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J. E. L. OGDEN.

STEAM TRAP.

APPLICATION FILED NOV. 17, 1906.

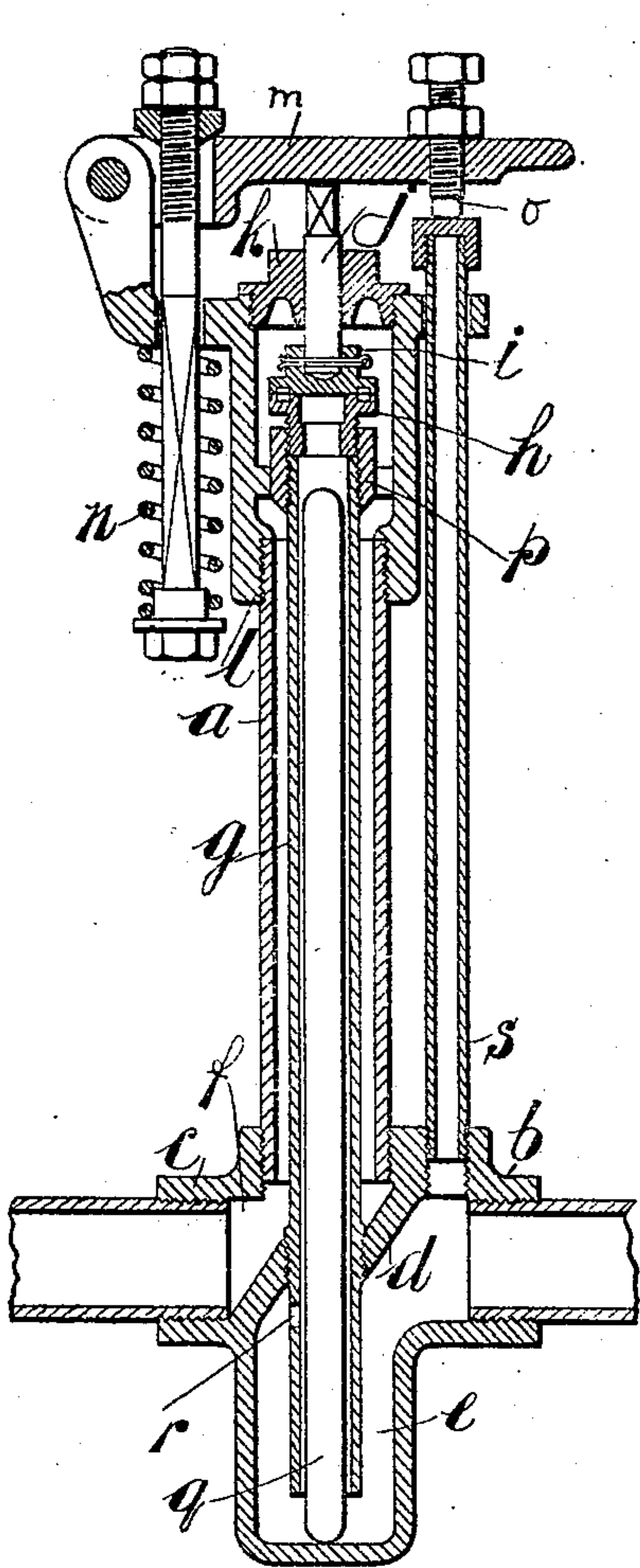


Fig. 1

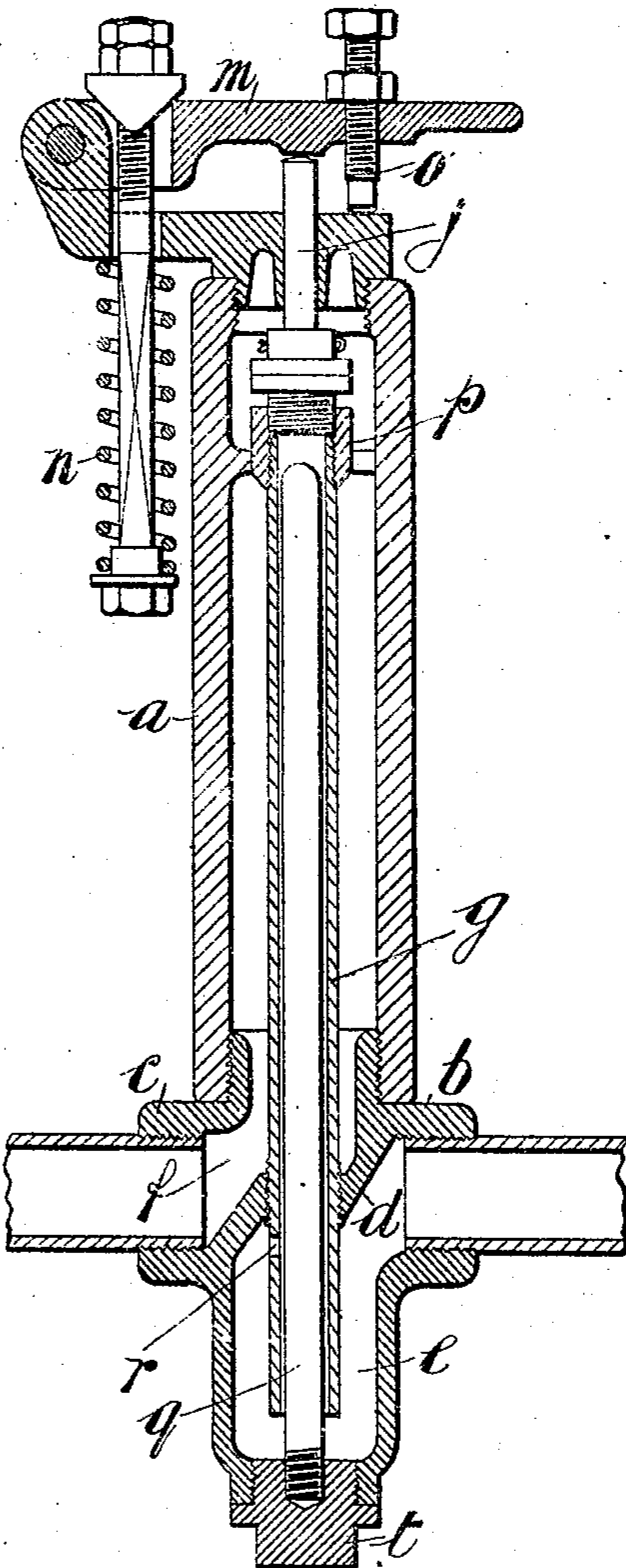


Fig. 2

Attest

C. S. Macdonald
Edward N. Sartou

Inventor
John Edward Lewis Ogden
By Spear, Middleton, & Dunbar
Attys.

UNITED STATES PATENT OFFICE.

JOHN EDWARD LEWIS OGDEN, OF LISCARD, ENGLAND.

STEAM-TRAP.

No. 848,390.

Specification of Letters Patent.

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Application filed November 17, 1906. Serial No. 343,867.

To all whom it may concern:

Be it known that I, JOHN EDWARD LEWIS OGDEN, a subject of the King of Great Britain and Ireland, residing at Penshurst, Lincoln Drive, Liscard, in the county of Chester, England, have invented certain new and useful Improvements in Steam-Traps, of which the following is a specification.

This invention relates to steam-traps of the expansion type, my object being to construct such appliances from a few simple and conveniently-arranged parts that shall be capable of working with reliability and efficiency with either high or low pressure steam.

Referring to the accompanying sheet of explanatory drawings, Figure 1 is a sectional view of a convenient form of steam-trap constructed in accordance with this invention, while Fig. 2 is a similar view of a modification of the same trap.

The same reference-letters in the two views indicate the same or similar parts.

I provide, in the example shown at Fig. 1, an outer tube or casing, such as *a*, which is screwed at one end into a casting or fitting containing admission and exhaust ports, as *b* and *c*, respectively. This casting or fitting is divided into two chambers by a diagonal partition *d*. The inlet or admission port *b* communicates with one of these chambers, as *e*, which I shall call the "admission-chamber," and the exhaust-port *c* communicates with the other chamber, as *f*, which I shall call the "discharge-chamber." An expansion-tube *g*, constructed of brass or some other metal having a high coefficient of expansion, is arranged within the outer tube *a*. This expansion-tube *g* passes through the partition *d* just mentioned, so as to communicate with the inlet-chamber *e*. The annular space between the outer tube and the expansion tube communicates with the discharge-chamber *f*. The other end of the expansion-tube is provided with a valve-seat *h*, which receives a valve *i*, adapted to control the out-flow of fluid from the expansion-tube *g*. The said valve is mounted on a stem or spindle *j*, passing through the cap *k* of the valve-containing chamber *l*, to which the outer tube *a* is attached. The annular space between the outer tube *a* and the expansion-tube *g* communicates with this valve-chamber. A lever *m* is arranged, as illustrated, in combination with a spring *n* to exert pressure on the valve-stem *j*, and so force the valve toward its seat. The lever is, however,

also provided with a pin or adjustable stop *o* to limit the motion of the lever due to the action of the spring.

When the expansion-tube *g* contains steam, unless this steam is at a very low pressure the expansion of the tube will be such that the valve-seat and the valve will be in contact with each other. The stem *j* will also be in contact with the lever *m*. When, however, the expansion-tube contains nothing but water, or a certain amount of water at a relatively low temperature, the tube will be so much contracted as to withdraw the seat from the valve, the valve being kept off its seat by the fluid-pressure within the expansion-tube and the spring being unable to force the valve against its seat owing to the stop *o* provided on the lever. It follows that the water can escape past the valve-seat and flow down to the discharge-chamber *f*. The valve employed is of the type described in my prior patent specification forming part of the application filed January 5, 1905, Serial No. 239,786. Such valve has a pop action which gives a greater opening than can be obtained by the mere contraction of the expansion-tube *g*.

I may, if desired, provide the expansion-tube with guiding fins or members to keep it in its proper position within the outer tube, but not to prevent relative axial movement between the two. These guiding-fins are preferably arranged toward the valve end of the expansion-tube. In the examples illustrated the upper end of the tube *g* is fitted with a collar or its equivalent, as *p*, which slides between guide-pieces projecting from the interior of the valve-chamber *l*, as shown.

I provide a rod, as *q*, within the expansion-tube, so as to leave only a narrow annular space for fluid between the rod and the interior of the expansion-tube. By thus reducing the capacity of the expansion-tube I reduce the amount of steam which is pocketed in it when water begins to enter the tube. This arrangement also allows a small quantity of water to exert a large cooling effect on the expansion-tube. I may provide the inlet-chamber with a dirt-cock, through which dirt, which collects in the inlet-chamber, can be blown out, if desired.

I prefer that my trap should be placed vertically with the valve-chamber at the upper end. The trap may, however, be used in other positions, if desired. I may, if desired, as shown, extend the expansion-tube *g*

almost right through the inlet-chamber. When the trap is employed in a vertical position with the valve-chamber at the upper end, the expansion-tube will then be fed with
 5 water from the bottom or sump-like part of the inlet-chamber—that is, with the coolest water. With this arrangement I may, if desired, provide a small hole, as *r*, in the extension of the expansion-tube and at the upper
 10 end of the inlet-chamber. This hole reduces the amount of steam which will be pocketed in the expansion-tube by the rise of water, and so insures a prompt opening of the valve when a discharge is necessary.

15 In order to compensate for alterations in the pressure of the steam and water supplied to the trap, I provide a compensating tube, as *s*, which is preferably arranged parallel to the outer tube *a*. The interior of the com-
 20 pensating tube communicates at one end with the inlet-chamber of the trap and with no other part of the same. The tube is closed at the other end—that is, at the end adjacent to the valve-chamber—and at this
 25 end the pin or stop *o*, before described as being provided on the lever *m*, which controls the action of the valve, is arranged to make contact with the compensating tube. This
 30 compensating tube is full of steam during the action of the trap. It is preferably formed of a metal, such as brass, which has a high coefficient of expansion. The consequence is that the tube alters in length according to the temperature of the steam which gains ac-
 35 cess to the trap, and thus allows for the lever being pulled by the spring to a greater extent in the direction of the valve when low-pressure steam is being used than when high-pressure steam is being employed. The
 40 valve can therefore close, although the elongation of the expansion-tube is not so great. The compensating tube is, however, preferably arranged only to compensate to a certain extent, so that with a very low pressure
 45 of steam—say a pressure of only a few pounds above atmosphere—the valve will not close on its seat.

The compensating tube may be arranged on any side of the outer tube which may be
 50 considered most convenient in any particular case. It may be made as long as is thought necessary, and the steam may be allowed to fill either the whole of it or only a part of it. When the trap is to be used in a horizontal
 5 position, I may, if desired, partially close up the entrance to the expansion-tube from the

inlet-chamber and allow water to enter such tube only at the upper side thereof. This insures that when water commences to flow into the expansion-tube from the inlet-chamber
 60 a considerable quantity will quickly rush in.

In the modification shown at Fig. 2 the compensating tube *s* is dispensed with, and the valve-containing chamber is cast in one piece with the outer tube or casing *a*. A de-
 65 tachable screw-plug *t* is provided at the bottom of the sump-like part of the inlet-chamber to facilitate cleaning and to permit of the ready screwing in of the expansion-tube *g*.

Having now described my invention, what
 I claim as new, and desire to secure by Let-
 70 ters Patent, is—

1. In steam-traps of the expansion type, the combination with a water - discharge valve and an expansion-tube effecting the
 75 opening and closing of the said valve, of a fitting provided with inlet and outlet chambers and having a sump-like or water-collecting chamber formed integrally with the said in-
 80 let-chamber and an extension from the said expansion-tube projecting within the said water-collecting chamber, substantially as described.

2. In steam-traps of the expansion type, the combination consisting of a water-dis-
 8 charge valve, an expansion-tube, a valve-seating for the said valve secured integrally with the said expansion-tube, a loaded lever acting to press the valve against its seating,
 90 a fitting provided with inlet and outlet chambers, and a sump-like or water-collecting chamber into which the said expansion-tube projects, substantially as described.

3. In steam-traps of the expansion type, the combination consisting of a water-dis-
 95 charge valve, an expansion-tube, a valve-seating for the said valve secured integrally with the said expansion-tube, a loaded lever acting to press the valve against its seating, adjustable means limiting the said action of
 100 the loaded lever, a fitting provided with inlet and outlet chambers, and a sump-like or water-collecting chamber into which the said expansion-tube projects, substantially as de-
 105 scribed.

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

JOHN EDWARD LEWIS OGDEN.

Witnesses:

VIVIAN ARTHUR HUGHES,
 CHARLES CONRAD.