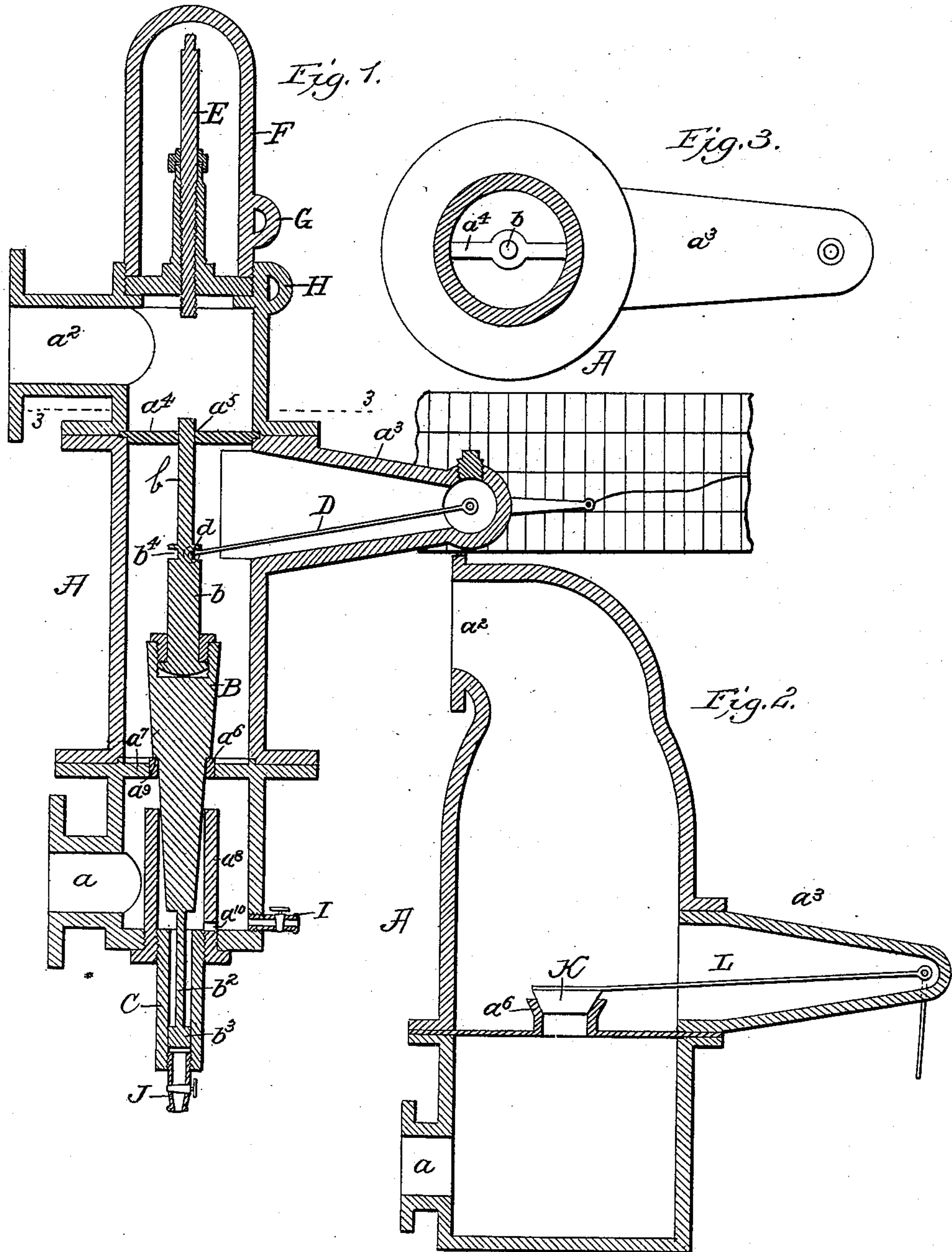


(No Model.)

G. C. ST. JOHN.
STEAM METER.

No. 567,054.

Patented Sept. 1, 1896.



Witnesses:

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UNITED STATES PATENT OFFICE.

GAMALIEL C. ST. JOHN, OF NEW YORK, N. Y.

STEAM-METER.

SPECIFICATION forming part of Letters Patent No. 567,054, dated September 1, 1896.

Application filed June 13, 1895. Serial No. 552,725. (No model.)

To all whom it may concern:

Be it known that I, GAMALIEL C. ST. JOHN, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Steam-Meters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to steam-meters.

The object is to produce a steam-meter presenting in a few number of parts and in a compact form a device that will accurately register the amount of steam used in a given time, and in which the parts shall be so constructed and assembled as to present the highest possible range of usefulness with a minimum degree of danger of derangement of the parts from long-continued use.

With these objects in view the invention consists in the novel construction and combination of parts of a steam-meter, as will be hereinafter fully described and claimed.

In the accompanying drawings, forming part of this specification, and in which like letters of reference indicate corresponding parts, I have illustrated one form of embodiment of my invention capable of carrying the same into effect, although other forms of embodiment may be employed without departing from the spirit of the invention.

In the drawings, Figure 1 is a vertical transverse section of the preferred form of meter. Fig. 2 is a similar view of a modified form; and Fig. 3 is a horizontal sectional view, taken on the line 3 3 of Fig. 1, showing more particularly the guide in which works the stem of the operating-valve.

Referring to the drawings, A designates a suitable casing, provided with an ingress-opening α , and egress-opening α^2 , and a hollow projection α^3 , the function of which latter will hereinafter appear. The casing is provided at its upper portion with an internal guide α^4 , having an opening α^5 located, preferably, at its center, and with a valve-seat α^6 , arranged in a diaphragm α^7 , located below the said guide.

Fitting within the valve-seat is a tapered or conical valve B, having its upper end pro-

vided with a stem b , preferably one that is removable from the valve, the said stem being designed to engage the opening α^5 in the guide α^4 , and at its lower end with a second stem or projection b^2 , carrying a piston-head b^3 , which works in a dash-pot C, located at or near the lower end of the casing, the dash-pot and the guide α^4 serving to cause the valve to move in a vertical line, the dash-pot being filled with water operating to steady the movement of the valve and thus cause it to effect the function for which it is designed. The piston fits loosely within the dash-pot, in order that when the valve starts to rise or to seat itself the movement will be as free from friction as possible, and, also, gradual as possible, this being due to the fact that the water in the dash-pot surrounding the piston has to pass between the walls of the dash-pot and the periphery of the piston as often as the valve is raised by the pressure of the steam or sinks toward or to its seat when the supply of steam has been cut off, thereby, at one and the same time, giving the greatest sensitiveness to the movement of the valve and steadiness to its upward and downward movement, and also preventing any dancing motion when engines are supplied with steam or sudden impact between the valve and its seat, which might result in injury to one or both. The main result obtained by means of the dash-pot and the water therein is the desirable steadiness on the chart outside of the casing where the flow of steam is recorded. While the dash-pot is described as being located at or near the lower end of the casing, it is to be understood that the invention is not to be limited to this arrangement, as the dash-pot may be located within the casing at the point occupied by a deflecting and pressure-equalizing shield α^8 (hereinafter to be described) and to be made to perform its proper function. If preferred, the valve may be a true taper from end to end, but as a matter of specific improvement I construct the valve of two cones, integral or otherwise, the difference in the diameters of the two cones forming a seat or peripheral flange α^9 , which is designed to rest on the seat α^6 and thereby limit the downward movement of the valve.

Projecting upward from the dash-pot or

from the lower portion of the casing to a point near the valve-seat a^6 is the deflecting and pressure-equalizing shield a^8 , which is to protect the valve from the direct impact of the steam as it enters the casing, and thereby prevent such impact from tilting the valve and causing it to bind in its seat and thus work unevenly, and also serves to deflect the steam and bring it uniformly toward and up to the seat a^6 , where by its force it raises the valve and escapes between the seat and the valve and thence to the egress-opening a^2 , the guide a^4 being so constructed as to present no obstruction to the free escape of the steam.

Pivoted at a point near the outer portion of the projection a^3 and within the same is a rod D, the inner free end having a stud or projection d , which engages a groove b^4 in the stem b , so that the movements of the valve will cause the rod to rock on its pivot and thus move a pointer located externally of the casing and traversing a strip of paper moved by clockwork, whereon the movement of the valve is recorded and the quantity of steam used and the length of time of its use are thus rendered ascertainable.

The upper portion of the casing is provided with a threaded stem E, which is designed to be raised or lowered, and thus regulate the quantity of steam permitted to pass through the valve and egress-opening. Thus, for example, if a consumer wishes a supply of steam sufficient to run a five-horse-power engine, the stem E is set so as to allow the valve a sufficient play to furnish that amount, but no more. The stem E is covered by a cap F, which is screwed onto the top of the casing, thus preventing any tampering with the stem when once set. If desired, a chain may be passed through loops G and H, located, respectively, on the cap and on the casing, and by securing its end by a lock entry to the interior of the casing will be prevented, or, if preferred, the cap F may be provided with an ordinary lock.

In order to withdraw the water of condensation from the casing, a petcock I is provided at the bottom, or, if preferred, a pipe may be employed which will run from the bottom of the casing to a trap. To keep a uniform depth of water in the dash-pot, the cylinder or sleeve a^8 is perforated at its base with a small hole a^{10} on the opposite side from the inlet of steam, which permits the water of condensation to escape from the sleeve or cylinder into the casing, from whence it is removed by the current of inflowing steam or by the means of petcock I or pipe connected with a trap aforesaid. The hole a^{10} at the bottom of the sleeve, as described, maintains uniform depth of water in the dash-pot and reduces to a minimum the alteration in the weight of valve which the steam-pressure has to overcome, due to the fact of the valve rising and sinking in the water of the dash-pot; that is to say, when the rod and piston-head rise in the water of the dash-pot

the valve becomes progressively heavier in accordance with the amount of water displacement. In other words, the higher the piston rises out of the water the greater will be the weight of the valve. This uniformity in the height of water in the dash-pot is important when the fact is taken into consideration that the meter is based entirely upon the principle of gravity, and, that being true, the weight should be as uniform as possible in order to get a uniform record. The dash-pot can be blown out and cleaned by means of a petcock J, located at its bottom. In some instances the dash-pot may be dispensed with, also the guide a^4 , the valve-seat a^6 alone being used, as shown in Fig. 2, which is a modified form of construction of the meter shown in Fig. 1. In this modification an ordinary tapered plug-valve K is employed, which fits in a seat formed in a diaphragm k , and to the valve is attached an arm or rod L for operating the pointer on the outside of the casing. The valve K operates by gravity, and in being raised by the action of the steam, and in dropping by gravity, operates the pointer referred to in a manner that will be perfectly obvious.

I claim for my invention that it is adapted to equalize the flow of steam and to prevent the pounding tendency occurring every time the cut-off of an engine acts. It is not a steam-pressure regulator, because the steam will equalize itself above the valve and below the valve, but it will prevent any sudden changes, and hence I claim that it is withal a steam-pressure equalizer and has a tendency to smoothen the flow of steam. The guide, valve, and dash-pot are calculated to regulate the flow of steam to any point where it is desired to be free from the vibrating or pounding tendency due to steam being taken and cut off by engine while in action. I claim that my meter will measure water and other fluids and also gases on the same principle as it measures steam. This indicator will be valuable in district steam-heating systems, where it is desirable to know simply how long steam is being used when the quantity has been agreed upon and it is only desirable to know how long steam is being used and whether any has been used during the hours not agreed upon.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A steam-meter comprising a suitable casing provided with an ingress and an egress opening and with an internal valve-seat, and a valve engaging the seat and having its end portions guided and its intermediate portion shielded from the direct impact of the steam, whereby to prevent tilting and consequent binding of the valve in its seat, substantially as described.

2. A steam-meter comprising a suitable casing provided with an ingress and an egress opening and with an internal valve-seat, a

valve having its end portions guided and its intermediate portion fitting within and projecting below the valve-seat and opposite the ingress-opening, a deflecting and pressure-equalizing shield surrounding the lower portion of the valve, and registering mechanism actuated by the valve, substantially as described.

3. A steam-meter comprising a suitable casing provided with an ingress and an egress opening and with an internal valve-seat, a cone-shaped valve having its end portions guided and its intermediate portion fitting within and projecting below the valve-seat and opposite the ingress-opening, a deflecting and pressure-equalizing shield surrounding the lower portion of the valve, and registering mechanism actuated by the valve, substantially as described.

4. A steam-meter comprising a suitable casing provided with an ingress and an egress opening and with an internal valve-seat, a valve having its end portions guided and its intermediate portion fitting within and projecting below the valve-seat and opposite the ingress-opening, a deflecting and pressure-equalizing shield surrounding the lower portion of the valve, a dash-pot in which the lower end portion of the valve works, and registering mechanism actuated by the valve, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GAMALIEL C. ST. JOHN.

Witnesses:

PATRICK RYAN,
J. W. KENNEDY.