

V. F. LASSOE.

Compensating Spring-Balances for Safety-Valves.

No. 142,481.

Patented September 2, 1873.

Fig. 1.

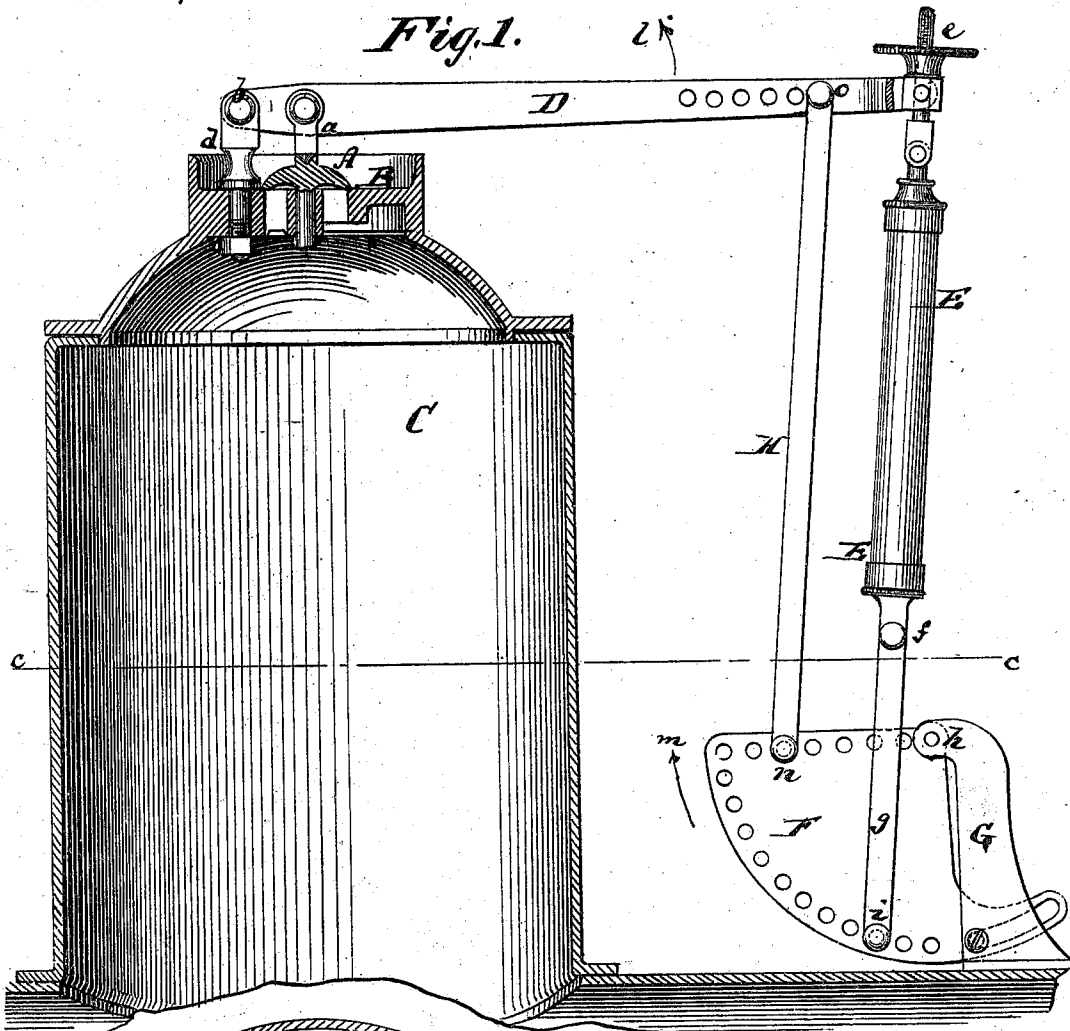
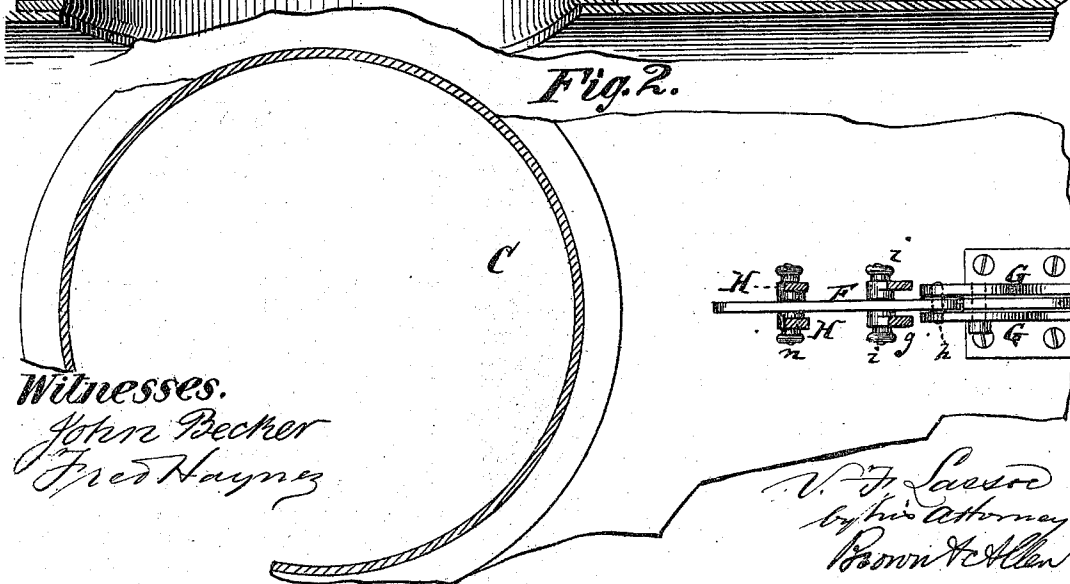


Fig. 2.



Witnesses.

John Becker
Fred Haynes

V. F. Lassoe
by his Attorney
Barnes & Allen

UNITED STATES PATENT OFFICE.

VALDEMAR F. LASSOE, OF BROOKLYN, ASSIGNOR TO VALDEMAR FREDRIK LASSOE AND GEORGE FREDRICK MEYER, OF NEW YORK, N. Y.

IMPROVEMENT IN COMPENSATING SPRING-BALANCES FOR SAFETY-VALVES.

Specification forming part of Letters Patent No. **142,481**, dated September 2, 1873; application filed June 5, 1873.

To all whom it may concern:

Be it known that I, VALDEMAR FREDRIK LASSOE, of Brooklyn, in the county of Kings and State of New York, have invented an Improved Compensating Spring-Balance for Safety-Valves, of which the following is a specification:

Figure 1 is a side view of the improved compensating spring-balance for safety-valves; Fig. 2, a horizontal section on the line *c c*, Fig. 1.

This invention has for its object to provide a spring-balance for safety-valves, with means for adjusting and regulating the power of the spring, so that such power will not be increased with the opening of the valve.

On locomotives, steamships, &c., where the application of a weight to the safety-valve is not practicable, owing to the jarring motion of the engine or the rolling of the vessel, and the consequent injurious effect which the weighted lever would exert upon the valve, springs have been introduced in place of the weights. These spring-balances were, however, very defective in one particular—that is, as the valve was raised off its seat by pressure of steam the spring, being thereby affected, increased its resistance to the action of the steam upon the valve, and therefore it required a greater steam-pressure to keep the valve open than it did to open the same; consequently the increased power of the spring sufficed, immediately after the opening of the valve, to reclose the latter, and thus the chief object of a safety-valve was defeated. Various attempts have been made to counteract this injurious effect of the increase of the spring-power, but none that were successful.

The present invention aims at such a compensation of the spring-balance that the power of the spring will remain nearly the same, or perhaps even become decreased, as the valve is being lifted off its seat. This object is partly attained by connecting the off end of the spring-balance with a vibrating bell-crank lever or quadrant, in such manner that the distance between the valve-lever and the point of connection of the spring with the aforementioned quadrant-lever will be less increased

during the upward motion of the valve-lever than if the spring were secured to a stationary point, owing to the consequent vibration of the quadrant toward the valve-lever. It is evident that this circumstance will only partly contribute to compensate the increased force of the spring, because the latter surely elongates. To make up for the balance, the valve-lever and quadrant or bell-crank are connected by a link, which transmits back to the former a fraction of the strain exerted upon the spring by the pressure of the valve, thus leaving the difference of these two items as effectual resistance to the steam-pressure. If, for example, the safety-valve is set to obey a steam-pressure of thirty pounds, and the spring properly adjusted to represent such power of thirty pounds, the effect of an excess of steam-pressure will be the elevation of the valve; but upon its elevation, and consequent transmission of motion to the spring-balance, the latter will still retain its resisting power of thirty pounds, and will, with the use of this invention, not increase in power, thereby allowing the steam, as long as there is an excess of pressure, to keep the safety-valve open. The adjustment of the parts may be such that the spring-pressure may be brought down, say, to twenty-nine pounds, perhaps, when the valve is raised to facilitate the keeping open of the valve by the least excess of steam-pressure. The lever, quadrant, or bell-crank is slotted or perforated, or otherwise so arranged as to permit the point of its connection with the spring-balance, and also with the connecting-link, to be varied at pleasure, so that the apparatus can be set at any suitable decrease of steam-pressure. This adjustment can also be effected by moving the fulcrum or supporting-bracket of the quadrant to and fro in a line parallel to the valve-lever; and the arrangement will yield the same result if the quadrant is turned so that the spring-connection will come between the link and valve, instead of having the link placed between the valve and the spring.

In the accompanying drawing, the letter A represents a safety-valve of suitable construction, placed upon an appropriate seat, B, of

the steam-dome C, or other part of a boiler. The valve A is, by a link, *a*, connected in the ordinary or suitable manner with a beam or lever, D, which is, at *b*, pivoted to a fixed post or standard, *d*. The outer end of the lever D is connected with a spring-balance, E, the latter being of the customary construction—that is to say, one end of the spring contained in such balance is connected with the rod *c* that is secured in the beam D, while the other end of such spring is connected with the lower end of the balance, so that the more the end *f* is drawn away from D the more will the power of the spring within E be increased. The lower end *f* of the spring-balance is, by a rod, *g*, connected with a lever-quadrant or bell-crank, F, that is, at *h*, pivoted to a fixed frame or standard, G. The pin *i*, which connects the rod *g* with the quadrant F, is beneath the pivot of F, as shown. A link, H, connects the beam D with the upper part of the quadrant F, as shown. In the drawing, the valve A is represented as being closed upon its seat. Whenever, by an excess of steam-pressure within the dome or boiler C, the valve is raised off its seat, the beam D will be swung up, in the direction of the arrow *l*, on its pivot *b*. By such motion of the beam, and the connection of the same with the quadrant, the latter will be caused to swing on its pivot *h* in the direction of the arrow *m*. By such movement of the quadrant the connecting-point *i* of the spring-balance with the quadrant will be elevated, and, therefore, the extension of the spring with E, and its consequent increase of power, will be less than it would be were the lower part of the spring-balance E fixed instead of movable. In consequence of the motion of the quadrant F a back pressure is exerted by the link H upon the lever D, which pressure increases as the rod *g* moves away from the fulcrum *h*. Hence, the more the valve is lifted off its seat the more effectual will be the action of the link H. This is

a very important point of the construction. By adopting suitable relations between all the dimensions the effect of the spring on the valve may be kept nearly uniform, or may even be made to decrease while the valve is raised.

For permitting the proper adjustment of the parts the quadrant F may be perforated, as shown; or it may be slotted or otherwise constructed to allow the pins *i* and *n* to be set in the desired manner, for it is evident that the further down the pin *i* is originally set on the lever or bell-crank F the larger will be its proportion of motion during the raising of the valve, and the larger, therefore, the counter-acting influence of such motion upon the increased spring-power. It is also evident that the nearer the pin *n* is set to the pivot *h* the greater will be the power exerted by the link-connection H upon the lever D. The upper pivot *o* of the link H may also be adjustable upon the beam D, by perforating or slotting the latter, or otherwise, so that the power of the link-connection may be increased the further *o* is set away from *b*, and reduced the nearer *o* is set to *b*.

I desire it to be distinctly understood that I do not claim any connection of the balance-spring E with a support which is rigidly secured, as I know this to be an old and well-known arrangement of parts, which, by my invention, I have attempted to improve.

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

The quadrant or bell-crank lever F, connected by a link, H, with the lever D of a safety-valve, and combined with the spring-balance E, which connects with both levers D and F, substantially as and for the purpose herein shown and described.

V. F. LASSOE.

Witnesses:

A. V. BRIESEN,
FRED. HAYNES.