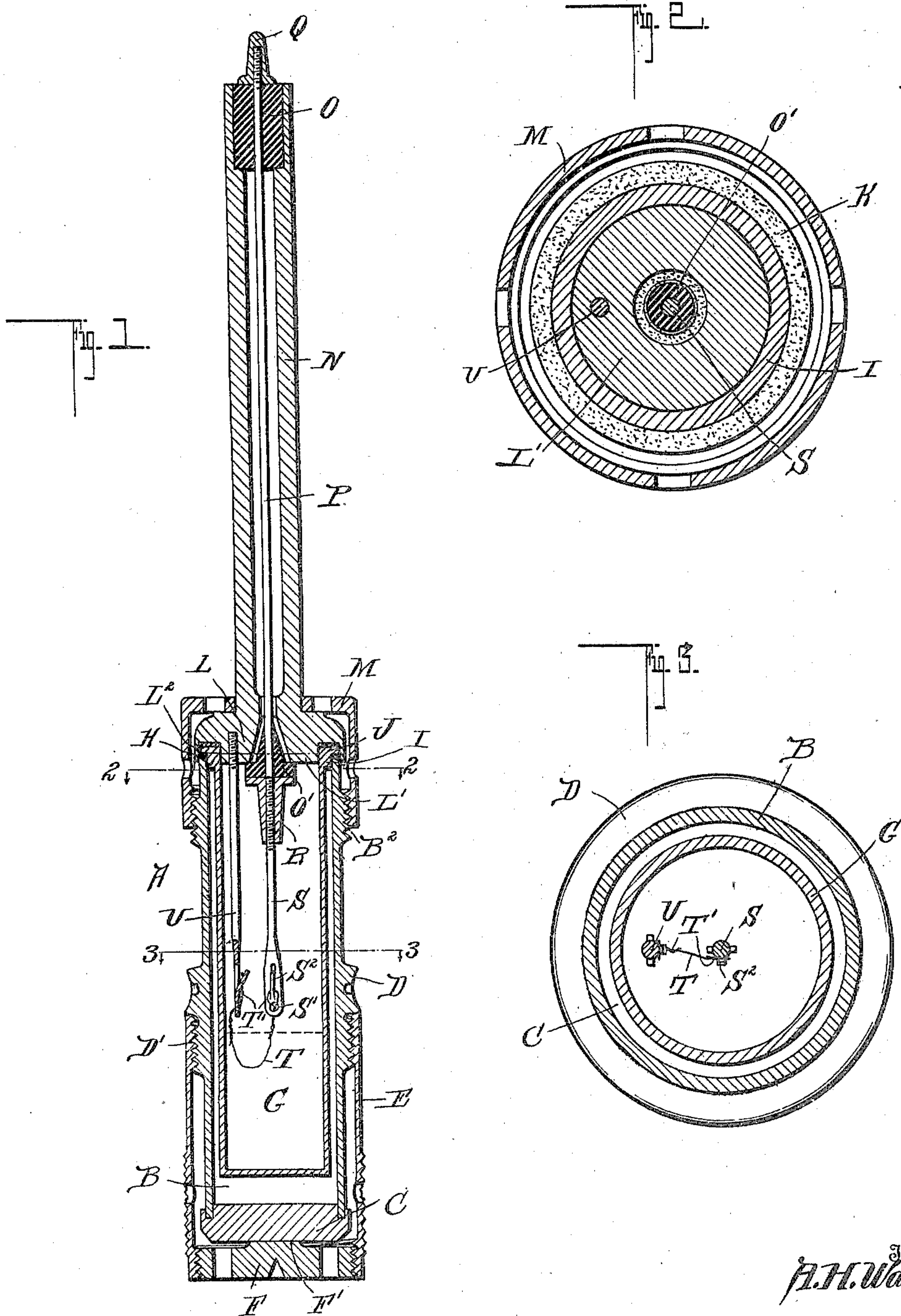


A. H. WALRATH.
CALORIMETER.

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951,709.

Patented Mar. 8, 1910.



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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, ARTHUR H. WALRATH, a citizen of the United States, residing at Davenport, in the county of Scott and State of Iowa, have invented a new and useful Calorimeter, of which the following is a specification.

This invention relates to certain new and useful improvements on the Parr calorimeter, Patent #673,325, and more particularly to the bomb, the object being to provide the bomb with a combustion vessel which is surrounded by an air jacket whereby the same can be heated to incandescence, in order that perfect combustion can be obtained of the fuel placed in the bomb to be tested.

Another object of my invention is to provide a bomb in which the combustion vessel can be completely removed from the bomb after the determination has been made, in order that the bomb can be used immediately again, to take another determination without having to thoroughly clean and dry the bomb, as is the case with the bomb used in the Parr calorimeter.

Another object of my invention is that the residue of the determination is removed in the combustion vessel, so that the same can be set aside in order that a determination of the same can be made at any convenient time.

Another advantage of my invention is to provide an improved fuse wire which can be easily and quickly attached or detached from the terminals, and one which will insure a positive ignition of the fuel so that all danger of the electric heat acting on the bomb before the charge is ignited is prevented, whereby a more accurate determination can be obtained.

In the Parr bomb, the water is allowed to come into direct contact with the walls of the combustion chamber, which cools the same to such an extent that it is impossible to obtain perfect combustion of the fuel to be tested, whereby a portion of the fuel is left unburned and the determination can be only determined with accuracy by collecting the unburned fuel and weighing the same and deducting the weight of the unburned fuel from the weight of the charge first placed in the bomb, which is almost impossible to be accomplished by an ordinary operator.

With these and other objects in view, the invention consists in the novel features of

construction, combination and arrangement of parts, hereinafter fully described and pointed out in the claims.

In the drawings forming a part of this specification: Figure 1 is a vertical section through my improved bomb. Fig. 2 is an enlarged section taken on lines 2—2 of Fig. 1, and Fig. 3 is an enlarged section taken on lines 3—3 of Fig. 1.

In carrying out my invention, I employ a bomb A comprising a cylindrical casing B, having a thick bottom C and an annular flange D provided with a threaded portion D', over which is screwed the internally threaded upper end of a sleeve E, spaced from the casing B, and provided with an internally threaded lower end in which is screwed a threaded bottom F having a central boss F' on which the bottom C rests so as to hold the bottoms apart. The sleeve and bottom F are provided with apertures so as to allow a free circulation of water between the casing, sleeve and bottoms. These openings also form sockets for the jaws of a spanner-wrench which is used for securing the parts tightly together. The above description is given so that the advantages of my improvement can be readily set forth, it of course being understood that my improvement which will be later described, can be used with various other forms of bombs.

My invention comprises principally a cylindrical combustion vessel G adapted to be placed within the casing B, of the bomb, and is of such a size that when placed in position, an air space will be left between the walls of the vessel and the casing so as to form an air jacket in order that the vessel will not be affected by coming into contact with the water, whereby the vessel can become heated to incandescence by the charge placed therein which aids the combustion of the fuel. The upper end of the vessel G is provided with an annular shoulder I which fits snugly in the casing B at its upper end, and with an outwardly projecting annular flange J, having an insulating washer K arranged on the underside, adapted to be forced tightly down on the upper edge of the casing, as will be hereinafter fully described. It will be seen that by this construction the shoulder of the vessel is the only portion which comes into contact with the casing which is so mounted that the same will be protected to a certain extent, as will be later described. The ef-

fect of the water on the same through the casing will not prevent the vessel from becoming incandescent which is one of the most essential features of my invention. A
 5 cap L is then placed over the vessel G having a central plug L' which fits snugly in the upper end of the vessel G, so as to completely close the vessel to make it air-tight and if necessary a washer can be placed
 10 around the plug in an annular seat formed by a depending flange L² which extends down over the flange of the vessel and the insulating washer which prevents the flange from coming into direct contact with the
 15 water into which the bomb is placed to take a determination.

Arranged over the cap L, is an outer cap M having a central opening and an internally threaded lower portion adapted to
 20 work on an externally threaded flange B² formed on the casing B, adjacent its upper end, for securely locking the cap L and vessel G in position so as to form a water-tight joint between the members. The cap M is
 25 provided with apertures in its top and sides, to allow the water to circulate freely between the upper portion of the casing and the outer portion of the cap L, the apertures also forming sockets for the jaws of the
 30 spanner-wrench so that the same can be screwed tightly in position. It will be seen that by securing the vessel in the bomb in this manner, it is held firmly in position and at the same time is prevented from coming
 35 into direct contact with the water, only a very small portion of the vessel being in contact with the bomb.

Projecting upwardly centrally from the cap L is an integral hollow stem N having
 40 an insulating plug O secured in its upper end, through which extends a conducting wire P having a cap terminal Q secured on its upper end and extending into an insulating plug O' secured in a conical bore
 45 formed in the plug L' of the cap L, which communicates with the bore of the stem. The plug O' carries a terminal plug R having a threaded bore in which is adapted to be screwed a terminal S, which is provided
 50 with an opening S', adjacent its lower end, and a hooked lug S² over which is adapted to be secured the loop of my improved fuse wire T, the other end of which is secured over the lug of a similar terminal U secured
 55 in a threaded bore formed in the plug L' so that by making contact with any suitable current of electricity between the terminal cap Q and the stem N, the fuse wire T is quickly brought to incandescence in order to
 60 ignite the charge in the combustion vessel.

The fuse T is provided with a loop T' at each end which is formed by twisting the wire upon itself for such a distance that
 65 the twisted portion will extend into the

charge so as to insure ignition. The wire is placed in position on the terminals by forcing the loop through the openings of the terminals and hooking the same over the
 hook lugs, and it will be seen that by this
 70 construction the fuse wires can be made in different lengths to suit different size charges, which will enable an inexperienced operator to use the same with the assurance
 75 that the charge will be ignited at once without any danger of the wires being too short to ignite the charge as is often the case with inexperienced operators when trying to adjust the wires by guess work.

While I have shown and described my improvement used on an electric fuse bomb, it of course is understood that it can be used with the same results on a hot wire ignition bomb.

Having thus fully described my invention, 85 what I claim as new and desire to secure by Letters Patent is:—

1. A calorimeter bomb comprising a water-tight casing having an air-tight combustion vessel arranged therein and heat insulated 90 therefrom.

2. A calorimeter bomb comprising a water-tight casing having an air-tight combustion vessel arranged therein surrounded by an air-jacket. 95

3. A calorimeter bomb comprising a water-tight casing having an air-tight combustion vessel arranged therein surrounded by an air-jacket, said vessel being insulated from said casing. 100

4. A calorimeter bomb comprising a water-tight casing, a combustion vessel provided with a flange for supporting it within the casing, and a cap provided with a plug for closing said vessel and a flange for covering 105 the flange of the vessel.

5. A calorimeter bomb comprising a casing, a flanged combustion vessel arranged in said casing, surrounded by an air-jacket, and a cap for closing the mouth of said vessel, 110 and protecting the flange of the vessel from the water into which the bomb is placed.

6. In a calorimeter bomb, the combination with a casing, of a combustion vessel arranged in said casing having an annular 115 shoulder at its upper end, fitting snugly in the casing and provided with an outwardly projecting flange extending over the upper edge of the casing and a cap arranged over said vessel provided with a plug fitting 120 snugly in the vessel, and a flange extending over the flange of the vessel.

7. A calorimeter bomb comprising a casing, a combustion vessel having an annular 125 shoulder in its upper edge fitting in said casing, said shoulder having an outwardly projecting flange, an insulating washer carried by said flange adapted to rest on the upper edge of said casing, a cap provided with a plug adapted to fit snugly in the upper end 130

of said vessel, said cap having an annular depending flange extending down over the flange and washer of the vessel, and a second cap for securely locking said first-mentioned
5 cap in position.

8. In a calorimeter bomb, the combination with a pair of terminals having openings at their lower ends, of hooked lugs formed over

said terminals above said openings, and a fuse wire having loops formed on its ends adapted to be forced through said openings and hooked on said lugs. 10

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