C. Graham,

Steam Safety Valve.

No. 30,964. Patented Dec. 18, 1860.

Fig: 1.

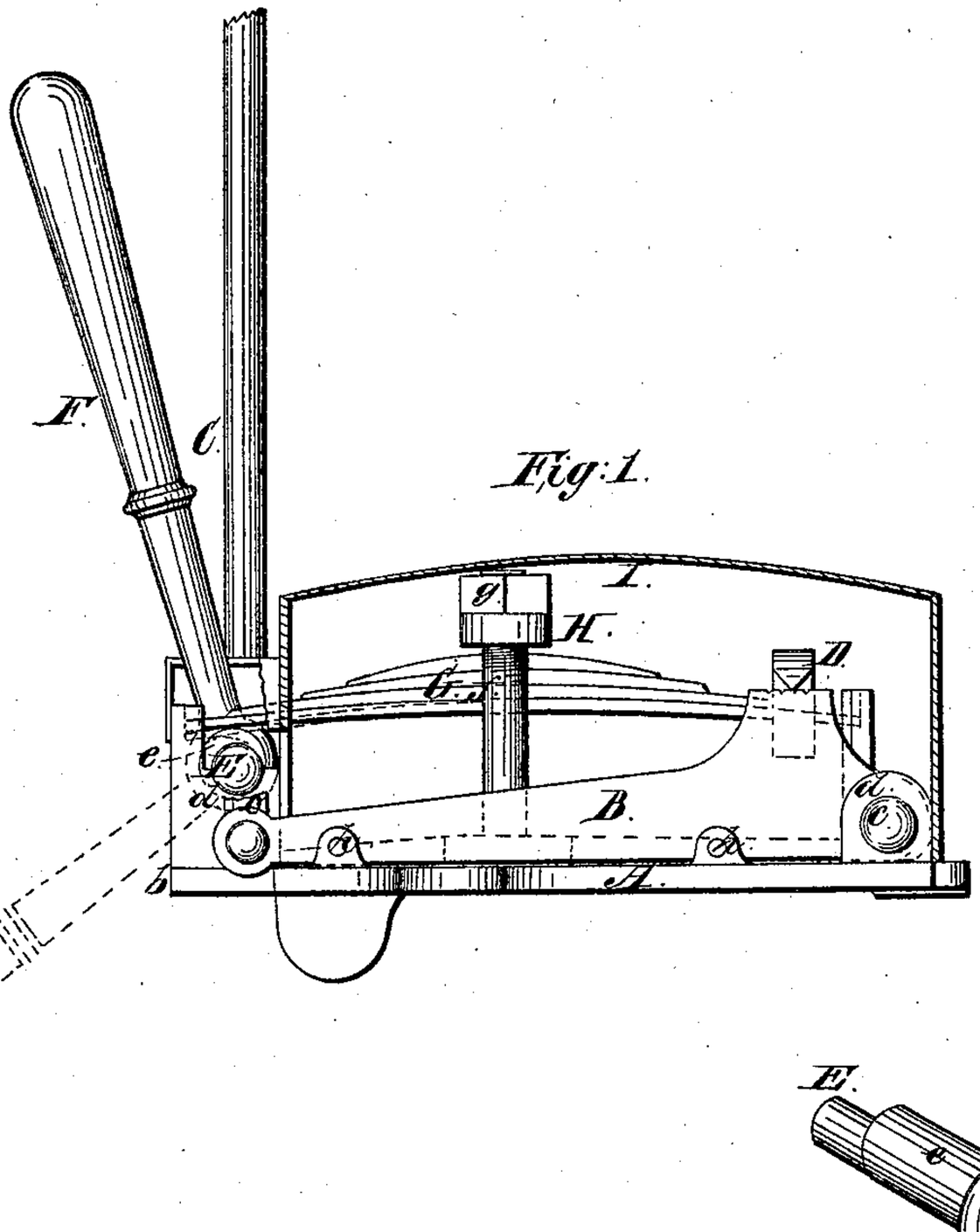


Fig: 3

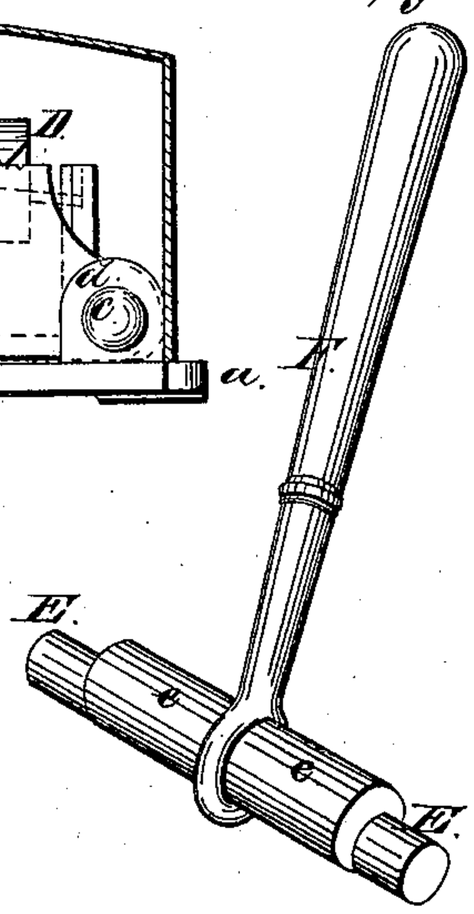
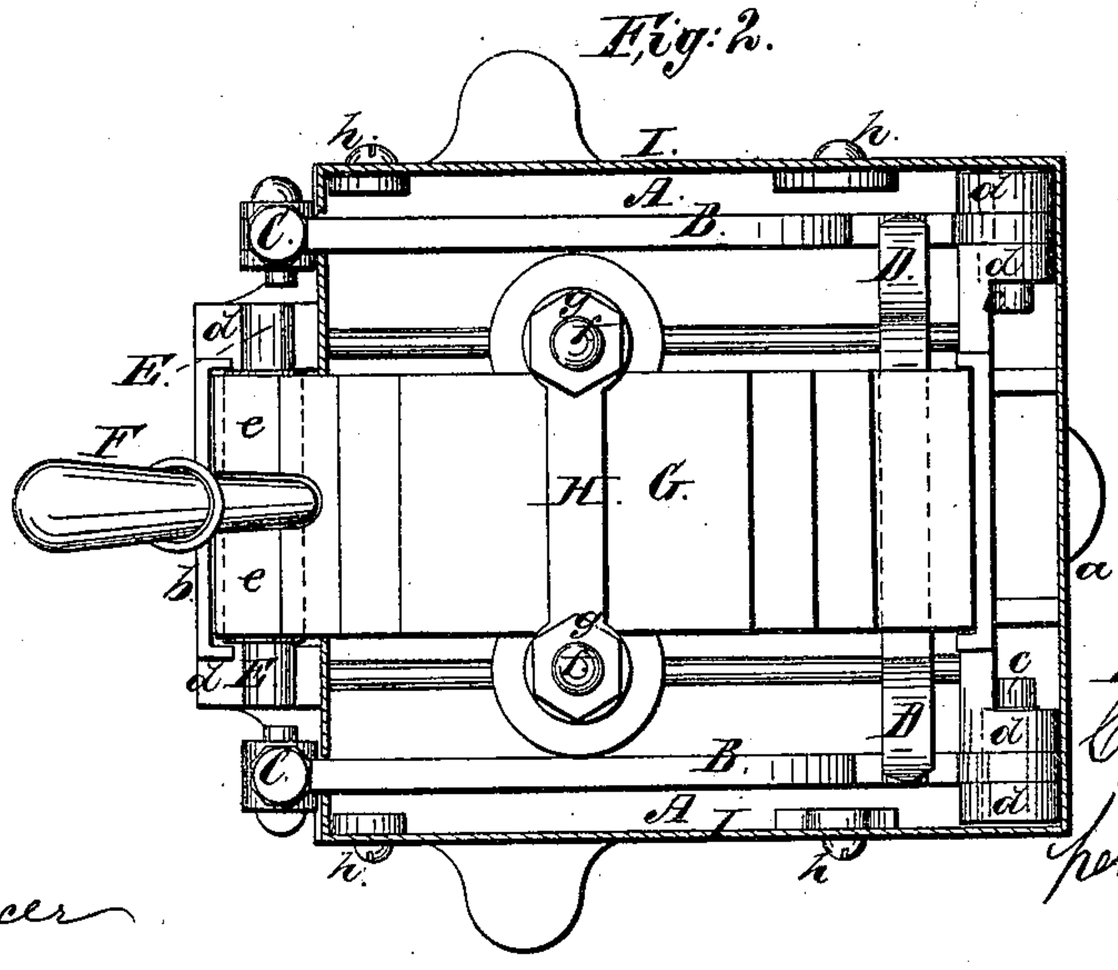


Fig: 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

CHARLES GRAHAM, OF SCRANTON, PENNSYLVANIA.

SPRING-BALANCE FOR SAFETY-VALVES TO BOILERS.

Specification of Letters Patent No. 30,964, dated December 18, 1860.

To all whom it may concern:

Be it known that I, CHARLES GRAHAM, of Scranton, in the county of Luzerne and State of Pennsylvania, have invented a new and Improved Spring-Balance for the Safety-Valves of Locomotive and other Boilers; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1, is a side view of the balance with the casing in section. Fig. 2, a top view of the same with the casing in section. Fig. 3, is a perspective view of the pressure relieving lever and its eccentric shaft.

Similar letters of reference indicate corresponding parts in the several figures.

The want of some convenient and expeditious means of reducing the load upon the safety valves of locomotives has long been felt. With the spring balance in common use, the nut, constituting the only means by which the load can be varied, requires to be turned so far before any considerable reduction of load is obtained, and the adjustment to effect such reduction is so tedious that engineers when compelled to stop for a time will often neglect to reduce the load as it is their duty to do on such occasions, or will fail to reduce it as much as they ought to do.

The object of my invention is to enable the load on the valve to be conveniently and instantaneously reduced by the engineer as much as may be desirable, and to this end my invention consists mainly in a certain mode of employing an eccentric and lever in combination with a spring whereby the desired result is produced.

To enable those skilled in the art to make and use my invention I will proceed to describe its construction and operation.

A, is a horizontal plate intended to be bolted to the top of the steam gage or otherwise supported and secured in a fixed position at the rear of the locomotive, with the end *a*, next the boiler and the end *b*, toward the engineer.

B, B, are two parallel levers arranged above the plate A, and secured to the said plate by their fulcrum pins *c*, *c*, which are inserted in lugs *d*, *d*, cast on the said plate near the end *a*. These levers are intended to be connected with the safety valve or valves by rods C, C. D, is a cross bar having two knife edged or V shaped journals, resting in notches in the two levers B, B, near the fulcra, *c*, *c*.

E, is a short shaft having journals at its ends resting in bearings *d*, *d*, on the plate A, near the end *b*, thereof. This shaft constitutes the fulcrum of a lever F, which is firmly secured to it, and the said shaft has formed upon or secured firmly to it an eccentric *e*.

G, is the spring made in what is known as the semi-elliptic form having one end resting upon the cross bar D, and the other end upon the eccentric *e*, and held down at about the middle of its length by a bar H, bolts *f*, *f*, and nuts *g*, *g*, the said bar being placed across the top of the spring, the bolts being secured in the plate A, and passing through eyes in the ends of the said bar, and the nuts being screwed on to the bolts above the said bar, to cause the said bar to produce as great a pressure as may be desired upon the spring which having one end resting upon the cross bar D, is caused to have its pressure transmitted to the levers B, B, and from thence through the rods C, C, to the safety valve lever or levers. I, is a cover which is secured to the plate A, by screws *h*, *h*, for the purpose of covering up all the parts of the balance but the lever F, and the ends of the rods C, C, and the ends of the levers B, B, the said levers B, B, and F, working through slots in the said cover.

The kind of spring represented is selected for the reason that its pressure may be increased and diminished very materially by a very slight range of motion. Other kinds of springs possessing the same quality might be used in combination with the eccentric *e*, and lever F. The eccentric and lever are used in the following manner to control the pressure of the spring upon the bar D, through which the said pressure is transmitted to the valve. The greatest pressure is produced when the most prominent part of the eccentric is in contact with the spring as shown in bold outline in Fig. 1, and this pressure is diminished gradually as the eccentric is moved from that position by the lever F, which occupies a position within the reach of the engineer. The pressure is kept so adjusted by the nuts *g*, *g*, that when the eccentric is in the position in which its most prominent part is in contact with the spring or as near to that posi-

tion as the construction of the parts permits, the load produced on the valve or valves is just what is desired for the running of the engine, and hence the engineer is prevented from using the lever for the purpose of increasing the pressure beyond what he is allowed to carry, but by moving it more or less from that position which he can do without difficulty, he is enabled to reduce the pressure as much as he may desire within the limits of the effect of the eccentric *e*, which may be proportioned to suit the circumstances of different roads. The lever and eccentric are shown in black outline in Fig. 1, in the position in which the greatest relief permitted is given to the valve the lever being supposed to be in contact with a stop on the plate A. The eccentric will be kept stationary in any position in which it may be placed, within a certain distance from that represented in black outline in Fig. 1, by the function of the spring G.

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

1. The employment in combination with the spring of a spring balance for safety valves, of an eccentric *e*, and lever F, applied to operate substantially as herein specified for the purpose set forth.

2. The arrangement of the eccentric shaft E, spring G, levers B, B, cross bar D, and the pressure bar H, with its screws and nuts *f*, *f*, *g*, *g*, substantially as herein described, in combination with each other and with a bed plate A, or other equivalent base or support.

CHAS. GRAHAM.

Witnesses:
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