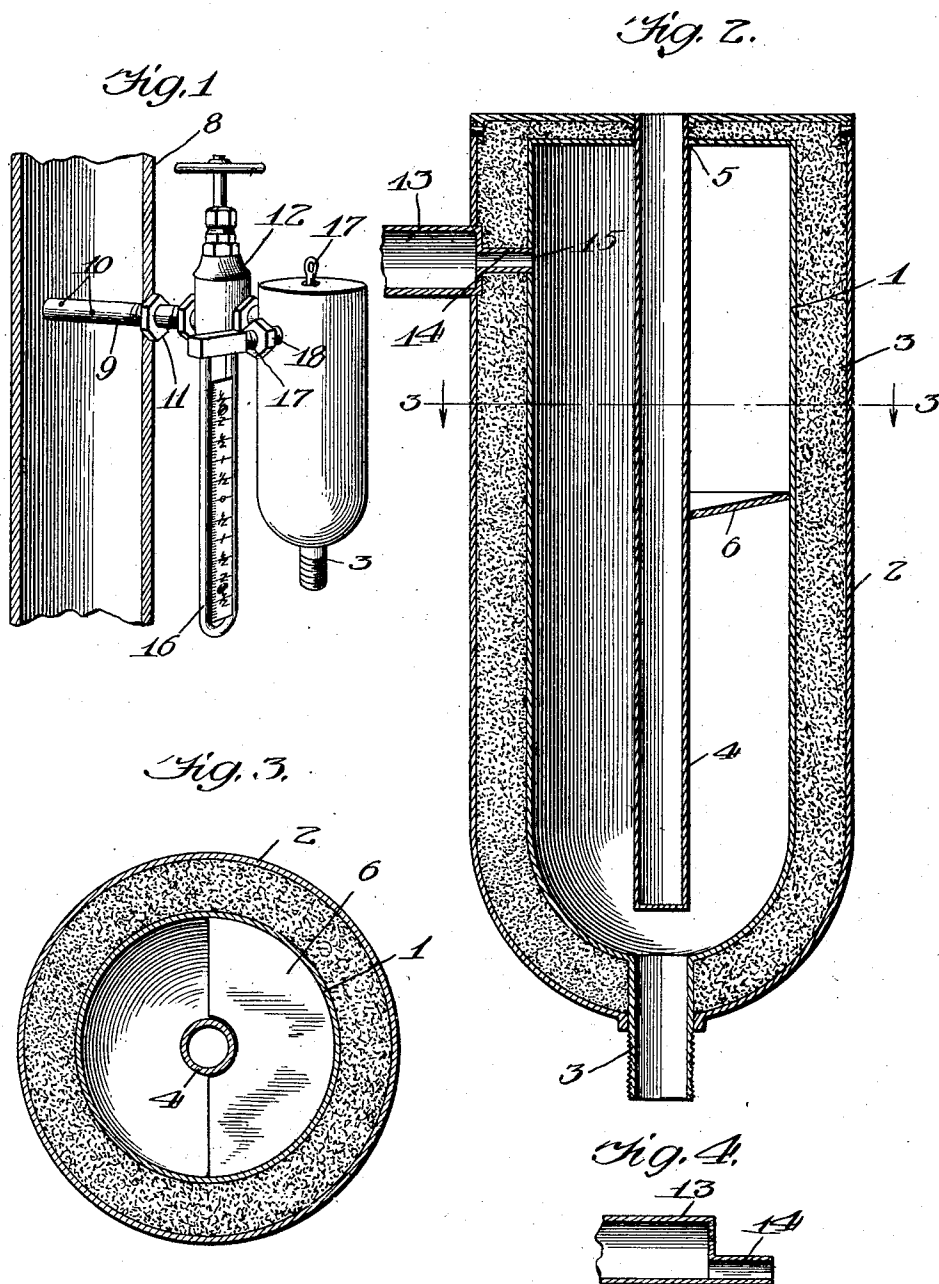


No. 857,984.

PATENTED JUNE 25, 1907.

L. M. ELLISON.
STEAM CALORIMETER.
APPLICATION FILED MAR. 30, 1905.



Witnesses:
Robert F. Weir
J. V. Domans.

Inventor:
Lewis M. Ellison
By: George S. Pines
Attorney

UNITED STATES PATENT OFFICE.

LEWIS M. ELLISON, OF CHICAGO, ILLINOIS, ASSIGNOR TO AMERICAN STEAM GAUGE AND VALVE MANUFACTURING COMPANY, OF BOSTON, MASSACHUSETTS.

STEAM-CALORIMETER.

No. 857,984.

Specification of Letters Patent.

Patented June 25, 1907.

Application filed March 30, 1905. Serial No. 252,883.

To all whom it may concern:

Be it known that I, LEWIS M. ELLISON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Steam-Calorimeters, of which the following is a specification.

My invention relates to improvements in steam calorimeters or devices for determining the amount of water carried in suspension in a current of steam. In devices of this character it has been the usual custom to provide a vessel or body into which this steam is admitted from the main steam pipe through a throttle valve and means whereby a thermometer may be inserted in this vessel or body, whereby, by a simple calculation based on the reading of the thermometer, the amount of moisture in the steam may be determined. Heretofore, serious difficulty has been met with, due to the fact that the inlet pipe through which the steam is admitted to the body becomes heated by the passage of steam therethrough from the high pressure pipe, and as this pipe is connected to the side walls of the chamber, heat is also conveyed to the side walls, thus causing considerable evaporation of the moisture in the steam chamber. Furthermore, due to the chilling effect of the atmosphere upon the walls of the steam chamber, a certain amount of radiation is caused and due to these two features the calorimeter is not accurate.

It is one of the objects of my invention to overcome these difficulties and others which have presented themselves in measuring instruments of this character, by providing means whereby the amount of metal used in the inlet pipe is reduced to minimum, thereby reducing this portion which is heated by the high pressure steam and prevent evaporation in the steam chamber.

Other advantages of my device will appear in the specification and claims.

In the accompanying drawings I have illustrated one embodiment of my invention in which

Figure 1 is a perspective view of my calorimeter attached to a steam pipe, the pipe being shown in cross section; Fig. 2 is an enlarged sectional view of my steam chamber; Fig. 3 is a section taken on the line 3—3 of Fig. 2; and, Fig. 4 is a sectional view of a

modification of my throttling nozzle or valve.

In constructing my device I provide a body or chamber 1, which may take any form, although in the present instance is shown as being cylindrical and having a bowl-shaped bottom. An outer jacket 2 of rigid material, as metal having the same general configuration as the steam chamber or body is provided and this jacket surrounds the steam chamber or body 1 on all sides, a space or chamber 3 being left between the jacket and the body. This chamber may be filled with lamp black or other non-conducting material or, if desired, may be left vacant, in which event the air contained in the chamber will serve as a non-conductor of the heat. The lower end of the body or chamber 1 is open and communicates with an exhaust pipe 3, which extends through the jacket 2 to the atmosphere. A cup 4, in which a thermometer may be inserted, extends into the chamber almost to the lower portion thereof, the lower end of this cup being closed and the upper end being opened and making a steam-tight joint at the point 5 and extending through an opening in the upper end of the jacket 2. In order that the steam may be deflected against this cup, centrally of the body or chamber 1, and upon the opposite side from that in which the steam is admitted, is preferably arranged a deflector 6.

The steam chamber or body is connected with the steam pipe 8 by a tube or pipe 9, which is adapted to be inserted in the steam pipe, and project into the same some distance, as shown in Fig. 1, the portion which fits in the steam pipe having small perforations, as 10, through which the steam may pass into the pipe. A suitable nut 11 serves to hold the tube or pipe in position against the steam pipe, and a stop valve 12 is provided whereby the steam may be shut off or admitted to the steam chamber or body 1. The opposite end 13 of the pipe is secured to the jacket 2 and has a reduced portion 14, which extends through the jacket and connects with an opening 15 in the steam chamber. This reduced portion 14 forms a throttling nozzle for the steam which is admitted through the pipe 13 to the chamber.

A mercury gage 16 is connected with the

steam chamber by the pipe 17, a swivel joint 18 being formed in this pipe in order that the gage may be adjusted laterally. It will be noted with respect to this mercury gage 5 that the same is attached at right angles, as shown in Fig. 1, to the inlet pipe 13 and by means of the screw-threaded connection with the jacket of pipe 13 and the swivel joint 18, the gage may be adjusted to always 10 maintain a vertical position.

In Fig. 4 I have illustrated a modification of my nozzle or inlet to the steam chamber, in which it will be noted that the reduced portion 14 of the pipe 13 is located at and 15 extended along the bottom of the inlet pipe, thereby preventing the formation of a pocket in the inlet pipe and moisture which may separate in the inlet pipe will fall to the bottom of the pipe, and be carried into the steam chamber 1 and cannot be driven back into 20 the main steam pipe.

In operation, the valve 12 is opened and the steam passes through the pipe 9 and through the throttling nozzle or reduced portion 14 into the steam chamber 1. As it 25 passes into this chamber, it will pass across the cup 4 and striking the deflector 6 be thrown back against the cup and then pass out through the exhaust 3. A thermometer 30 17 may be inserted in the cup and the moisture contained in the steam ascertained by a simple calculation.

By the arrangement of the double chamber and filling the space between the outer 35 chamber or jacket and the inner chamber with a non-conducting material, it will be seen that radiation is reduced to a minimum and by the arrangement of a deflector opposite and below the nozzle or place of entry 40 of the steam, the steam after having crossed the cup and the thermometer contained therein will be deflected and caused to cross the cup a second time or several times, before exhausting through the opening 3, 45 thereby providing greater opportunity for the steam to affect the thermometer contained in the cup and permit a correct reading of the device. Further, by providing the reduced portion 14 upon the inlet pipe 50 13 and securing this reduced portion to the wall of the body 1, the area of the pipe is

reduced, thereby preventing the conduction of heat to the steam chamber from the high pressure steam and the same also serves to throttle the steam in passing to the steam chamber. The reduction of this area and the consequent reduction of heat prevents a corresponding amount of evaporation of the moisture in the steam chamber, rendering the device more accurate. 55 60

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a calorimeter, the combination with a vessel or body, of a jacket surrounding the same, an entering pipe connected to said jacket and having a portion of smaller diameter located at and along the under side of said pipe and extending between said jacket and said vessel or body, and means 70 to permit the insertion of a thermometer into said vessel or body.

2. In a calorimeter, the combination with a vessel or body, of a jacket surrounding the same, an entering pipe connected to said jacket and having a portion of smaller diameter having the walls thereof of substantially the same thickness extending between said jacket and said vessel or body, a pressure gage connected to said vessel or body 80 by a swivel joint and extending at right angles to said entering pipe, and means to permit the insertion of a thermometer into said vessel or body.

3. In a calorimeter, the combination with 85 a vessel or body, of a jacket surrounding the same, an entering pipe connected to said jacket and having a portion of smaller diameter extending between said jacket and said vessel or body, a deflector arranged 90 within said vessel or body, a pressure gage connected to said body by a swivel joint and extending at right angles to said entering pipe, and means to permit the insertion of a thermometer into said vessel or body. 95

In witness whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LEWIS M. ELLISON.

Witnesses:

JOHN BREESE,
GEO. S. PINES.