No. 680,813. Patented Aug. 20, 1901.

A. SIMONINI.

AUTOMATIC GAS IGNITING DEVICE.

(Application filed June 5, 1901.)

(No Model.)

Fig. 1.

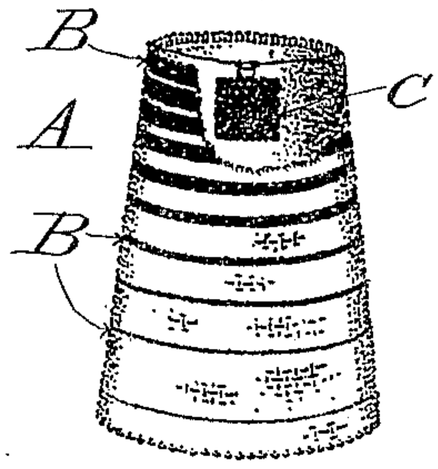


Fig. 3.

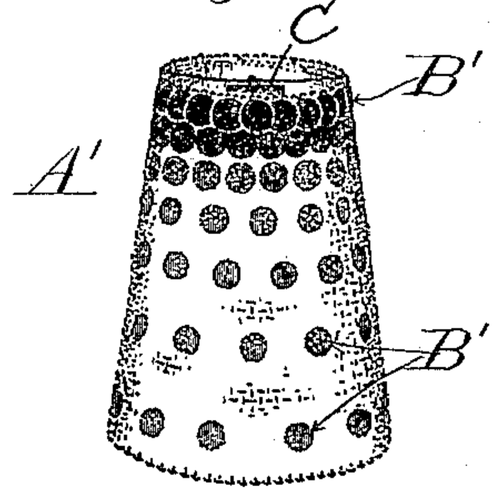
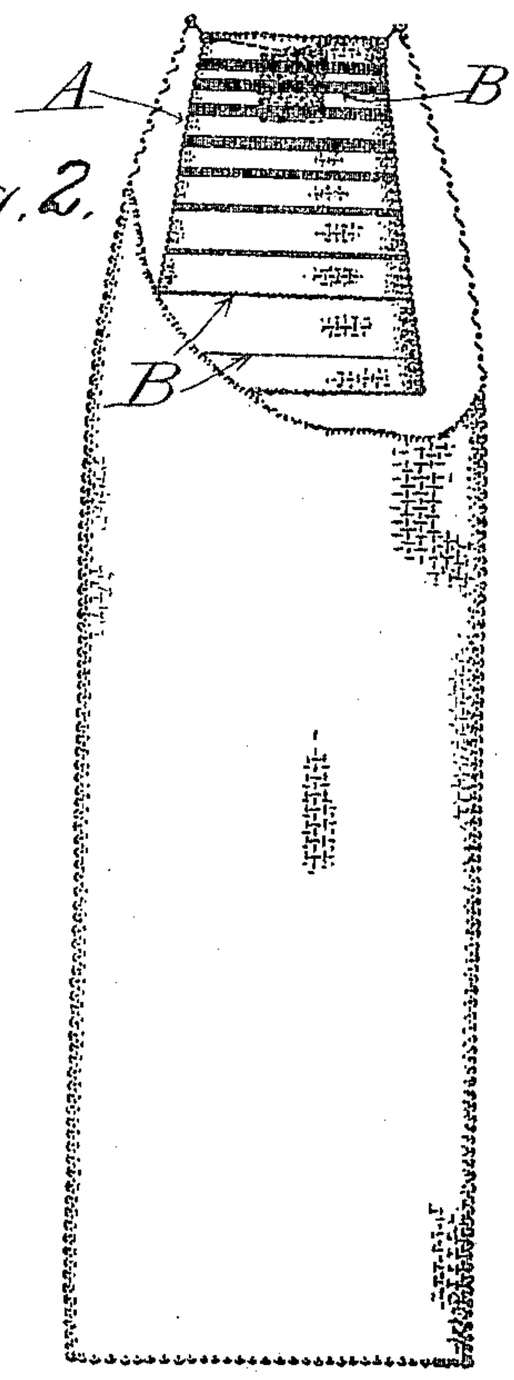


Fig. 2.



WITNESSES:

W. C. Burdine.

J. B. Malnaté.

INVENTOR:

Angelo Simonini

BY

Dodge and Sons

ATTORNEYS.

UNITED STATES PATENT OFFICE.

ANGELO SIMONINI, OF GLOUCESTER CITY, NEW JERSEY.

AUTOMATIC GAS-IGNITING DEVICE.

SPECIFICATION forming part of Letters Patent No. 680,813, dated August 20, 1901.

Application filed June 5, 1901. Serial No. 63,306. (No model.)

To all whom it may concern:

Be it known that I, ANGELO SIMONINI, a citizen of Austria, and a subject of the Emperor of Austria-Hungary, residing at Gloucester City, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Automatic Gas-Igniting Devices, of which the following is a specification.

This invention has reference to an igniting device for automatic gas lighting, the construction of which will be hereinafter fully set forth, reference being had to the annexed drawings, wherein—

Figure 1 is a detail view of the igniting device; Fig. 2, a sectional view of a mantle with the igniter applied thereto, and Fig. 3 a detail view of a modified form of the igniting device.

Investigation has shown that the addition of platinum chlorid to rare earths under certain circumstances produces a very effective and durable igniting compound; but recent researches prove that other metals of the platinum group may be used for the same purpose more effectively and with greater economy. The percentage in the case of iridium or rhodium, if used, is as low as nineteen one-thousandths of one per cent. and even less. It has heretofore been proposed to employ a combination of materials containing a slight trace of platinum metal as an addition to rare earths in order to increase the light-giving capacity. These combinations are of no practical value for use in automatic gas-lighters, especially those which are subjected to a continuous exposure to the heat and influence of the flame. As in previous instances, I find that the compounds most efficient for illuminating purposes through their high incandescence are not suited for igniters when placed in a Bunsen flame, as they do not readily take up the glow from the preliminary or intermediate heaters. My last researches, however, again prove that the same elements which constitute the integral parts of the best incandescent mantles furnish good igniters if used in different proportions and in proper relation or arrangement relative to each other.

An igniter must have the property of producing a high temperature and to a certain degree bright incandescence when started in catalytic action. Further, it must take up with ease the glow from an intermediate heater, such as will be hereinafter described, and cause it to spread throughout its entire body or surface. The compounds used for incandescent mantles produce a high temperature and bright incandescence when started in catalytic action; but they do not readily take up the glow from an intermediate heater, and if they do so in the beginning they soon lose that property when subjected to the influence of the flame.

It is a rule so far without exception that in combinations used for incandescent gas lighting the elements which are especially adapted for catalytic action are present in very small quantities. A comparatively small increase in the percentage of those elements over the amount that gives the highest efficiency causes a material decrease of the incandescence; but while the efficiency in that respect decreases the efficiency as an igniter increases, but only up to a certain limit.

As pointed out in my previous Patent No. 670,334, the variation of the percentage of platinum in combination with rare earths—thorium oxid, for instance—produces the following results: A compound containing from twenty-five to one hundred per cent. of platinum in the form of platinum-black will have a catalytic action at any temperature if placed in the flow of mingled air and gas. The resulting glow is not bright, and the temperature is comparatively low. A compound consisting of seventy-five per cent. platinum-black, twenty-four per cent. thorium oxid, and one per cent. cerium oxid may be used as a preliminary heater. If the percentage of platinum-black be as low as twenty-five per cent., the results are not reliable. Where a smaller percentage of platinum is used, the catalytic action is started only when the compound is preliminarily heated by a compound containing a greater percentage of platinum-black. A compound containing a small percentage of platinum is used as an intermediate heater. The resulting glow in the intermediate heater is brighter and the temperature higher than that in the preliminary heater, but is not high enough to ignite the gas until the percentage in the case of

platinum is less than the one resulting from an addition of one and one-half per cent. platinum chlorid to thorium nitrate. In that case, or especially if a still less percentage of platinum is employed, it is found that in order to excite the compound into catalytic action it is required that not only a preliminary heater, but also an intermediate heater, which of itself cannot produce catalytic action at ordinary temperatures, but which when once started by the preliminary heater produces a higher temperature than the latter, be employed. An efficient combination which will readily ignite the gas is made up from one-half of one per cent. platinum chlorid, one per cent. cerium nitrate, and ninety-eight and one-half per cent. thorium nitrate. If the percentage of platinum is again reduced, I find that the incandescence rapidly increases. Such a compound is difficult to start into catalytic action, and after having been subjected to the influence of the flame for twenty-four hours can only be started into action by being placed in a Bunsen flame. Exactly the same condition exists if any other platinum metal, such as rhodium or iridium, is substituted for platinum, only it takes less rhodium or iridium to make an igniter. A rhodium igniter should contain about two one-hundredths of one per cent. of rhodium, the rest being thorium oxid ninety-nine per cent. and cerium oxid ninety-eight one-hundredths of one per cent. If the percentage be increased up to one-half of one per cent, the product will be an intermediate heater not capable of igniting the gas. Reducing the percentage of rhodium to about one one-hundredths or five one-thousandths increases the incandescing power; but it does not readily take up the glow from the intermediate heater and will act in a catalytic manner only when subjected to the influence of a Bunsen flame.

From the preceding it will be seen that it is most important to gradually build up the heat in order to produce a reliable and quick-acting self-lighter, and this may be done in different ways. One way would be to paint several lines or spots on an incandescent mantle, the lines or spots preferably overlapping each other a little, and to employ with said mantle a preliminary heater consisting, essentially, of platinum-black. The several lines or spots must be made with solutions having different percentages of rhodium, so that the igniting-line will carry two one-hundredths of one per cent. rhodium, the one next to the igniting-line about one-tenth of one per cent., and the following about two-tenths of one per cent. It is obvious that by following this method difficulty will arise in controlling the proportions, as the percentage of rhodium in the different lines not only depends on the percentage of rhodium in the various solutions to be painted on the mantle, but also on the relative quantity of the solution which is put on the mantle. It is of the greatest importance that the igniting portion should have the proper percentage of rhodium incorporated, and it is therefore preferable to impregnate a separate webbing to carry the igniting compound. Another webbing to be placed in close proximity to the igniter may be impregnated with a solution for an intermediate heater containing, say, from four one-hundredths to two-tenths of one per cent. of rhodium, the remainder being thorium nitrate and cerium nitrate in the proportions of ninety-nine to one. It is not necessary to impregnate a special webbing for the intermediate heater, as the percentage of rhodium therein may vary more than in the one for the igniter. Therefore the lighter may be made up in the following manner:

A piece of webbing in the form of a ring-section—such, for instance, as A, Fig. 1—is impregnated with a solution of ninety-nine per cent. of thorium nitrate, ninety-eight one-hundredths of one per cent. cerium nitrate, and two one-hundredths of one per cent. rhodium chlorid. This body forms the igniter. The webbing is dried and is then painted in a series of lines B, Fig. 1, or overlapping spots B′, Fig. 3, with a solution for an intermediate heater, said solution containing ninety-nine per cent. thorium nitrate, eight-tenths of one per cent. cerium nitrate, and two-tenths of one per cent. of rhodium chlorid. This solution painted on the igniting-webbing increases the percentage of rhodium in the igniting-webbing on the painted spots from two one-hundredths of one per cent. to about twelve one-hundredths of one per cent. or less, according to the quantity applied. The ring-section of the webbing is painted heavier at the upper end and gradually lighter toward the lower portion, care being taken not to paint along the lower edge thereof at a distance, say, one-eighth of an inch from the edge. These painted lines or spots constitute the intermediate heater. The preliminary heater, (designated by C, Fig. 2,) which shows a mantle with my self-igniter applied thereto, is held in contact with webbing A near the upper end thereof. Said preliminary heater consists, essentially, of platinum-black. The webbing or section which has been treated as above is bent into a cone and suspended from the top of the mantle, as in Fig. 2.

I am aware that lighters have heretofore been described consisting of a preliminary heater and one or more lines painted on an incandescent mantle; but in no case is there a gradual building up of the heat in accordance with the peculiar properties of the different compounds containing different percentages of the platinum metal. In United States Patent No. 670,334 a lighter is described wherein there is a gradual building up of the heat; but platinum alone is described as the metal employed, and at that time rhodium and iridium were not considered practical. As will be seen from the

following statement, it is of the greatest importance to control the percentage of the metal in the limits stated. If the painting of the igniting-webbing is not carried out as prescribed, or if there is no gradual decrease, but a sharp falling off of the percentage of rhodium from the upper to the lower end of the webbing, it will be found that after a comparatively few burning hours the glow will not travel from the upper to the lower end, but will stop at the sharp break or at the point where the rhodium leaves off, and consequently the gas will not be ignited.

It is of course to be understood that the rare earths used in the solution are in the form of nitrates and that preferably the metal or metals are in the form of chlorids. When, however, the lighter is ashed or burned, the nitrates, if nitrates are employed, are changed into oxids and the metal chlorids destroyed, leaving the metal present.

Having thus described my invention, what I claim is—

1. A lighter for gases and vapors, comprising in combination a preliminary heater; a secondary heater consisting of rare earths and rhodium; and an igniter containing rare earths and rhodium, the rhodium being present in the igniter in a percentage of substantially two one-hundredths of one per cent.

2. A lighter for gases and vapors, comprising in combination, a preliminary heater; a secondary heater consisting of a body of fibrous material impregnated with a solution containing thorium nitrate ninety-nine per cent., cerium nitrate and rhodium chlorid, the cerium nitrate being present in a greater percentage than the rhodium chlorid; and an igniter consisting of ninety-nine per cent. thorium nitrate, cerium nitrate and rhodium chlorid, the rhodium chlorid being present in a percentage of substantially two one-hundredths of one per cent.

3. A lighter for gases or vapors, comprising in combination, a preliminary heater; and a body of fibrous material in close relation to said heater, said body being treated with a solution consisting of nitrates of rare earths and rhodium chlorid, and the upper portion of the webbing being subsequently treated with a second solution containing the same constituent elements, the rhodium chlorid being present in a greater percentage.

4. A lighter for gases or vapors, comprising in combination, a preliminary heater of platinum-black; and a body of fibrous material in close relation thereto, said body being impregnated with a solution of rare earths and a metal of the platinum group to form an igniter; and a portion of said body being also treated with a second solution to form an intermediate heater, said solution containing the same constituent elements with the metal present in a greater percentage and amounting to substantially two-tenths of one per cent.

5. A lighter for gases or vapors, comprising in combination, a preliminary heater of platinum-black; an igniter comprising a body of fibrous material impregnated with a solution of thorium nitrate ninety-nine per cent., cerium nitrate ninety-eight one-hundredths of one per cent., and rhodium chlorid two one-hundredths of one per cent.; and an intermediate heater formed on the fibrous body with a solution containing ninety-nine per cent. thorium nitrate, and the remaining one per cent. composed of cerium nitrate and rhodium chlorid, the chlorid being present in a quantity amounting to substantially two-tenths of one per cent.

6. A lighter for gases or vapors, comprising in combination, a preliminary heater of platinum-black; an igniter comprising a body of fibrous material surrounding the same, said body being impregnated with a solution of thorium nitrate ninety-nine per cent., cerium nitrate ninety-eight one-hundredths of one per cent., and rhodium chlorid two one-hundredths of one per cent.; and an intermediate heater formed on the upper portion of the fibrous body with a solution containing ninety-nine per cent. thorium nitrate, eight-tenths of one per cent. cerium nitrate, and two-tenths of one per cent. rhodium chlorid, said solution being applied in gradually-decreasing quantity from the upper end of the fibrous body toward the lower end thereof.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

A. SIMONINI.

Witnesses:
FRANK L. KELLNER,
H. WILMER NORTH.