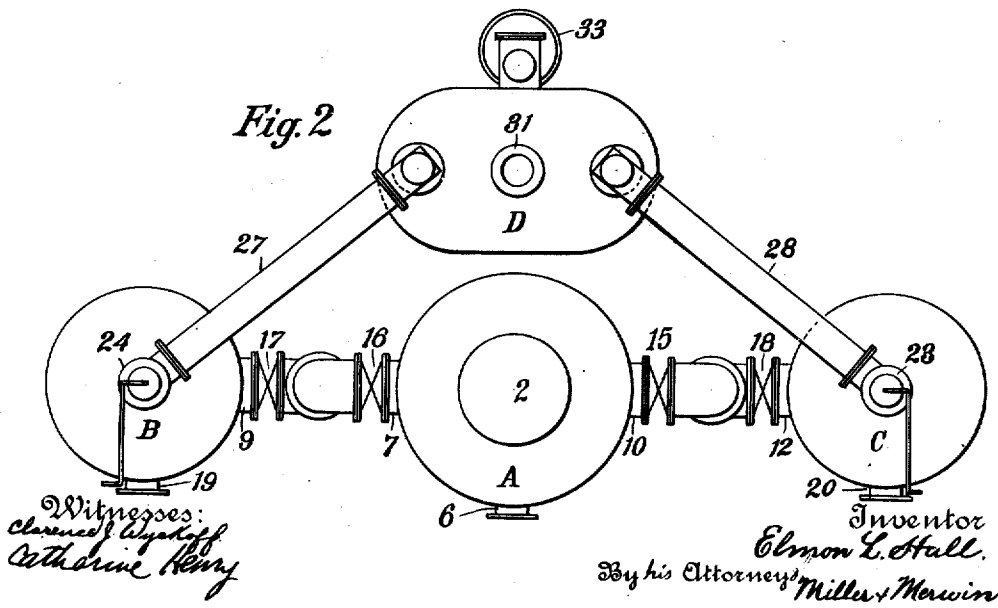
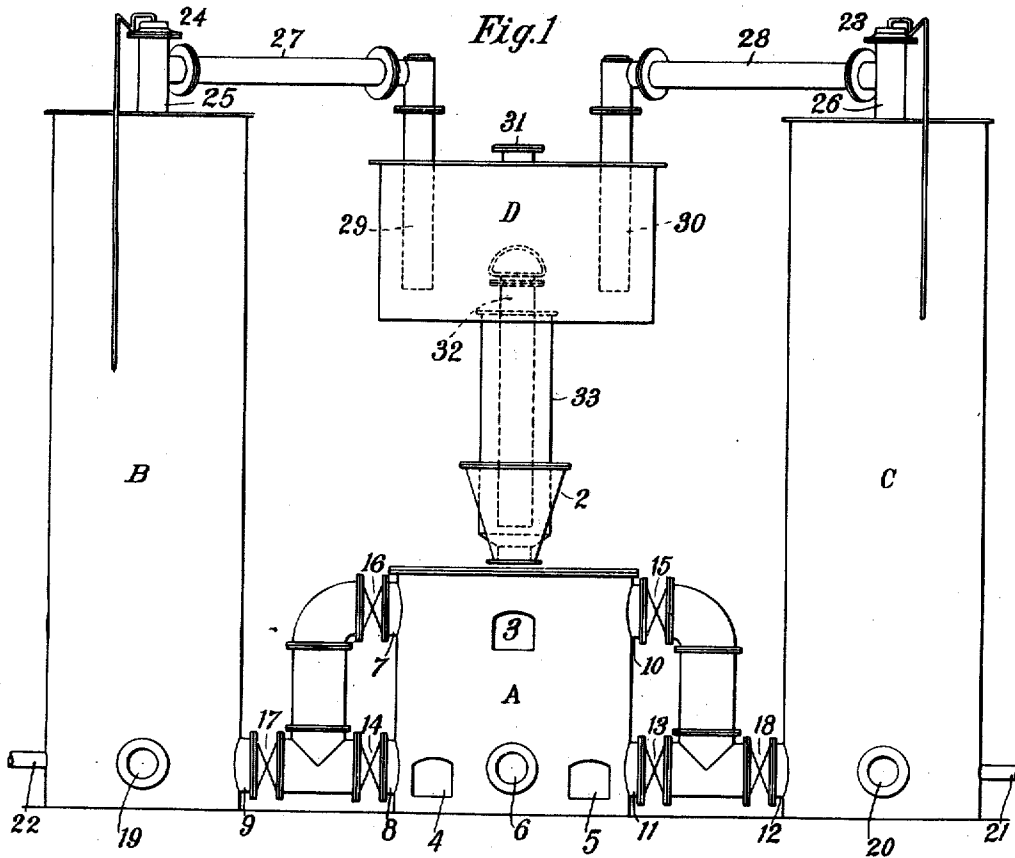


E. L. HALL.
PROCESS OF PURIFYING GAS.
APPLICATION FILED JULY 11, 1908.

911,494.

Patented Feb. 2, 1909.



UNITED STATES PATENT OFFICE.

ELMON L. HALL, OF PORTLAND, OREGON, ASSIGNOR TO SECURITY SAVINGS AND TRUST COMPANY, OF PORTLAND, OREGON, A CORPORATION OF OREGON.

PROCESS OF PURIFYING GAS.

No. 911,494.

Specification of Letters Patent.

Patented Feb. 2, 1909.

Application filed July 11, 1908. Serial No. 443,121.

To all whom it may concern:

Be it known that I, ELMON L. HALL, a citizen of the United States, residing at Fifth and Yamhill streets, Portland, Oregon, have invented a new and useful Process of Purifying Gas, of which the following is a specification.

My invention relates to improvements in the purification of illuminating gas and its object is to remove from such gas, after it has been purified as much as possible by hitherto known methods, the organic compounds of sulfur which remain therein and which hitherto have been considered unremovable. Illuminating gas, and especially that made from the crude oils of the Pacific coast, contains when first manufactured organic sulfur in the form of carbon bisulfid and inorganic sulfur in the form of sulfureted hydrogen. It is highly desirable to remove both of these before using the gas for illuminating purposes, as they are obnoxious and injurious substances. Heretofore but little difficulty has been experienced in removing the sulfureted hydrogen, which result has been accomplished by passing the gas through a body of lime or oxid of iron and by other methods. This operation has no effect on the carbon bi-sulfid, but leaves it remaining in the gas, and heretofore there has been no known method, so far as I am aware, of removing it. The result is that when the gas is burned at the burner tip this carbon bi-sulfid is converted into sulfurous acid, a product which is injurious to metallic objects in the room where the gas is burning and also deleterious to persons breathing it.

The object of my invention is the removal of this carbon bi-sulfid from gas which has been partially purified by the removal of the sulfureted hydrogen, and this I accomplish by first converting the carbon bi-sulfid into sulfureted hydrogen and then removing the latter by any of the methods heretofore used for that purpose.

In the annexed drawings I have illustrated one form of apparatus by which my process may be carried out.

Figure 1, represents an elevation and Fig. 2 a plan view of the apparatus.

In the drawings A represents the generator and B and C the reheaters similar to ordinary water gas superheaters, containing loose or checker work fire brick. The generator is provided with a hopper 2 for the continuous

supply of fuel and with cleaning doors 3, 4 and 5 and air inlet 6. The generator is connected by means of pipes 7 or 8 and 9 with the reheater B and by the pipes 10 or 11, and 12 with the reheater C. After the reheater B has become sufficiently heated for service, it is cut off from the generator by closing the valve 17, and the valve 18 is opened to connect the generator with reheater C. When the latter is sufficiently heated, the connections are reversed for the purpose of again heating the reheater B. When solid fuel is used the pipes 8 and 11 are cut off by means of the valves 13 and 14 and the heated gases from the generator pass through the pipes 7 and 9 to the reheater B or through 10 and 12 to reheater C. When liquid fuel is used the valves 13 and 14 are opened and valves 15 and 16 are closed to connect the generator with the reheaters by pipes 8 and 9, and 11 and 12. To heat the reheater B the valve 18 in the pipe 12 is turned to cut off communication between the generator and the reheater C, and the valve 17 in the pipe 9 is turned to open communication between the generator and the reheater B. Gas to be purified is admitted to the reheaters by the inlets 19 and 20 and steam is introduced at 21 and 22. The reheaters have valves 23 and 24 which the reheaters are connected through pipes 25 and 26 with the stack during the process of heating. They are also connected by means of pipes 27 and 28, and 29 and 30 respectively, with seal D. This seal is provided with an outlet 31 leading to the coolers and purifiers (not shown), and also with a water overflow pipe 32 leading to an overflow tank 33, by means of which the water in the seal is maintained at a proper level.

By means of the described connections the generator is operated continuously, and connected alternately with the reheaters.

According to my invention it is necessary that the gas, which is to be purified, should be subjected to a high degree of heat, which in practice varies from six hundred to one thousand degrees centigrade. After one of the reheaters has been raised to that temperature the gas is introduced therein and carried through the described coolers and purifiers, the generator being meanwhile connected with the other reheater for the purpose of raising its temperature sufficiently to receive a supply of gas when the first re-

heater has been cooled in practice, thus making the operation continuous. In subjecting the gas to the high temperatures used by me hydrogen will be split off from the hydro-carbons of the gas, thus furnishing nascent hydrogen. And furthermore, as the gas passes through the checkerwork of the reheater, the aqueous vapor, which normally is present in the gas, is decomposed, and thereby a further supply of nascent hydrogen is produced. The high degree of heat used will operate to break up the sulfids present (carbon bi-sulfid etc.) and the nascent hydrogen produced as above described unites with the liberated sulfur of the gas to produce sulfureted hydrogen, which is afterwards removed by the ordinary process of purification.

I have found in practice that the introduction of steam into the reheater intensifies the reactions, due to the better conductivity of the steam for heat than the gas alone, thus enabling the latter to better attain the requisite temperature. And furthermore, the steam furnishes an additional supply of nascent hydrogen for union with the liberated sulfur of the gas. Consequently, I desire it to be understood that I may carry out my invention either with or without the aid of steam.

It will be observed from the foregoing that my invention is primarily intended to operate upon so-called purified gas, that is to say, gas which has already been freed, by well known methods, of the sulfureted hydrogen produced at the time of manufacture, and which gas in that condition is supposed to be ready for consumption, but which as a matter of fact contains carbon bi-sulfid. I take the gas in the condition in which it is ordi-

narily consumed still containing carbon bi-sulfid and I further purify it by removing this carbon bi-sulfid so as to produce an absolutely pure article of gas which contains neither organic nor inorganic sulfur compounds, and this I accomplish by converting carbon bi-sulfid into sulfureted hydrogen by the action of heat and then removing the sulfureted hydrogen by any of the well known methods heretofore practiced.

I do not herein claim the apparatus shown, but reserve the same for a future application to be filed in due season.

Having thus described my invention, what I claim and desire to secure by Letters Patent is

1. The process of further purifying illuminating gas which has already been partially purified by the removal of sulfureted hydrogen but which still contains carbon bi-sulfid, consisting in reheating the gas to a high temperature whereby the carbon bi-sulfid is converted into sulfureted hydrogen, and then removing the sulfureted hydrogen.

2. The process of further purifying illuminating gas which has already been partially purified by the removal of sulfureted hydrogen but which still contains carbon bi-sulfid, consisting in reheating the gas to a high temperature in the presence of steam whereby the carbon bi-sulfid is converted into sulfureted hydrogen and carbon di-oxid, and then removing the sulfureted hydrogen.

In witness whereof, I have hereunto set my hand at the city of Portland, Oregon this 14th day of May, 1908.

ELMON L. HALL.

Witnesses:

H. M. PAYNE,
JOHN J. ERKINS.