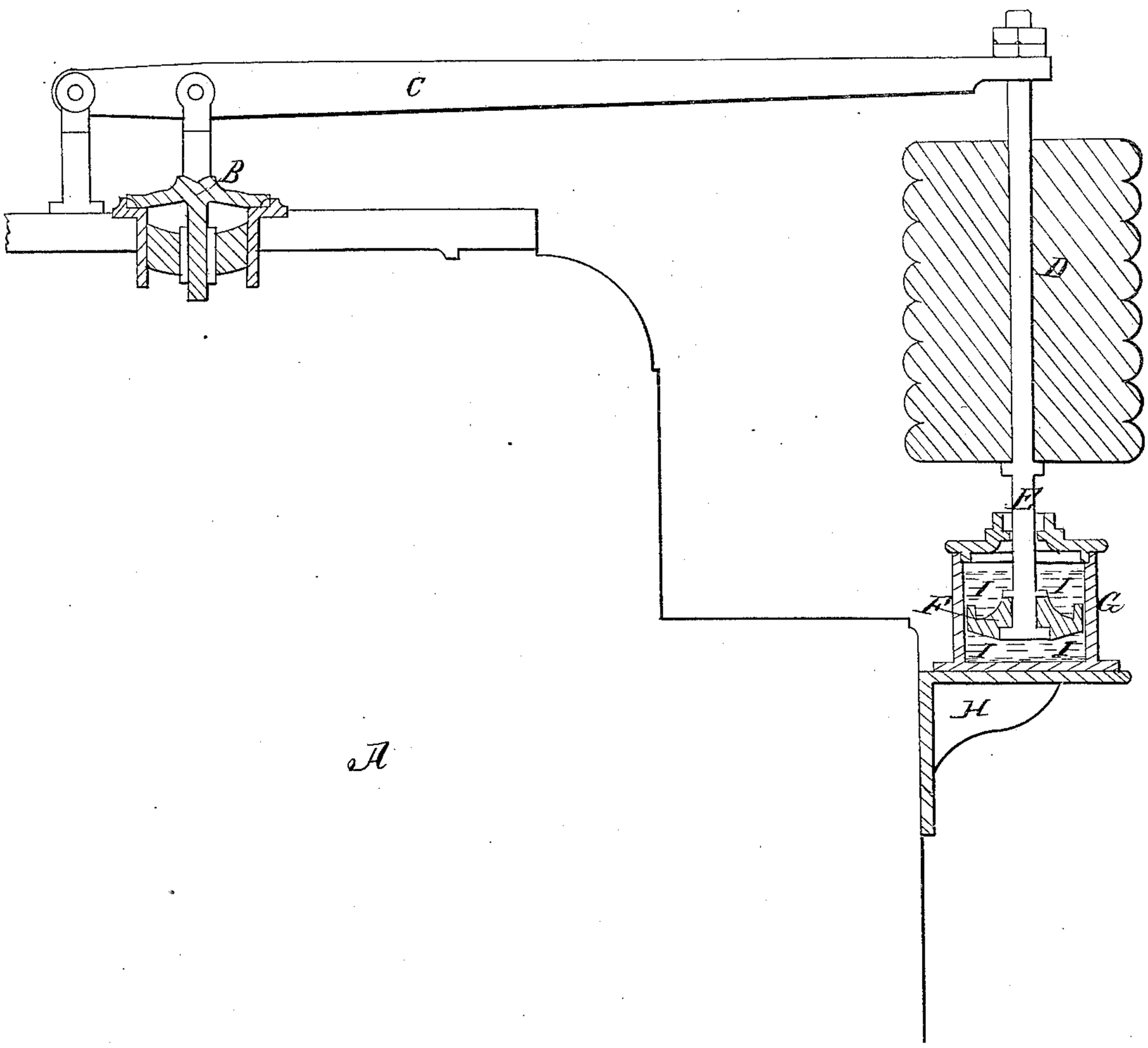
H. WATERMAN.

SAFETY VALVE.

No. 10,243. Patented Nov. 15, 1853.



UNITED STATES PATENT OFFICE.

HENRY WATERMAN, OF HUDSON, NEW YORK.

SAFETY-VALVE FOR LOCOMOTIVE-ENGINES.

Specification forming part of Letters Patent No. 10,243, dated November 15, 1853; Reissued July 9, 1867, No. 2,675.

To all whom it may concern:

Be it known that I, HENRY WATERMAN, of the city of Hudson, county of Columbia, State of New York, have invented a new and Improved Mode of Constructing the Safety-Valves of Locomotive-Engines; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and letters of reference marked thereon.

Owing to the jolting of the locomotive engine when in motion it was found necessary at an early day to discard the use of the simple weight upon the lever of the safety valves as large portions of steam would be blown off when the pressure was below the point indicated by the mean pressure of the weight upon the valve, as for instance when the boiler was suddenly thrown upward the weight would continue to go up, so that by the recoil and momentum the valve would be a portion of the time raised from its seat and the steam allowed to blow off when below the desired point of pressure, the spring balance was substituted and has been generally used or applied to the lever of safety valves.

It has been long known that the spring balance is an imperfect indication of the pressure of steam from the following causes. The safety valve in rising will raise the outer end of lever that rests upon, though a much greater distance than the valve itself as the proportions of power of the lever, as for instance a lever of a power of twelve times, resting on a valve say two inches diameter, when the valve is raised to its full capacity say one half inch will raise its outer end six inches a distance quite impossible with an ordinary spring balance without greatly increasing the pressure balance consequently at the same time increasing the pressure of the steam, so that it will be seen an adequate discharge cannot take place with a spring balance resting upon, taking another instance, suppose a valve to raise one eighth of an inch, which allows an escape of about one fourth the capacity of the valve, the outer end of lever will rise one and a half inch, if to this a spring balance is attached with a scale of one twentieth of an inch to the lb. it is evident that the pressure will be increased thereby thirty lbs. per inch. To remedy this difficulty I propose to use the simple weight and lever so as to attain as near as possible a constant and uniform pressure upon the valve and in order to prevent the vibrations of the weight and lever I apply to outer end of lever a rod that descends vertical by which the weight is suspended to lever, at the bottom of said rod below the weight attach a small piston of about three inches diameter surrounding this piston I place a cylinder in which this piston is allowed to move freely and easily, the cylinder is firmly attached to boiler or other convenient parts, into this cylinder I put a fluid, mercury, oil, alcohol, or water, I prefer good sperm oil, this fluid must fill the cylinder to near the top so as to completely cover the piston, it is evident that the piston can move no faster than the fluid is made to pass by the piston and that it will check all sudden vibrations yet freely pass to a position due to pressure &c. By having an adequate facility of discharging surplus steam we have succeeded in securing an uniform temperature and pressure in the locomotive boiler, preventing almost entirely the difficulty of leakage of tubes, riveted joints so commonly caused by these variations, also design is as a sure preventive of explosion from these causes.

A, represents the rear part of boiler.

B, represents the ordinary safety valve.

C, represents the ordinary lever.

D, represents the weight.

E, represents the rod upon which the weight is suspended to lever.

F, represents the piston attached to rod E.

G, represents the cylinder in which the piston F is allowed to move freely.

H, is stand by means of which the cylinder is attached to boiler A.

I I I I represents the fluid in cylinder G which covers the piston F.

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

The piston F attached to the weighted end of the valve lever within the cylinder G and immersed in the liquid in the cylinder, combined and operating in the manner and for the purposes herein discribed.

HENRY WATERMAN.

Witnesses:

DARIUS PECK,

JAMES CLARK.

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