(No Model.)

H. C. WILDER.

SAFETY VALVE.

No. 306,568. Patented Oct. 14, 1884.

Fig. 1.

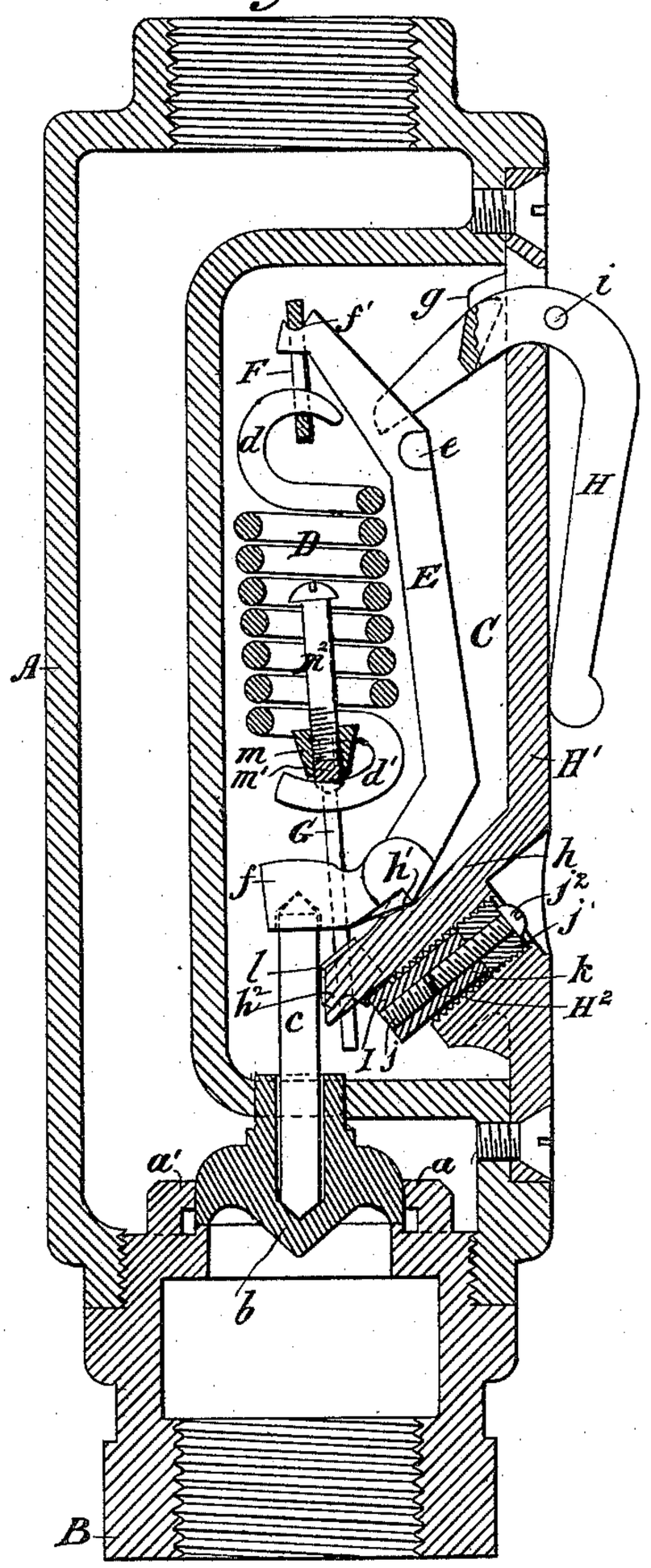


Fig. 2.

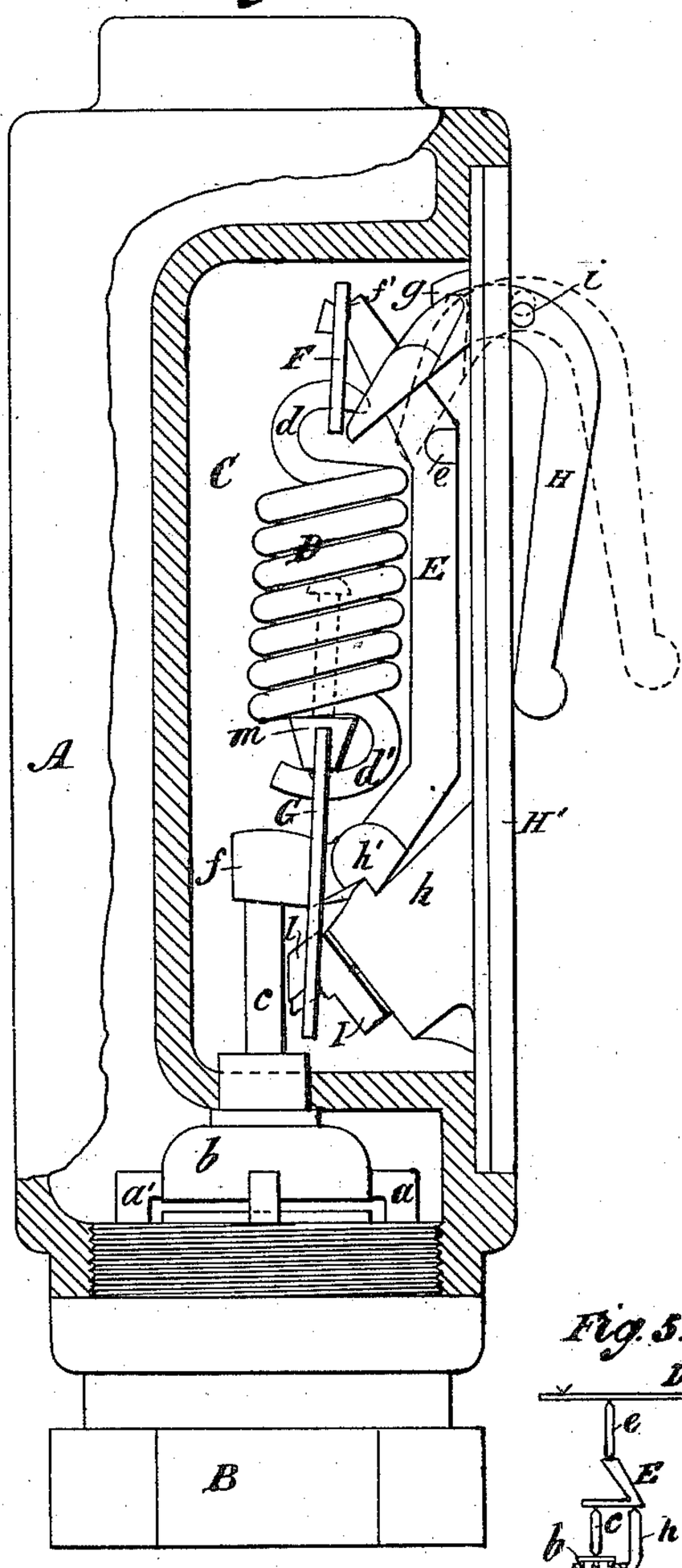


Fig. 5.

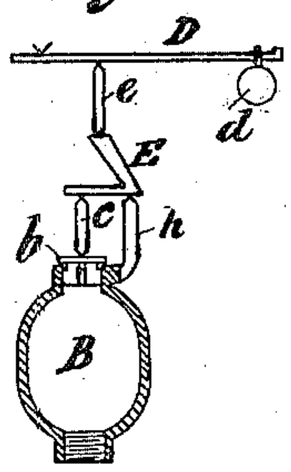


Fig. 4.

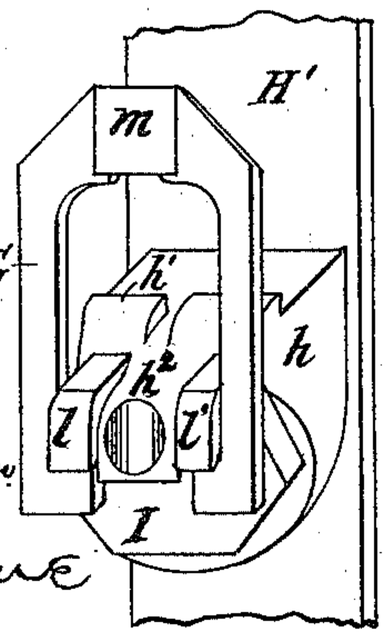
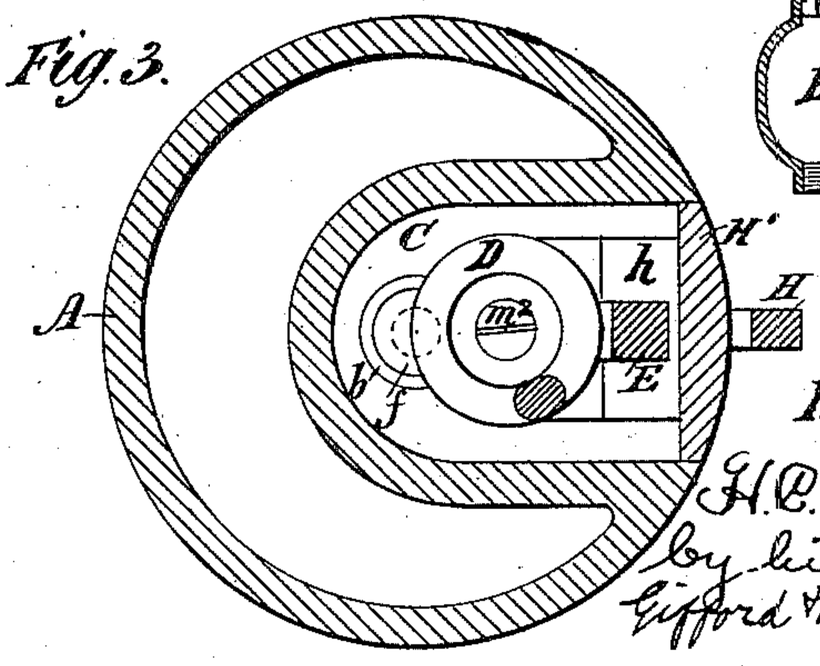


Fig. 3.



Witnesses
James R. Bowen
T. J. Keane

Inventor
H. C. Wilder,
by his attys,
Gifford & Brown.

UNITED STATES PATENT OFFICE.

HENRY C. WILDER, OF ASHBY, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO JOEL G. WILLARD, OF NEW YORK, N. Y.

SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 306,568, dated October 14, 1884.

Application filed March 21, 1884. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. WILDER, of Ashby, in the county of Middlesex and State of Massachusetts, have invented a certain new and useful Improvement in Safety-Valves, of which the following is a specification.

This improvement relates to safety-valves having combined with them springs for resisting their movement away from their seats.

The object of my improvement is to cause the spring controlling the valve to operate with a decreasing leverage, and thereby prevent an undue boiler-pressure.

Hitherto in the construction of spring safety-valves the arrangement for the adjustment of the valve to a given boiler-pressure has acted on or parallel with the axis of a spring so arranged that as an over-pressure of steam raised the relief-valve from its seat the spring acted upon it with an increasing force, thus permitting the boiler-pressure to be dangerously augmented. Various devices for overcoming this defect have been attempted, all of which are more or less objectionable.

In the accompanying drawings, Figure 1 is a vertical sectional view of a safety-valve embodying my improvement. Fig. 2 is another vertical view, partly in section, showing the parts in a different position. Fig. 3 is a transverse section of the same. Fig. 4 is a view of a portion thereof detached, and Fig. 5 is a diagram showing a modification of my improvement.

Similar letters of reference designate corresponding parts in all the figures.

A designates the outer case or shell of the valve. As shown it is in the form of a cylinder. At its lower end said case fits a base, B, to which it may be screwed. A passage extends through said base in the direction of its length. This base is adapted to be connected in any suitable manner to a steam-boiler. Upon the inner end of said base are arranged guides *a a'*, between which a valve, *b*, is adapted to move freely back and forth toward and from its seat. The valve is provided with a recess adapted to receive one end of a pin, *c*. The said pin *c* is preferably made of less diameter than that of the said recess, so that it may have a rocking motion therein. The case or shell A has arranged in it a chamber, C. Around this chamber, and within the case or shell, is a passage adapted to afford free egress to steam escaping from the boiler. In the bottom of said chamber there is an opening adapted to receive a stem-like projection with which the valve *b* is provided. Thus the valve is additionally guided in its movements.

In the chamber C is arranged a lever, E. It is fulcrumed at *h'* upon a projection, *h*. As shown, this projection is knife-edged. This projection may advantageously extend from the inner surface of a plate, H', forming a removable cover for the chamber, and secured in place by screws or otherwise. In the fulcrum *h'* may be a notch, and on the lever E a corresponding rib to prevent a lateral movement of the lever E.

D is a spiral spring, employed to act on the lever E so as to hold the valve normally on its seat. The lever E is preferably made curvilinear in form. Near the lower extremity of said lever is a socket, *f*, preferably made integral therewith, and which is adapted to receive an end of the pin *c*. Near its upper end said lever E is provided with a notch, *f'*, adapted to receive a link, F, to which is attached one end of the spring D by means of a hook, *d*, made integral therewith, or by any other suitable means, in such manner that the said link shall be approximately in line with the axis of the said spring. I prefer to use a link for this purpose; but I may in lieu thereof use a swiveling connection or other device, or connect the spring directly to the lever. The lower end of the spring D is secured to a link, G, by means of a hook, *d'*, made integral with the spring, or by any other suitable means. Near its upper end the lever E is provided, as shown, with projections *e e'*, which are adapted to engage with the bifurcated end of another lever, H. This lever H is preferably fulcrumed upon projections *g g'*, extending from the inner surface of the plate H'. The lever H extends through the said plate H', and its outer end may be curved downwardly. A pin, *i*, prevents the lever H from being drawn into the chamber C. Normally the lever E and the spring D are inclined slightly forward within the chamber C at an angle to the line of application of the force tending to raise the valve.

In the projection *h* is a screw-threaded passage, *j*, adapted to receive at the inner end the shank *k* of an adjustable device, H². This adjustable device has on its inner end a head, I, from which extend lugs *l l'*, one on each side of a shoulder, *h*², located at the inner end of the projection *h*. The shank *k* of the adjustable device is adapted to be moved freely in and out of the passage *j*. It is kept from turning by the lugs *l l'*. The link G fits in notches in the under side of the lugs *l l'*.

In the outer end of the passage *j* is a set-screw, *j'*, which, after adjustment, may be secured in any desired position within said passage by a jam-screw, *j*², passing loosely through it and into the shank on the adjustable device H². The outer surface of the plate H' is preferably recessed to facilitate the operation of the screws *j' j*².

The link G has upon its upper end a boss, *m*, through which extends a screw-threaded passage open at both ends. In the lower end of this passage is a pin, *m'*, which bears against the hook *d'* of the spring D. The upper end receives a screw, *m*². By adjusting the screw lengthwise the tension of the spring may be varied. The link G is, as shown, held in such position by the tension of the spring as to be approximately in line with the axis of said spring and with the link F. I may vary the tension of the spring by manipulating the screw *j'* so as to alter the position of the adjustable device H². The lever E, when in its normal position, is canted forward toward the inner side of the chamber, and the spring D then acts through the lever E with the maximum leverage, under whatever adjustment the parts may have upon the pin *c*, to keep the valve *b* on its seat. As the pressure of steam raises the valve, the lever E is forced backward toward the plate H', thus shifting the point of the lever at which the resistance of the spring is exerted upon it relatively to the fulcrum and to the point at which the power exerted upon the valve is transmitted to the lever. In other words, the distance between the point where the resistance of the spring is exerted, measured laterally or across the chamber from the fulcrum of the lever, is being shortened relatively to the distance across the chamber of the point at which the power is applied from the fulcrum of the lever; therefore the spring operates with a decreasing leverage.

The valve may be tripped by pulling the outer end of the lever H.

The adjustable device H² is a very important feature of my improvement. Its adjustability obliquely to the axis of the spring and to the length of the chamber C is advantageous, not only because it provides for varying the length of the spring, but also because it provides for simultaneously varying the normal relation of the point at which the resistance of the spring acts on the lever E with respect to the point at which the force exerted on the valve acts upon the said lever.

In the diagram shown in Fig. 5 I have used a weighted lever, as at D. As the valve is raised from its seat, the weighted lever operates through the lever E and link *e* to produce a decreasing leverage on the valve. This arrangement is the equivalent of that previously described, and which I claim.

My improvement is applicable to safety-valves for reservoirs containing compressed air as well as for receptacles containing steam.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a safety-valve, the combination of a case or shell, a valve, a spring for retaining said valve on its seat, and a lever connected at one end to the spring and fulcrumed near the other on a fixed portion of the shell, all being so arranged and combined that the force exerted by said spring on the valve will be varied when said valve shall have been raised from its seat, substantially as specified.

2. The combination of a valve, a spring for retaining the valve on its seat, a lever having the spring connected to it, and a device also having the spring connected to it and capable of adjustment obliquely to the axis of the spring, so that when adjusted it will vary the tension of the spring and the point at which the spring will normally act on the lever, substantially as specified.

3. In a safety-valve, the combination of a case or shell, a valve, a spring for retaining said valve on its seat, and a lever with which the said spring is connected, all being so arranged and combined that when in a normal position said lever and spring will incline forward at an angle to the line of application of the force tending to raise the valve from its seat, and when moved out of a normal position by said force will be together moved backward, so that the spring will exert a varying force upon the valve, substantially as specified.

4. The combination of a valve, a lever, E, a spring, D, a link, F, a link, G, and screw *m*², for adjusting the tension of the spring D, substantially as specified.

5. The combination of a valve, a lever, E, spring D, lever H, a plate, H', having the projection *h*, a link, G, an adjustable device, H², and means for adjusting said device to increase or decrease the tension of said spring D and vary the point at which it acts on the lever, substantially as specified.

HENRY C. WILDER.

Witnesses:
T. J. KEANE,
JAMES R. BOWEN.