or some other point on the boiler, and the two chambers could be connected by means of a pipe or passage-way, as described.

Although I have described this safety-valve as being connected with a steam-boiler, it will be readily discerned by any practical person that it is also applicable for water, air, gas, or, in fact, any liquid or gaseous pressure.

It will be noticed that my auxiliary valve is comparatively frictionless, as no attempt is made to make the piston-shaped portion of it steam-tight. Moreover, its peculiar relative arrangement with the main valve is such that, unlike other safety-valves with which I am familiar, no complicated levers or other attachments are required to effect the desired end, as the simple action of the auxiliary valve in rising from its seat causes the main valve to lift the full height permitted.

What I claim as my invention is—

1. In a safety-valve, an auxiliary-valve chamber, B, having a perforated cap, K, and provided with a passage, E, leading from a point between the steam-tight valve-seat *g*, and snugly-fitting piston end *f* of the auxiliary valve G to the chamber A above the main valve C, all constructed and arranged for operation substantially as and for the purpose specified.

2. In a safety-valve, an auxiliary valve, G, having a steam-tight seat, *g*, and snugly-fitting piston end *f* contained within the chamber B, recessed, as described, in combination with the passages E and E″ arranged in connection with the chamber A, substantially as and for the purpose specified.

3. In a safety-valve, the elbow-shaped escape-pipe D, entering the chamber A, and forming a seat for the main piston-valve C, substantially as and for the purpose specified.

4. In a safety-valve, the pipe F, carried through a hole connecting the boiler with the chamber A, in combination with the passage E, and valve G, and chamber B, constructed as shown, as and for the purpose specified.

5. In a safety-valve, a chamber, A, recessed as described, and provided with a piston-valve,

C, in combination with the elbow-shaped escape-pipe D, substantially as and for the purpose specified.

6. In a safety-valve, a chain, M, connected to the regulating-cap K, screwed onto the auxiliary-valve chamber B, in combination with the regulating set-screw L, passing through the top cap of the chamber A, substantially as and for the purpose specified.

FRANK B. SCOVELL.

Witnesses:
LOUIS N. KISH,
DONALD C. RIDOUT.