UNITED STATES PATENT OFFICE.

ERAZM J. JERZMANOWSKI, OF NEW YORK, N. Y.

IMPROVEMENT IN PROCESSES OF MANUFACTURING WATER-GAS.

Specification forming part of Letters Patent No. **204,437**, dated June 4, 1878; application filed March 30, 1878.

To all whom it may concern:

Be it known that I, ERAZM J. JERZMANOWSKI, of the city, county, and State of New York, have invented a new and useful Improvement in the Manufacture of Water-Gas, of which the following is a full, true, and exact description.

My improvement has special relation to the purging of the generator or generating-chamber in which what is known as "water-gas" is produced.

In the production of water-gas according to the processes patented to myself, steam and air are alternately admitted into a cupola containing highly-heated incandescent anthracite coal, charcoal, coke, or other equivalent material. The artificial currents of air are used to produce the high degree of heat in the generator which is necessary for the decomposition of the steam which is to follow.

The products of combustion are, generally speaking, carbonic oxide, nitrogen, and carbonic acid, which, together with the undecomposed air, fill the generating-chamber while the fire is being blown by the admitted air. It is obvious that the products of this combustion would be injurious if mixed with the water-gas.

Connected with my generator is what is known as a "purge-valve," which I keep constantly open during the passage of the air.

It has usually been customary, on shutting off the supply of air and before the admission of steam, to close this purge-valve. Then, since this valve was closed while there was a certain pressure of air within the decomposing-cupola, the subsequent admission of steam might cause an explosion, injuring, to a certain extent, the generator, and sending to the gas-holder impurities which impair the water-gas.

By my process I shut off the air-supply before I close the purge-valve. The purge-valve continues open until the pressure within the gas-generating chamber has been reduced to the atmospheric pressure. This pressure is determined by means of a pressure-gage communicating with the interior of the chamber. Subsequently steam is admitted. The purge-valve remaining still open, the admitted steam drives out before it all the impurities and the products of combustion remaining in the generating-chamber. These gases escaping at the purge-valve burn with a flame of a bluish color. This flame is watched by the operator until its color changes to yellow, when it is known that water-gas is being formed within the chamber. This gas consists, generally, of hydrogen, carbonic oxide, and a small proportion of carbonic acid, and certain impurities, generally sulphuric. Steam is admitted and water-gas formed until the temperature of the generator is reduced to a temperature at which steam is not fully decomposed. Then, before the admission of air, the purge-valve is once more opened, whereby the pressure of steam and water-gas within the gas-generator is reduced once more to the atmospheric pressure, as will be shown by the gage. Then a supply of air is once more admitted. Heretofore air has been admitted while the chamber was full of water-gas, whereby a second explosion might be occasioned. Until my improvement it has been impossible to determine the exact period at which steam or air should be admitted, there being no means for determining the pressure within the gas-generating cupola, and the cause of the explosions and difficulties being unknown.

An attempt has been made to accomplish the result of thoroughly purging the chamber of the products which might be in it resulting from the decomposition of steam before the admission of air, and vice versa, which process was patented to E. Stern, May 23, 1876, No. 177,767. In the processes described in that patent the pressure was not reduced to the atmosphere before the admission of the air or steam, as the case might be; but the attempt was made, by admitting the air or steam at a high pressure and suddenly, to drive out before it the products remaining in the cupola before they had time to mingle with the air or steam and to form explosive compounds; but this idea was impracticable, since the gases had time to mingle before the gas remaining in the cupola was driven out by the admitted steam or air.

By my present invention the exact time for each step in the process can be accurately determined. Thus, air is first admitted, bringing the generator to a proper temperature.

Then it is shut off, the purge-valve remaining open. This purge-valve is allowed to remain open until the pressure within the chamber is reduced to the atmosphere. Then steam is admitted, and the purge-valve is allowed to remain open until the flame changes color. Then the purge-valve is closed, and steam continues to flow through the generator until the temperature of the generator is so far reduced as to render any further admission of steam unadvisable. This point is determined by eye-holes. Then the steam is shut off and the purge-valve opened, thereby allowing of the escape of the water-gas within the generator. The air which follows is not admitted to the apparatus until the pressure of steam remaining within it is reduced to that of the atmosphere.

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

1. In the manufacture of water-gas, the method of preventing explosion in the generator with elimination of the remaining injurious products of combustion, which consists in alternately admitting steam and air to the generator, charged as described, and freely passing off the products of combustion arising from the admission of the air till the pressure within the generator is reduced to atmospheric pressure, and also freely passing off the gas arising from the admission of the steam till the pressure within the generator is reduced to the pressure of the atmosphere, substantially as described.

2. In the manufacture of water-gas, the method of preventing explosion in the generator with elimination of the remaining injurious products of combustion, which consists in alternately admitting steam and air to the generator, charged as described, and allowing the purge-valve to remain open until the pressure within the generator is reduced to that of the atmosphere, when steam is admitted, driving out before it the products of combustion of the air through the purge-valve, which is left open until nothing but water-gas exists in the generator, when it is closed, and subsequently opened before the second admission of air.

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Witnesses:
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