

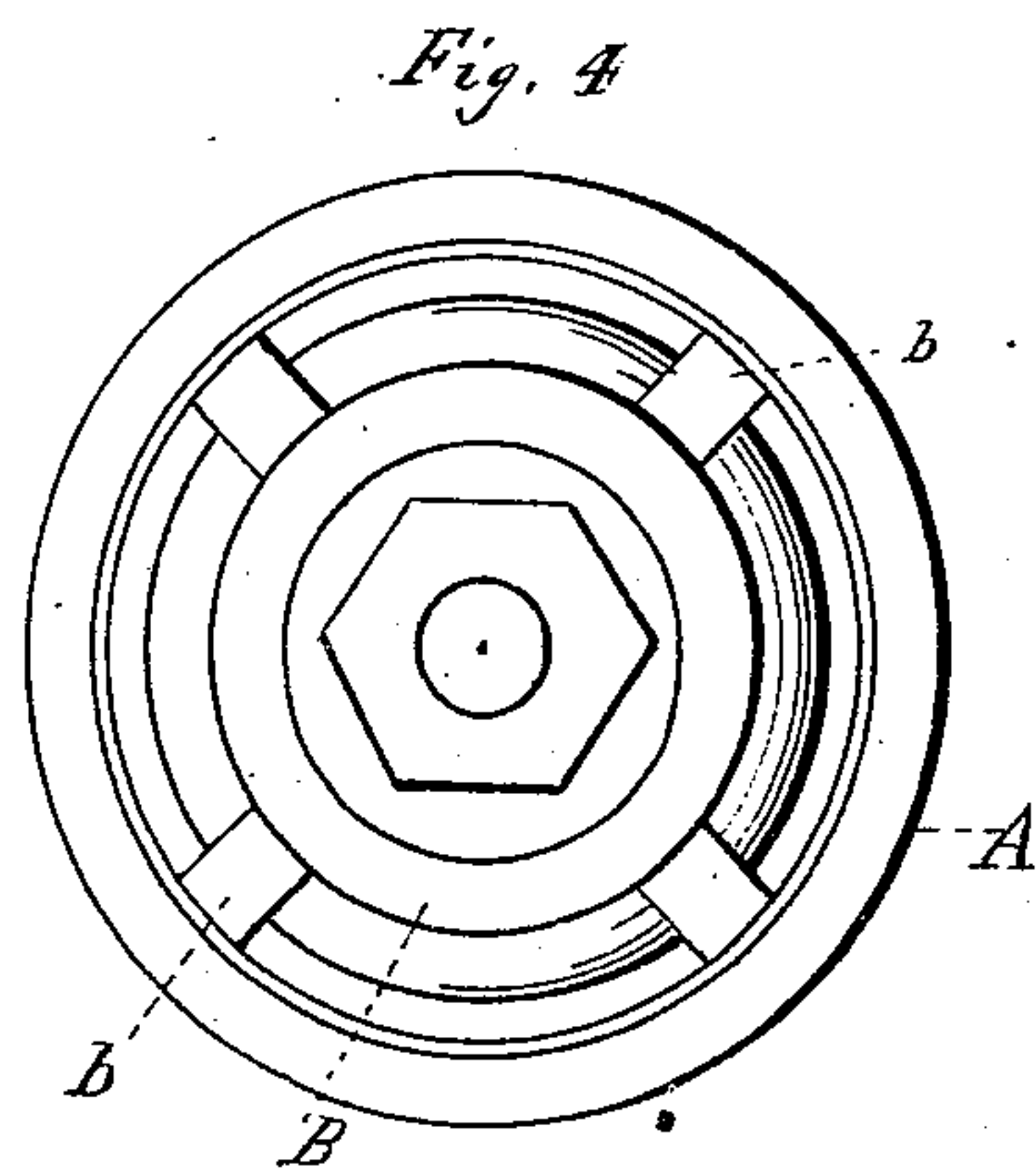
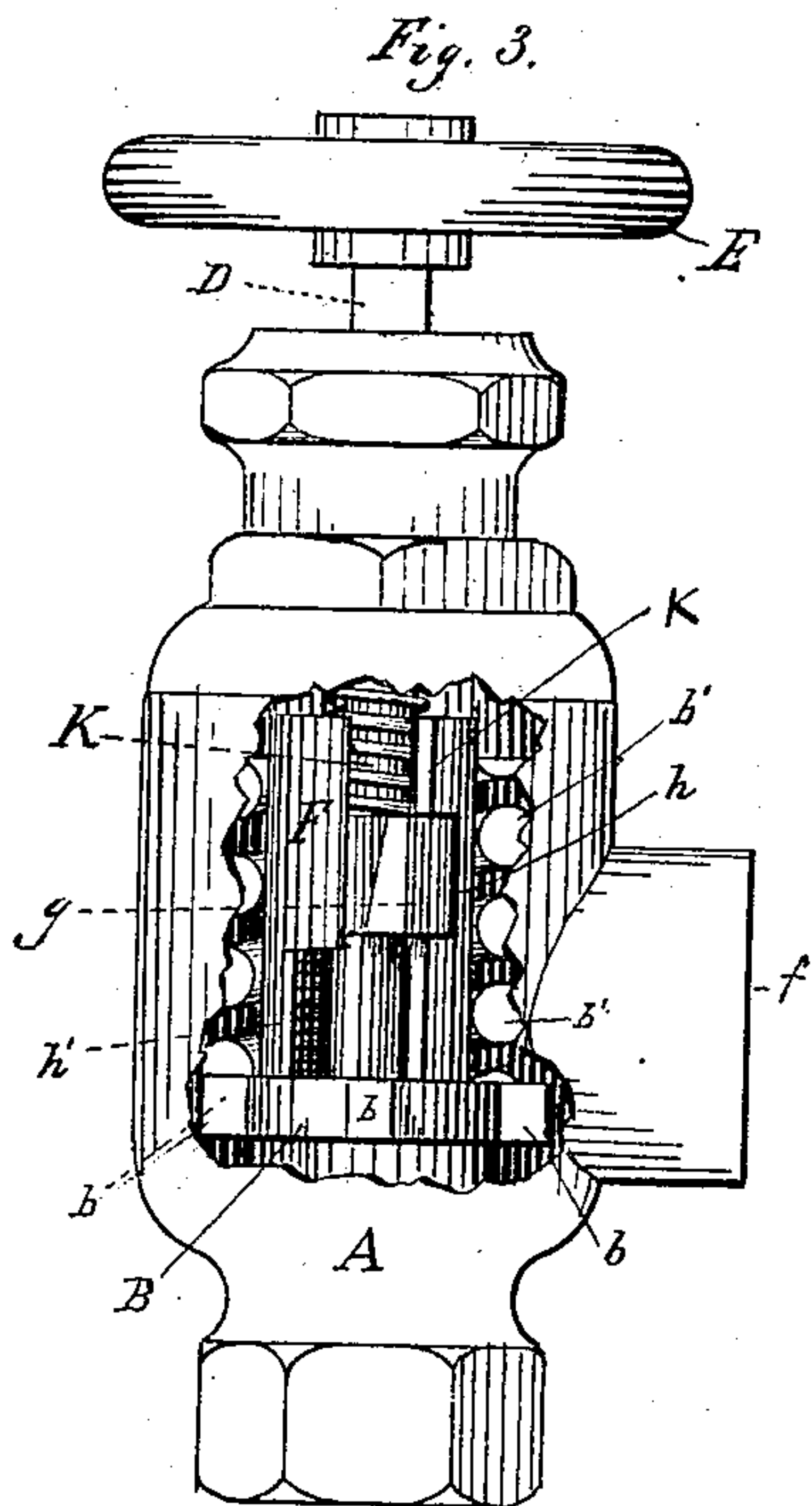
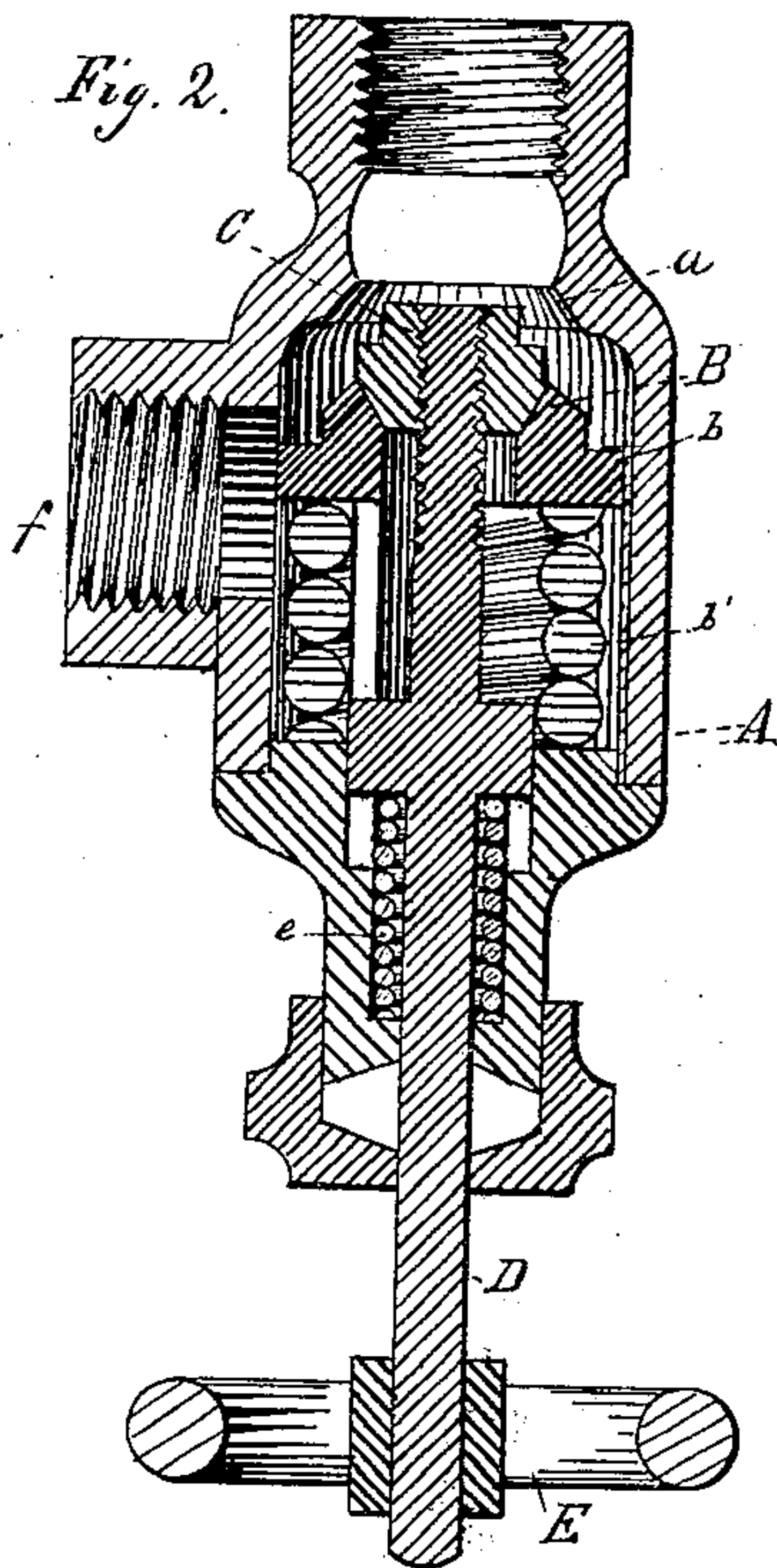
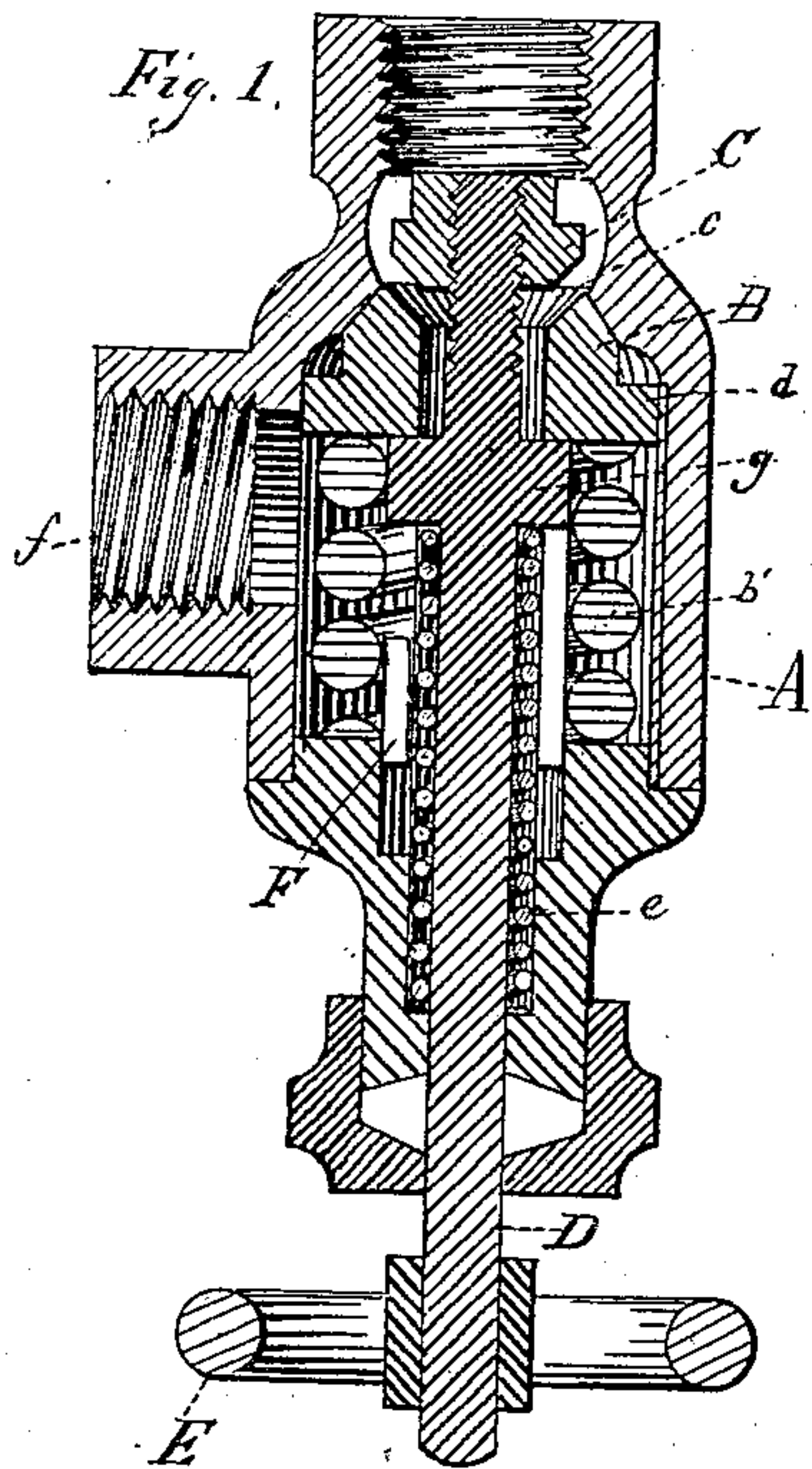
(No Model.)

J. AITCHISON.

RELIEF VALVE FOR STEAM ENGINES.

No. 246,858.

Patented Sept. 13, 1881.



WITNESSES

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UNITED STATES PATENT OFFICE.

JAMES AITCHISON, OF CLEVELAND, OHIO.

RELIEF-VALVE FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 246,858, dated September 13, 1881.

Application filed April 16, 1881. (No model.)

To all whom it may concern:

Be it known that I, JAMES AITCHISON, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Relief-Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to relief-valves for steam-cylinders, and is particularly applicable to cylinders of locomotives and that class of steam-engines requiring to be reversed in the travel of their piston, and also other engines and steam-pumps.

My invention consists in certain features of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the drawings, Figure 1 is a longitudinal section of my valve, showing the relief-valve open and the safety-valve closed. Fig. 2 is a longitudinal section of the same, showing the relief-valve closed and the safety-valve open. Fig. 3 is a view, with part of the case removed, showing the manner of locking the relief-valve, either open or closed. Fig. 4 is an end view of the safety and relief valves.

A is the case, which is provided with a valve-seat, *a*, at one end—viz., near its point of connection with the cylinder. On the seat *a* rests the safety-valve B, which is held tightly against said seat by means of a heavy coil-spring, *b'*, the tension of the spring *b'* being always much greater than the pressure of the steam required to operate the piston. This valve B is provided at its outer periphery with guiding-lugs *b*, which, while they serve to guide the said valve to and from its seat, will allow the escape of the surplus steam or water, as the case may be. The valve B and its stem F are made hollow and provided at the forward end with a valve-seat, *c*, on which the relief-valve C rests when in a closed position.

D is the valve-stem, to which the relief-valve C is adjustably attached by means of a screw-thread. This stem D is provided with an annular collar, *d*, which serves as a bear-

ing for one end of a spiral spring, *e*, which, by pressing against said collar, forces the relief-valve C open, and keeps it in that position until the steam is again admitted to the cylinder on that side of the piston, when, the pressure being greater than the tension of the spring *e*, the valve is forced against its seat or closed until the pressure is again removed by the opening of the exhaust-port hole. The spring *e* will then act to open the valve C and allow any water that may be in the cylinder to escape through the opening in the safety-valve B, and thence through the exit *f* in the case A.

E is a small wheel or handle, by means of which the relief-valve C may be operated from the outside of the case A.

The manner of locking the relief-valve C in a closed or open position is shown in Fig. 4 of the drawings. The hollow valve-stem F is provided with one, or there may be two, slots, *k*, which are cut lengthwise of said stem, and through which the lugs *g* on the collar *d* slide freely. These slots are in turn provided with recesses *h* and *h'*, which are cut at right angles to the slots *k*, and into which the lugs *g* fit. When it is desired to lock the relief-valve C, open or closed, all that is necessary is to bring the lugs *g* opposite the slot *h* or *h'*, as the case may be, by means of the handle E, and then by giving said handle a turn in the direction of said slots the lugs *g* are caused to slide into them, and the valve is thus held or locked in the desired position.

The operation of my valve is as follows: When steam is admitted to the cylinder to operate the piston, the pressure of the steam being greater than the tension of the spring *e*, the relief-valve C is forced against its seat and held there until the pressure is relieved, when the spring *e* will force it open and allow the water to escape, when the piston on its return travels toward that end of the cylinder.

This relief-valve is sufficient in all ordinary cases; but, if through any carelessness of the engineer or from other cause, much water should get in the cylinder, the piston on its return would force the relief-valve C against its seat, and this extra pressure, being now brought to bear directly on the safety-valve B, forces it open and allows the surplus water to

escape, thus preventing any accident from happening by having the cylinder-head forced from the cylinder or breaking the connecting-rod or crank.

5 Also, in reversing steam-engines it is very common to throw upon one end of the cylinder such force or strain as to blow off the head; but by using my valve this danger is obviated, as the spring *b'* of the safety-valve
10 may be made of such tension as to allow the surplus steam to blow off.

What I claim is—

1. The combination, with a relief-valve and a spring tending to force it away from its seat,
15 of a safety-valve and a spring tending to retain it against its seat, substantially as set forth.

2. The combination, with a safety-valve provided with a relief-valve seat and a spring for

holding the safety-valve against its seat, of a relief-valve adapted to fit the seat on the safety-valve and a spring operating to force the relief-valve away from its seat, substantially
20 as set forth.

3. A steam-cylinder valve, the same being provided with a relief-valve and an auxiliary
25 safety-valve, said relief-valve being adapted to be locked either in an open or closed position, substantially as and for the purpose shown and described.

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

JAMES AITCHISON.

Witnesses:

JNO. CROWELL, Jr.,
ALBERT E. LYNCH.