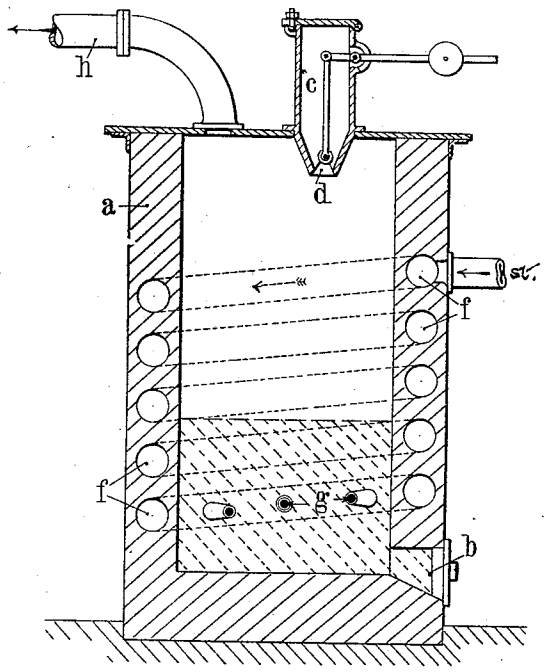
G. F. JAUBERT.

PROCESS FOR THE PREPARATION OF HYDROGEN BY AUTOCOMBUSTION.

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1,099,446.

Patented June 9, 1914.



Witnesses
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UNITED STATES PATENT OFFICE.

GEORGE FRANÇOIS JAUBERT, OF PARIS, FRANCE.

PROCESS FOR THE PREPARATION OF HYDROGEN BY AUTOCOMBUSTION.

1,099,446. Specification of Letters Patent. Patented June 9, 1914.

Application filed March 1, 1912. Serial No. 680,917.

To all whom it may concern:

Be it known that I, GEORGE FRANÇOIS JAUBERT, of 155 Boulevard Malesherbes, Paris, in the Republic of France, have invented certain new and useful Improvements in and Relating to Processes for the Preparation of Hydrogen by Autocombustion, of which the following is a specification.

In my prior application Serial No. 626,527, filed May 11th 1911 I have described an improved process for the preparation of hydrogen by auto-combustion, in a closed vessel, of a mixture containing an excess of fuel (metal, metalloid or alloy) and of a comburent or oxidizing agent capable of maintaining the combustion inside the closed vessel, in the presence of steam. Now, by carrying the said process into practice some bodies such as sodium and lime and the like are employed, the effect of which is to increase the cost of the process. The inventor has found that some metals, metalloids or alloys, particularly iron alloys, when heated at a very high temperature in a current of steam, kindle themselves, that is to say, they burn, and the combustion continues automatically with a strong output of hydrogen, without necessitating any exterior nor further heating, nor any addition of oxidizing agents, other than steam, this latter being sufficient to maintain the combustion. If this re-action is applied to ferro-silicon, containing 75% Si, corresponding about to the formula $FeSi_6$, the following equation is obtained:

$$3FeSi_6+4OH_2O=Fe_3O_4+18SiO_2+4OH_2.$$

which shows clearly the oxidizing action of the steam.

The present invention has for its object a process for the preparation of hydrogen by auto-combustion, in a closed vessel, of a metal, a metalloid or an alloy which has been previously heated to a very high temperature the combustion being effected in the presence of an oxidizing agent, and the process is characterized by the fact that the oxidizing agent is exclusively formed by the steam, the great advantage of the process being that any expensive ingredient is avoided. The metals, metalloids and alloys, which give the best result are ferro-alloys, particularly those having as a base silicon, aluminium, manganese and calcium.

The speed of the re-action may be increased or controlled by adding to the metal or alloy in the powdered state, a suitable quantity of an alkaline base such for example as lime. This addition of a relatively cheap alkaline base has for its result to give a better slag and also to regulate the combustion.

The accompanying drawing shows as an example, a sectional elevation of apparatus suitable for carrying the process into practice in a continuous manner.

The apparatus consists of a vat *a* of refractory material, having at its bottom an aperture *b* serving as an outlet for the slag, and at the upper part of the vat is a hopper with cup and cone feeder *c*—*d*.

f is a steam supply pipe or a pipe for the supply of water intended to be converted into steam, and *g* are nozzles for injecting the steam into the vat. The hydrogen exit pipe is shown at *h*. A suitable quantity of metal, metalloid or alloy is introduced into the vat and to this metal, metalloid or alloy a suitable quantity of the cheap alkaline base (such as lime) may be added or not. The contents of the vat are then kindled by any well known method.

Owing to the heat of the re-action the steam becomes superheated or else, the water entering at *f* through the nozzles *g* in the form of steam becomes volatilized. The steam is decomposed by its contact with the metal at a high temperature, the oxygen of the water being utilized for the combustion of the metal, metalloid or alloy and the hydrogen escaping through the pipe *h*. When necessary some metal is introduced through the hopper *c* either in the form of powder or in pieces, with or without the alkaline base referred to. In this manner a continuous process for preparing hydrogen is obtained. The slag may be extracted at *b* during the operation.

What I claim is:

1. The herein described process for the preparation of hydrogen by auto-combustion, which consists in introducing steam into a closed vessel containing previously heated ferro-silicon; substantially as described.

2. The herein described process for the preparation of hydrogen by auto-combustion, which consists in introducing steam into a closed vessel containing lime and previously-heated ferro-silicon; substantially as described.

3. The herein described process for the preparation of hydrogen by auto-combustion, which consists in introducing steam into a closed vessel containing lime and previously-heated powdered ferro-silicon; substantially as described.

In testimony whereof I have hereunto placed my hand at Paris, this sixteenth day of February, 1912.

GEORGE FRANÇOIS JAUBERT. [L. S.]

In the presence of two witnesses:
LUCIEN MEMMINGER,
HENRY SCHWAB.