

UNITED STATES PATENT OFFICE.

LÉON PIERRON, OF BRUSSELS, BELGIUM.

IGNITING-BODY FOR AUTOMATIC IGNITION OF COMBUSTIBLE GASES.

SPECIFICATION forming part of Letters Patent No. 657,004, dated August 28, 1900.

Application filed October 7, 1898. Serial No. 692,938. (No specimens.)

To all whom it may concern:

Be it known that I, LÉON PIERRON, a citizen of the French Republic, residing at Brussels, Belgium, have invented new and useful
5 Improvements in Igniting-Bodies for the Automatic Ignition of Combustible Gases, (for which I have applied for patents in Belgium, No. 134,292, bearing date March 9, 1898; in Germany, bearing date March 12, 1898; in
10 France, No. 276,591, bearing date March 31, 1898; in Austria, No. 48/4,162, bearing date August 2, 1898; in Hungary, bearing date April 6, 1898; in Russia, bearing date April 25, 1898; in Great Britain, No. 15,414, bearing date July 13, 1898,) of which the following is a specification.

This invention has for its object the production of bodies having for their basis the sponge or black of platinum, (or of metals
20 of this group,) which is capable of effecting ignition at ordinary temperature by the union of combustible gases with air, but having the advantage of being capable of remaining without change in the flame—that is to say,
25 of retaining their igniting properties intact—the object in view being to produce igniting-bodies which are not intended to be withdrawn from the flame by mechanical means immediately after ignition. It has been
30 sought for a long time to effect this object by purely chemical means, or by means both chemical and mechanical, by utilizing the well-known properties of spongy platinum (or of metals of the same group) or by adding
35 thereto mechanical devices having for their object to render its action more efficient and more durable. However, it has not been possible up to the present to produce igniting-bodies sufficiently suitable for practical and
40 commercial use, because the sponge employed readily became agglomerated and lost its properties or it was carried away by the current of gas or it required to be heated previous to acting. In order to remedy these drawbacks, it has been tried to divide the igniting
45 mass by means of inert substances; but if the researches made in this direction be examined it will be at once noted that the most diverse substances have been employed indifferently, incombustible and porous materials being simply used without any consideration whatever of their chemical composition, while also secondary reactions have al-

ways destroyed their efficacy and have rapidly rendered useless the bodies so produced. 55
Among the better-known igniting-bodies are those obtained after Doebereiner's principle by distributing platinum-black or blacks of other metals of the same group in natural refractory porous bodies, such as lava, asbestmehl, meerschäum, kieselguhr, &c. The
60 chemical composition of said bodies varies considerably, according to the sources from which they are obtained, and as they are mixtures or combinations of silica with alkaline or terrous oxids or alkaline-terrous oxids this explains their prompt alteration when they are allowed to remain permanently in the flame. The investigations which I have made
65 for ascertaining the exact cause of this want of success have led me to discover means of obviating these secondary reactions. For this purpose the body designed to produce ignition must be formed by the intimate union of two elements having the following
70 functions: (a) a porous or finely-subdivided product (or mixture of products) constituting to some extent a support intended to prevent the agglomeration of the second element and which I term the "supporting" element; (b)
75 a body (or mixture of bodies) having the property of producing the union of the gas with the air in such a manner as to effect the ignition and the lighting of the same, which I term the "igniting" element. Platinum and
80 metals of that group have the property of igniting gases when they are in a finely-divided state, but they lose that property when the porous condition disappears. This change is produced by an altered condition of the platinum due to one of the following causes: first,
85 an alloyage of the platinum with another metal; second, the formation of a compound wherein the platinum performs the part of an acid and unites with another ingredient to form a platinate. Evidently such changes
90 will take place only when the platinum is in presence of an oxid of salt of easy reduction or an alkaline, terrous, or alkaline-terrous oxids, or even salts formed by the union of these oxids with others, as the platinum may take the place of the oxid combined with the acid oxid. I have therefore formed what I
95 term the "supporting" element of substances which are infusible, non-volatile, and unchanged by the atmosphere, said substances 105

also presenting acid properties similar to those of platinum, so that a chemical combination with the latter shall be impossible. As the presence of other bodies, however small their quantity, would surely result sooner or later in producing a change in the platinum, I have eliminated such bodies entirely. I use as dividing matters oxids of silicon, titanium, niobium, tungsten, molybdenum, tantalum, vanadium, and the like, or, in other words, acid oxids which are infusible, non-volatile, unalterable in the air, and incapable of either forming chemical combinations with platinum or reacting upon one another in the conditions of use, the said oxids being obtained in a pure state and used as hereinafter described. The said oxids are used in the porous or finely-divided state, then impregnated with a salt or a mixture of salts of the platinum group, and sponge or black is afterward formed as usual and by known means. If it is desired to obtain bodies which shall be not only durable, but which shall have various other igniting properties (rapidity of ignition, &c.) in a highly-developed degree, it will be necessary to employ platinum salts (or analogous salts) which shall be not only very pure, but also capable of being decomposed without fusing—such as organic salts, &c.—and to subject them to the action of heat under the particular conditions which will be hereinafter stated in examples. The preparation of the oxids may be effected by starting from their natural or artificial combinations with alkalies or alkaline earths, which are subjected, for instance, to the treatments described in the *Treatise of Analyses* of Professor Frésenius for the purpose of obtaining these oxids in the state of purity. By properly selecting the raw material a tenuous precipitate may be obtained, if the raw material is a liquid, or a porous skeleton of oxid preserving the shape of the primitive body, if the raw material is a solid. However, as from the point of view of the homogeneity of the bodies to be produced it is often more convenient to operate by molding I shall cite two examples, so as to more particularly specify the details of the operation.

(a) A mixture of one hundred grams of pure gelatinous silica of ten per cent. (obtained by starting from the fluorid of silicon in order that it shall not contain any soda) with two grams of chlorid of titanium of two per cent. and fifty grams of solution of oxalate of platinum of four per cent. of platinum and ten grams of solution of salt of palladium of one per cent. has added to it a solution of gum tragacanth in such a manner as to produce a paste which can be easily molded. The pastilles are dried in a vacuum, (produced by a suction-pump,) commencing at the ordinary temperature, then heating progressively in a water-bath in such a manner as to reach 100° in forty-eight hours. The temperature is then continued and increased progressively and slowly (the vacuum being always contin-

ued) until the organic substances are entirely decomposed. In this manner there is obtained an igniting-body composed of oxids of silicon and titanium, containing in its pores a mixture of platinum and palladium in a state of very fine subdivision.

(b) Or the mixture may be made of gelatinous silica, chlorid of titanium, and gum tragacanth. The paste thus produced is molded. The bodies are dried at 50° and then at 100° in an ordinary regulator-stove. They are then dipped in a solution of oxalate of platinum, and when they are completely saturated (which is verified by breaking one of them and seeing whether the center is of the same color as the periphery) they are drained, dried, and calcined in a vacuum, care being taken that the temperature is only allowed to rise slowly. In this manner there is produced a final body of the same composition as that in the preceding example.

Instead of preparing the igniting-body as above described I may prepare any other solid, liquid, or pasty mixture containing, for example, (a) one or more of the above-mentioned oxids or a substance which when subjected to the action of heat will produce the same, (hydrates, organic salts, ammoniacal salts, &c.); (b) black or a decomposable salt of platinum or of analogous metals, preferably a salt which decomposes without fusing; (c) an organic substance. The said liquid or pasty mixture may be spun after the manner of artificial silk, or it may be used to impregnate porous bodies or washed vegetable thread or fabric or any other substance that can be destroyed without leaving a residue, which when used alone or in combination with platinum (or analogous) wire will yield on calcination an igniting skeleton that retains the shape of the body which has served in their preparation.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. A compound body for the ignition of gases, consisting of a base of metal of the platinum group, and pure acid oxids in a finely-divided or porous condition and having the metal combined therewith, substantially as and for the purposes described.

2. In a compound body for the ignition of gases, a supporting element for the igniting element, the same consisting of acid oxid in an absolutely pure condition, to prevent the agglomeration of the igniting element, said oxids being mingled with an organic compound to form a paste capable of being molded, dried and calcined, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

LÉON PIERRON.

Witnesses:

H. T. E. KIRKPATRICK,
J. S. KIRKPATRICK.