

W. F. FINKL.

PROCESS AND APPARATUS FOR DETERMINING THE AMOUNT OF CARBON IN FERROUS METAL.

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1,382,072.

Patented June 21, 1921.

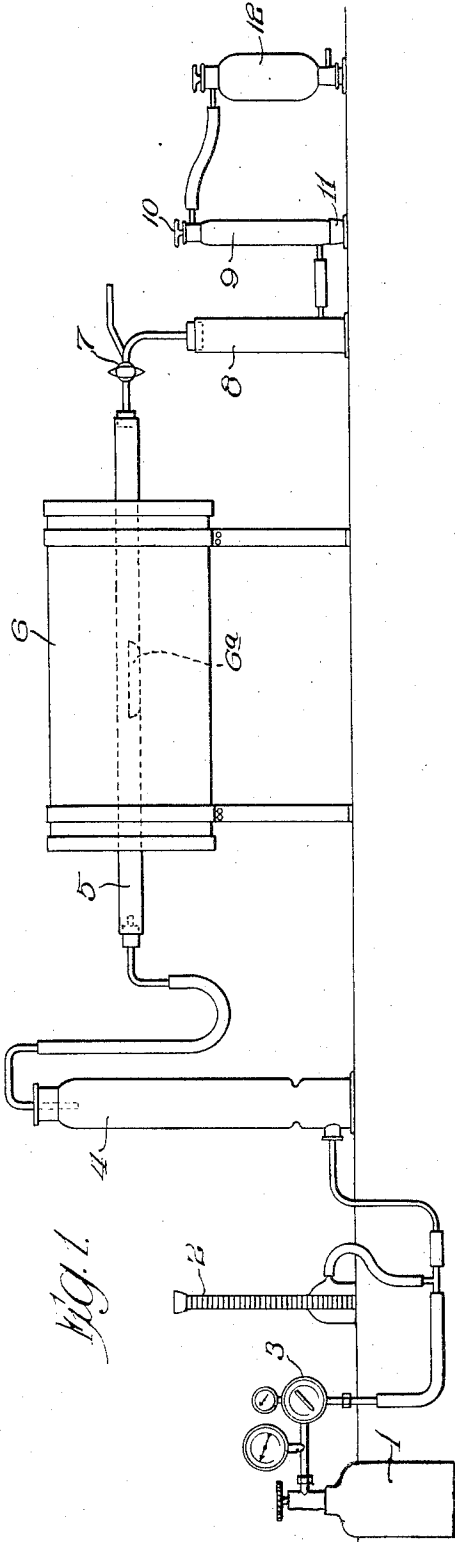


Fig. 2.

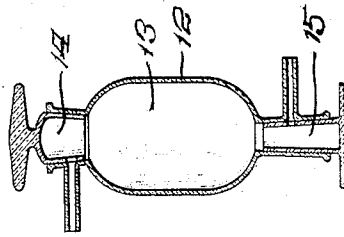
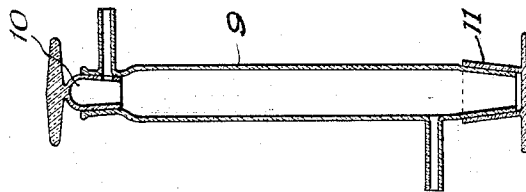


Fig. 3.



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Specification of Letters Patent. Patented June 21, 1921.

Application filed June 16, 1919. Serial No. 304,466.

To all whom it may concern:

Be it known that I, WILLIAM F. FINKL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Process and Apparatus for Determining the Amount of Carbon in Ferrous Metal, of which the following is a specification.

This invention relates to the process and apparatus of determining the amount of carbon in ferrous metal and has for its object to provide a new process and apparatus for this purpose wherein the amount of carbon may be accurately and quickly determined, and wherein the apparatus is simple and is easily manipulated, and the absorption bulb is of a new and improved and simplified form and can be used many times without renewing the absorbent material.

The invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a view of one form of apparatus for carrying out the process;

Fig. 2 is a sectional view of one form of absorption bulb;

Fig. 3 is a sectional view of the drying tube.

Like numerals refer to like parts throughout the several figures.

In carrying out the invention I provide a suitable source of oxygen, such as the oxygen tank 1. This tank is connected up in a suitable combustion train which may contain a mercury pressure gage 2 in any desired form. The oxygen is supplied at high pressure and is provided with any suitable pressure reducing valve 3. The combustion train may also contain a jar 4 containing some suitable material. In the lower part of this jar I place fused calcium chlorid. In the upper part I place an absorbent to remove carbon dioxide. This jar serves as a drier and purifier for the incoming gas. There may also be connected in the train a fused silica combustion tube 5 of suitable length and diameter and preferably glazed on the inside. Some suitable material such as asbestos is loosely packed in the exit end of this tube for a proper length from the stopper. Inside the tube 5 is a pure nickel sleeve placed in the combustion zone to protect the tube from the action of the spraying oxide of iron. A suitable combustion furnace 6 is provided and which as

shown, is an electrically heated carbon combustion furnace in which a suitable temperature, say for example 1,800° F. may be maintained at all times. The tube 5 passes through this furnace. A suitable combustion boat or receptacle 6^a is placed in the tube 5 as shown and the sample of ferrous metal such as steel or iron to be tested is placed in this boat. This metal to be tested may be drillings or the metal may be in any other suitable form, and is spread in a V shaped groove made in alundum contained in the combustion boat.

A three way cock 7 is placed in the stopper at the exit end of the tube 5. This enables the operator to flush the train without passing the gas through the purifying tubes and absorption bulb. The train may also contain a tube 8 containing mesh zinc which takes care of any of the sulfur gases evolved by the combustion. This may, for example, be a twenty mesh zinc. On the low sulfur steels this tube may be omitted. The train also contains a drying tube 9 filled with phosphoric anhydrid. This drying tube is provided at the top with an upper stopper 10 packed with asbestos to prevent fine particles of the anhydrid from passing over into the absorption bulb. As the anhydrid liquefies it drops down through the glass wool into the lower stopper 11. This lower stopper is arranged as shown in Fig. 3 so that it engages the exterior of the tube 9. This drying tube is not claimed in the present case but is claimed in a divisional application. This prevents the anhydrid from getting between the stopper and the face of the tube which it engages. The absorption bulb 12 is the last element illustrated in the combustion train. It consists of a single chamber 13 (see Fig. 2) and has an upper stopper valve 14 and a lower stopper valve 15, the lower stopper valve also acting as a base for supporting it. This absorption bulb is filled with a mechanical mixture in a dry form of an hydroxid of an alkali metal such as sodium hydroxid or potassium hydroxid thoroughly mixed with fibrous material such as asbestos, the fibrous material being in a finely divided state. This fibrous material is for the purpose of separating the particles of the hydroxid of an alkali metal so as to create a larger surface area for the absorption of the carbon dioxide.

In the operation of the device the weighed sample of ferrous metal to be tested is put in the boat 6^a and the boat is then placed in the combustion zone of the furnace as shown in Fig. 1. The sample of ferrous metal is burned in the presence of oxygen. The carbon of this sample is then converted into carbon dioxid which is forced through the absorption bulb 12 and is absorbed by the absorbent material therein. After the sample has been burned the oxygen is allowed to sweep through the train for a little while, say two minutes, so as to force all of the carbon dioxid into the absorption bulb. The absorption bulb is then weighed to ascertain its gain in weight and this gain represents the amount by weight of carbon dioxid produced by the burning of the sample. It is then an easy matter to calculate the amount of carbon in the sample as for example by multiplying by the factor .2727.

I claim:—

1. The process of determining the amount of carbon in ferrous metal which consists in passing the carbon dioxid produced from the carbon of the ferrous metal, through a dry, physical mixture in a finely divided state of an hydroxid of an alkali metal and fibrous material so as to cause the carbon dioxid to be absorbed thereby.

2. The process of determining the amount of carbon in ferrous metal which consists in

passing the carbon dioxid produced from the carbon of the ferrous metal through a dry finely divided physical mixture of sodium hydroxid and asbestos fiber so as to cause the carbon dioxid to be absorbed thereby.

3. An apparatus for determining the amount of carbon in ferrous metal comprising a receptacle having a single chamber, an inlet at the top of said chamber for the admission of the carbon dioxid, an outlet at the bottom of said chamber, and a finely divided mechanical mixture of hydroxid of an alkali metal and fibrous material contained within said chamber.

4. An apparatus for determining the amount of carbon in ferrous material comprising a receptacle having a single chamber, an inlet at the top of said chamber for the admission of the carbon dioxid, an outlet at the bottom of said chamber, a stopper valve for controlling said inlet, and a separate stopper valve for controlling said outlet, a dry mechanical mixture of sodium hydroxid and asbestos fiber forming a filling for said chamber.

In testimony whereof, I affix my signature in the presence of two witnesses this 28th day of May, 1919.

WILLIAM E. FINKL.

Witnesses:

EDNA B. PETERSON,
EDITH L. PORTER.