July 9, 1929. G. H. HALVORSON 1,720,327

CRUCIBLE

Filed May 2, 1927

Fig. 1.

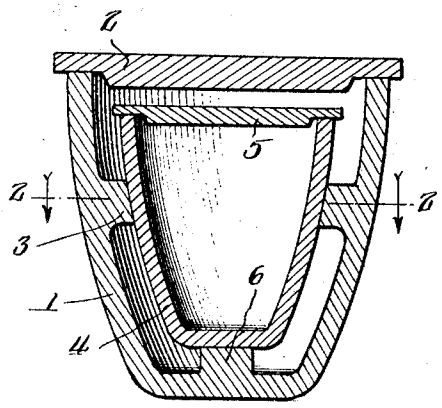


Fig. 2.

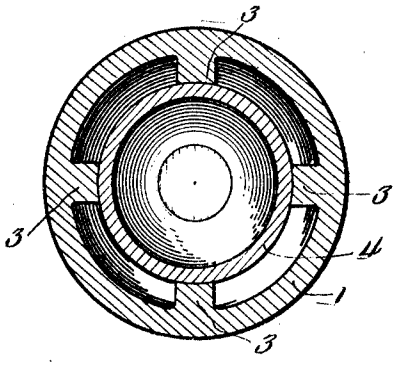


Fig. 5.

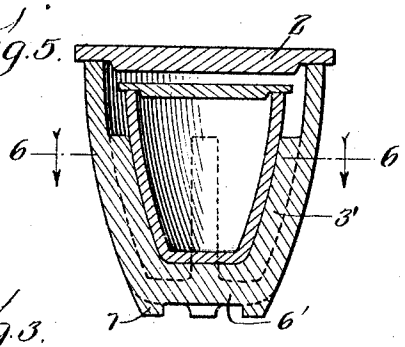


Fig. 6.

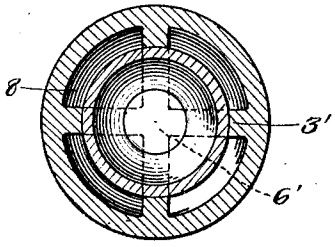


Fig. 3.

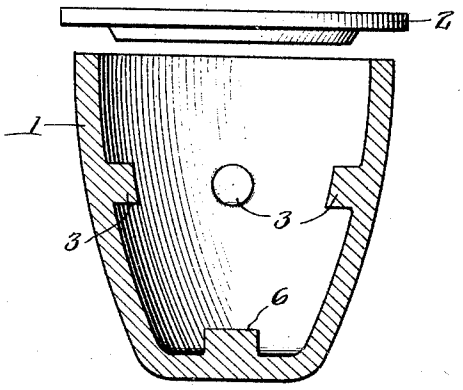
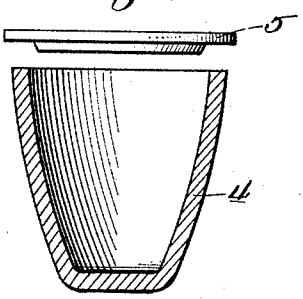


Fig. 4.



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UNITED STATES PATENT OFFICE.

GAYLORD H. HALVORSON, OF DULUTH, MINNESOTA.

CRUCIBLE.

Application filed May 2, 1927. Serial No. 188,237.

This invention relates to a new and improved apparatus for determining the volatile matter in fuel or other material.

Tests of this character are in general use for a number of purposes and particularly in connection with determining the volatile content of fuels, such as coal. Here the volatile content is an indication of a quality of the coal and of its suitability for various fuel purposes. It is highly important that tests such as these be so standardized as to enable different chemists in different laboratories to arrive at the same result in the tests of similar samples.

A method now in general use consists in placing a one gram sample in a platinum crucible of 15 cubic centimeters capacity and in placing the crucible in the front of a furnace registering 500 degrees centigrade until the flame subsides and then placing it in the interior of a muffle where the temperature is 950 degrees centigrade for three minutes, after which it is cooled and weighed, the loss in weight representing volatile matter. In carrying out the above method, a variation of one-half inch in the location of the crucible during the preliminary ignition may cause a variation in the volatile content determination of as much as 75/100 of 1%. While the same chemist using reasonable precautions may be able to obtain uniform results, it is very difficult for different laboratories to so manipulate the method that the coal will not be ignited more rapidly in one case than in the other.

It is an object of the present invention to provide a new and improved apparatus for the determination of the volatile matter in fuel or other material whereby the determination may be carried out by different persons with the assurance of securing uniform results.

It is a further object to provide a crucible which is lighter in weight, consequently easier to manipulate, which may be manufactured at a lower original cost and which absorbs less heat, allowing for a better control of the heating furnace temperature.

A more specific object is to provide a double wall refractory crucible, preferably of silica, having an air space between the inner and outer walls, thereby providing operating advantages of lightness in weight and lower original cost and maintenance.

Other and more specific objects will appear from the detailed description appended hereto.

In the drawings, wherein like reference characters designate like parts—

Figure 1 is a sectional elevation of a double wall crucible;

Figure 2 is a plan in section taken substantially on the line 2—2 of Figure 1;

Figure 3 is a sectional elevation of the outer casing of the crucible shown in Figure 1, showing the positioning lugs, and the cover is raised position;

Figure 4 is an elevation in section of the inner crucible with its top raised;

Figure 5 is a sectional elevation corresponding to Figure 1, but of a modified form of double wall crucible; and

Figure 6 is a plan view in section, taken substantially on the line 6—6 of Figure 5.

Referring particularly to the first modification, the outer casing of the double wall crucible comprises an outer wall 1 and a removable cover 2. Positioned at suitable intervals within the receptacle 1 are lugs or bosses 3 for maintaining an inner crucible 4, shown with its cover 5, in spaced relation to the outer receptacle walls. On the bottom of the receptacle, there is provided a lug or boss 6 for the purpose of positioning the bottom of the inner receptacle in spaced relation to the outer receptacle. It will, therefore, be seen that the inner crucible has an air space between it and the outer receptacle provided around the bottom, the sides and the top.

In the modification shown in Figures 5 and 6, instead of providing separate lugs or bosses 3 and 6, the opposite lugs are joined with the bottom lug, thereby forming a complete member 3′ and 6′.

Referring to Figure 6, it will therefore be seen that four air pockets 8 are provided substantially surrounding the inner crucible. It may also be found desirable to form the outer receptacle with legs 7 so that it may have an air space between the bottom and its support.

It has been usual to form the crucible of platinum, which is placed in some sort of a refractory casing, preferably magnesite. It is to be understood that the crucible shown may be made of platinum or any other suitable material, but it has been found preferable due to cheapness that the double

wall crucible be formed of any refractory material, preferably silica.

In the use of the device, a sample of the material to be tested is placed in the crucible 4. The cover 5 is placed over the crucible and it is lowered into the outer crucible or receptacle 1, which is covered by the cover 2. The assembled device may then be placed directly in the muffle, which is preferably at a temperature of 950° C., and due to the arrangement of the device, the sample will not be heated too rapidly. The rate of the heating will be uniform at all times, and the results secured by different laboratories using this apparatus will be truly comparable.

I have shown preferred illustrations of my device but it is to be understood that I do not wish to be limited to the modifications shown as other and various modifications may readily occur to those skilled in the art and come within the scope of the specification and appended claims.

I claim:

1. In a device of the character described, the combination of a silica receptacle, means in said receptacle comprising lugs for positioning a silica crucible in said receptacle whereby said crucible is spaced from the bottom and walls of the receptacle, and silica tops for said receptacle and crucible.

2. In an apparatus of the character described, the combination of an outer crucible, said outer crucible including a plurality of spacing lugs integrally formed therewith on the inner side wall and an additional spacing lug formed integral with said outer crucible on the inner side of the bottom thereof, a closure member adapted to extend across the open upper end of said crucible, a second crucible adapted to be disposed in said first-named crucible and to be spaced from the inner wall of said outer crucible by said spacing lugs and a closure member for said second crucible inwardly spaced from said outer closure.

Signed at Duluth, Minnesota, this 25th day of April, 1927.

GAYLORD H. HALVORSON.