H. C. PARKER.

PROCESS OF MAKING INCANDESCENT ELECTRIC LAMP FILAMENTS.

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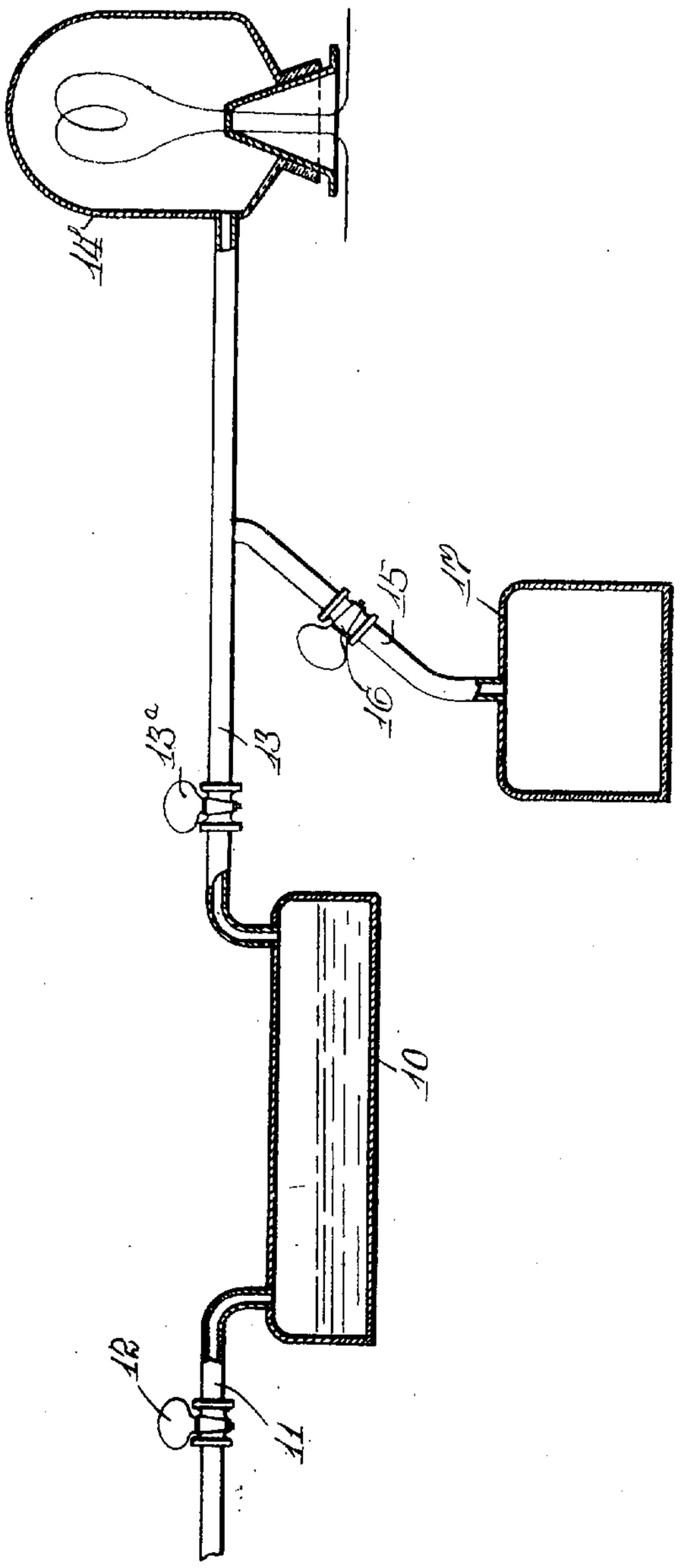
974,812. Patented Nov. 8, 1910.



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UNITED STATES PATENT OFFICE.

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PROCESS OF MAKING INCANDESCENT-ELECTRIC-LAMP FILAMENTS.

974,812. Specification of Letters Patent. Patented Nov. 8, 1910.

Application filed April 10, 1909. Serial No. 489,050.

To all whom it may concern:

Be it known that I, HERSCHEL C. PARKER, of the city of New York, county of Kings, and State of New York, have invented a new and useful Improvement in Processes of Making Incandescent-Electric-Lamp Filaments, of which the following is a full, clear, and exact description.

My invention relates to improvements in a process of making filaments for incandescent electric lamps, and the object of my invention is to produce a filament having a core either of carbon or metallized carbon with a coating of coherent, metallic chromium.

I have found that if chromium is deposited on a core in a coherent metallic condition, it makes a very satisfactory filament, as it has a high melting point, and produces a filament which has a long life and low wattage. I am aware that attempts have been made to produce satisfactory chromium filaments, but it has been found difficult to produce a filament on which the coating is a strictly coherent metallic structure. In many attempts, the deposit has been largely carbon or else in the form of an oxid of chromium, which under certain conditions resembles the metal, but is useless for lighting purposes.

In order to accomplish the required result, it is necessary to have in the flashing jar an excess of the vapor of chromium oxy-chlorid and a reducing and chlorin absorbing gas. The absorbent for the chlorin must be something for which the chlorin has a greater affinity than for the chromium so that when the chlorin is freed it will not recombine. For this purpose olefiant gas C_2H_4 seems to be the best gas, though other hydro-carbon gases can be used, such for instance as marsh gas or acetylene. The boiling point of chromium oxy-chlorid which is about 115 degrees centigrade, is so high that a sufficient amount does not vaporize into the treating jar directly, and if it is attempted to boil it in, the vapor condenses in the treating jar and is very troublesome. I have therefore found that the best way to introduce this excess of the chromium oxy-chlorid vapor is to make use of a vaporizer such as shown in the accompanying drawing, in which 10 is a glass tube which is preferably six to twelve inches long and from one to two inches in diameter. An inlet tube 11 controlled by the cock 12 is arranged near one end of the tube and above the oxy-chlorid contained therein, while an outlet tube 13 controlled by the cock 13ª rises from the upper part and opposite end of the tube and connects with the flashing jar 14 which can be of any usual type. The pipe 15, preferably controlled by the cock 16 and connecting with a tank 17 of the olefiant gas, also connects with the pipe or tube 13. It is necessary to have the olefiant gas mix with the hydrogen after the latter has become saturated with the oxy-chlorid vapor, because if the olefiant gas is first mixed with the hydrogen to any great extent, it has a tendency to solidify the oxy-chlorid and prevent sufficient vaporization. Possibly the mixture might be made so that the arrangement shown could be dispensed with, but I have found that in practice the arrangement works out perfectly. The tube 10 being partly filled with the chromium oxy-chlorid, the hydrogen vapor is passed over the surface of the liquid under pressure. A large amount of the vapor is then mechanically picked up and carried forward into the flashing jar. The amount of oxy-chlorid picked up may be increased at will if the outlet from the tube is left wide open while the inlet through which the hydrogen enters is constricted.

The pressure which appears to give the best results and to take in a sufficient amount of chromium oxy-chlorid, is noted to be about twenty-five inches. This is the pressure which passes into the flashing jar. Of this twenty inches, approximately, consists of the hydrogen mixed with the vapor of chromium oxy-chlorid, and the balance olefiant gas. If a sufficient amount of the chromium oxy-chlorid, however, is in the treating jar and the pressure is right, the percentage of olefiant gas is not important, and it may vary greatly, as it has been found that pure olefiant gas passed over the chromium oxy-chlorid to a pressure of about twenty to twenty-five inches, gives good results if the temperature is right, but as stated above, the olefiant gas has a tendency, when passed directly over the chromium oxy-chlorid, to solidify the same and prevent its vaporization, while pure hydrogen or hydrogen containing a very small percentage of olefiant gas, does not have this effect.

The mixture in the flashing jar should be

from five to twenty per cent. olefiant gas. The remainder is hydrogen vapor saturated with chromium oxy-chlorid. To be more exact, I find that I get the best results when the gases in the flashing jar are approximately twenty per cent. olefiant gas, seventy per cent. hydrogen, and ten per cent. chromium oxy-chlorid, although as stated, these percentages may be greatly varied. Care must be exercised to have the temperature right. If the temperature is too low, the chromium comes down in crystalline form. If the temperature is too high, the olefiant gas is broken up in a carbon deposit. It has been found by experiment that the proper temperature will be approximately between one thousand and twelve hundred degrees centigrade. I have also found that if the hydrogen alone is used, a deposit may be brought down under these conditions, but such a deposit contains the oxid of chromium, which resembles the metal, and as stated before, if the temperature is right, a coating of metallic appearance may be also brought down, and consists essentially of carbon. To resume, I find then that the best results are obtained by passing the hydrogen over the oxy-chlorid of chromium so that the oxy-chlorid is mechanically picked up and carried forward to the flashing jar, next admitting the olefiant gas after the oxy-chlorid has been picked up by the hydrogen, and finally flashing the filament in the mingled gases and with a temperature of from one thousand to twelve hundred degrees centigrade. I find that when this arrangement is carried out the flashing takes place instantly, and that I get a coherent, metallic chromium deposit all over the filament.

The olefiant gas besides acting as an absorbent for the chlorin, serves also as a deoxidizing agent, and thus absorbs the oxygen as well as the chlorin, and this is important because oxygen readily attacks metallic chromium. The flashing of the filament is performed in the usual way, that is by turning an electric current through it, thus raising it to the temperature of incandescence, and, as previously stated, the temperature should be approximately between 1000° and 1200° C.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent:—

1. The herein described process of making incandescent electric lamp filaments, which consists in flashing a filament in an atmosphere consisting of a hydrogen vapor saturated with oxy-chlorid of chromium, and with an absorbent gas for taking up the gases freed by the flashing process.

2. The herein described process of making incandescent electric lamp filaments, which consists in flashing a filament in an atmosphere containing hydrogen, oxy-chlorid of chromium and olefiant gas.

3. The herein described process of making incandescent electric lamp filaments which consists in flashing a carbon filament in an atmosphere containing hydrogen, oxy-chlorid of chromium and olefiant gas.

4. The herein described process of making incandescent electric lamp filaments, which consists in first passing hydrogen vapor over a surface of oxy-chlorid of chromium and into the flashing jar, second admitting an absorbent for the gases freed by flashing into the said mixture, and then flashing the filament in the said mixed gases.

5. The herein described process of making incandescent electric lamp filaments, which consists in flashing the filament in an atmosphere containing olefiant gas and the oxy-chlorid of chromium.

6. The herein described process of making incandescent electric lamp filaments, which consists in flashing the filament in an atmosphere containing a hydrocarbon gas and the oxy-chlorid of chromium.

7. The herein described process of making incandescent electric lamp filaments, which consists in flashing the filament in an atmosphere containing hydrogen, a hydrocarbon gas, and oxy-chlorid of chromium.

8. The herein described process of making incandescent electric lamp filaments, which consists in flashing the filament in an atmosphere containing oxy-chlorid of chromium and an absorbent for the gases freed by the flashing process.

9. The herein described process of making incandescent electric lamp filaments, which consists in flashing a filament in an atmosphere containing oxy-chlorid of chromium and a gaseous absorbent for the gases freed by the flashing process.

10. The herein described process of making incandescent electric lamp filaments, which consists in flashing the filament in an atmosphere containing oxy-chlorid of chromium and an absorbent for chlorin and oxygen.

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