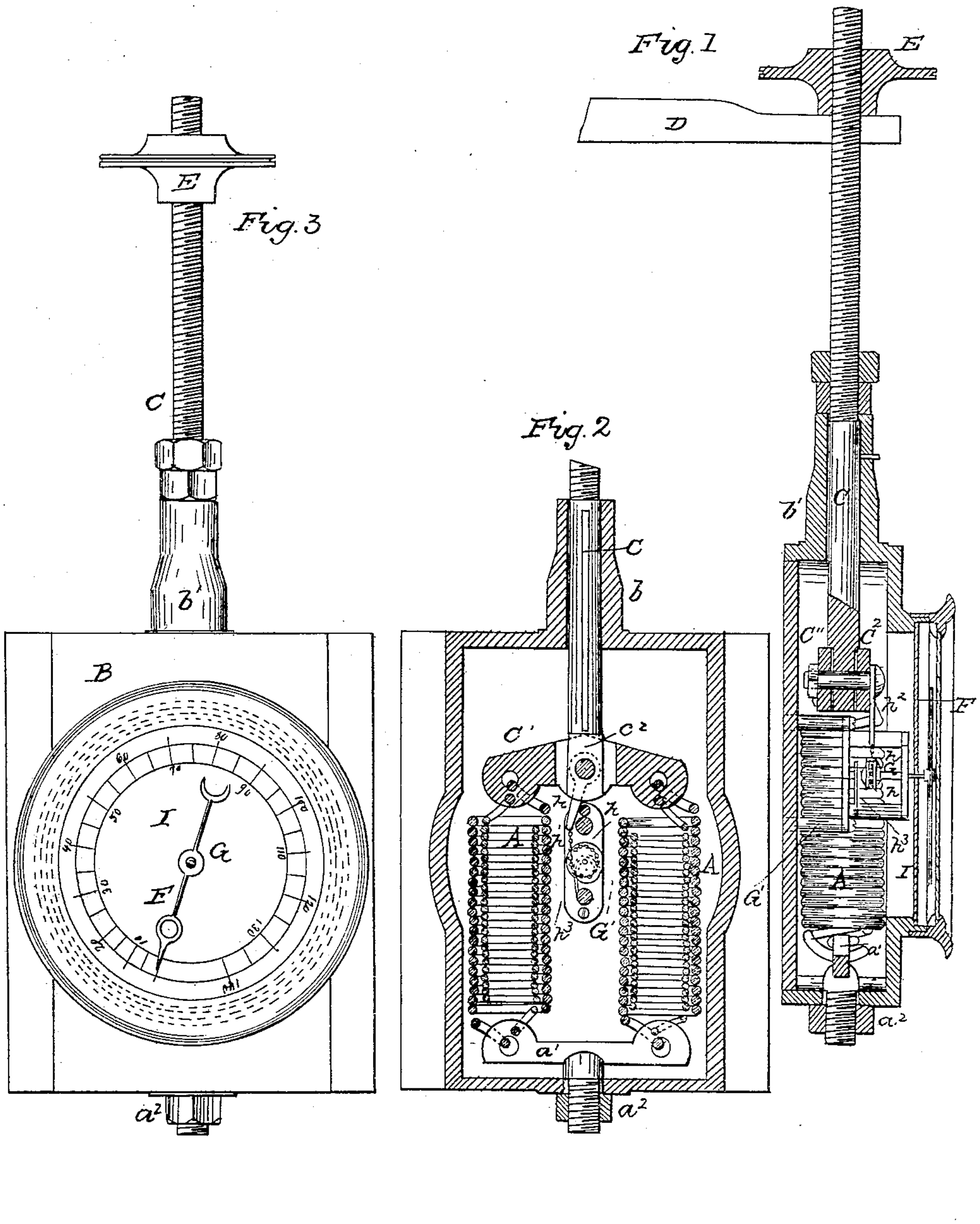
RAY & CLEVELAND.

Safety Valve Spring Balance.

No. 51,350. Patented Dec. 5, 1865.



WITNESSES

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IMPROVEMENT IN SAFETY-VALVE SPRING-BALANCES.

Specification forming part of Letters Patent No. **51,350**, dated December 5, 1865.

To all whom it may concern:

Be it known that we, THOMAS S. RAY and SAMUEL E. CLEVELAND, of the city of Buffalo, county of Erie, and State of New York, have invented an Improved Spring-Balance for Locomotive Safety-Valves; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure I is a side sectional elevation of our improved balance; Fig. II, a front sectional elevation of same, and Fig. III a front elevation.

The nature of this invention consists in such combination and arrangement of an index hand and plate with spiral balance-springs and screw-rod as will cause a rectilinear expansion or contraction of the balance-springs to move the index-hand and mark their exact tension, or, in other words, show the steam-pressure which will be required to lift the safety-valve.

Letters of like name and kind refer to like parts in each of the figures.

A A represent the spiral balance-springs arranged within the metallic case B and connected to the bottom thereof by a cross-piece, a', secured by the screw-shank and nut a^2. Each spring is made double—that is, composed of two springs, one within the other, to obtain greater strength and elasticity in a given length. At their upper ends the springs are connected to the screw valve-rod C by means of an equalizing cross-piece, C′, which is jointed thereto by a bolt, C^2. The screw-rod C projects up through the top of the case, which has a long boss, b', cast thereon to form a long guide-bearing for the rod and passes through the end of the safety-valve lever D with a screw-nut, E, above.

The case B being secured to the boiler or other stationary part of the locomotive, and the safety-valve lever being by construction fixed as against a downward movement, the screwing down of the nut E thereon will extend the springs A and cause them to hold down on the valve-lever with a power proportioned to the amount of their extension.

To indicate at once to the glance of the engineer this power which the springs exert to hold down the safety-valve lever an index hand and plate is combined therewith, as follows:

F represents the index-hand, which is supported on the end of a spindle, G, located between the springs and at the center of the case, and having its bearings in a frame, G′, secured to the back of the case. This spindle carries a drum, h, to which a chain, h', is connected by one end and wound thereon, said chain being connected at the other end to the screw-rod C or cross-piece C′, either directly or by an arm, h^2, so that an extension movement of the screw-rod and springs causes the chain to unwind therefrom and revolve the spindle, and with it the index-hand, the hand being brought back when the spring contracts by a light volute spring, h^3, which is wound up on the spindle as the chain unwinds therefrom.

By this arrangement and connection of the index-hand with the spring any degree of tension which may be imparted to them by the screwing down of the nut E on the screw-rod C will be shown by the index-hand pointing to a number on the graduated and marked index-plate I, said number representing the force in pounds per square inch which would require to be applied to the safety-valve to produce the same tension in the springs. For instance, if the springs be extended by the turning of the nut until the consequent movement of the index-hand shall bring it to the Fig. 10 on the index-plate, it will show that a pressure of ten pounds per square inch on the safety-valve will be required to equal the tension of the spring. If the pressure of steam should be increased beyond this point the tension of the springs would be insufficient to hold down the safety-valve, the lifting of which allows the steam to blow off until its pressure is again reduced below the tension of the spring.

It may be found convenient and necessary in some instances to use three or four springs, A, either double or single. In this case they may all be connected with the cross-pieces a' and C′ in same manner as already described. The cross-piece C′ being hinged to screw-rod C equalizes the pull of the several springs thereon and prevents them from binding it in its bearings b'.

Where more than one balance-spring is used it will be found necessary to use this equalizing cross-piece C′ or to hinge the lower cross-piece a' to the case in a similar manner, which would have the same effect.

After continued use the balance-springs may loose some of their elasticity, so that when unstrained they will fail to regain their minimum

length and bring the index-hand back to its primary position at O, and also permit a movement of the index-hand to take place without a corresponding variation in the tension of the springs. This slack or lost movement may be taken up by turning the nut a^2 on the screw-shank of the lower cross-piece, a', which will have the desired effect without affecting the index-hand.

The index-hand may be revolved by a rack and pinion instead of chain and drum, if preferred, the rack being attached to the cross-piece C′ and the pinion to the spindle G, or it may be effected by a segment and pinion.

This spring-balance is easy of adjustment, and can be set so as to permit the escape or blowing off of the steam at any desired pressure, the index-hand always showing this pressure to the engineer at a glance.

The use of a number of balance-springs combines the greatest strength with the greatest elasticity, and the whole construction of the balance renders it durable and not likely to wear and get out of order by the constant jars and strains to which locomotive-balances are necessarily subjected.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. The combination and arrangement of an index-hand, F, and plate I with spiral balance-springs A, screw-rod C, and screw-nut E, for the purpose of indicating the pressure of steam required to raise the safety-valve, substantially as described.

2. The combination, with the balance-springs A and screw-rod C, of an equalizing cross-piece C′, for the purpose substantially as described.

3. The arrangement of the lower cross-piece with a screw-shank and nut, so that any lost movement occasioned by loss of elasticity in the balance-springs may be taken up without affecting the index-hand, substantially as set forth.

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