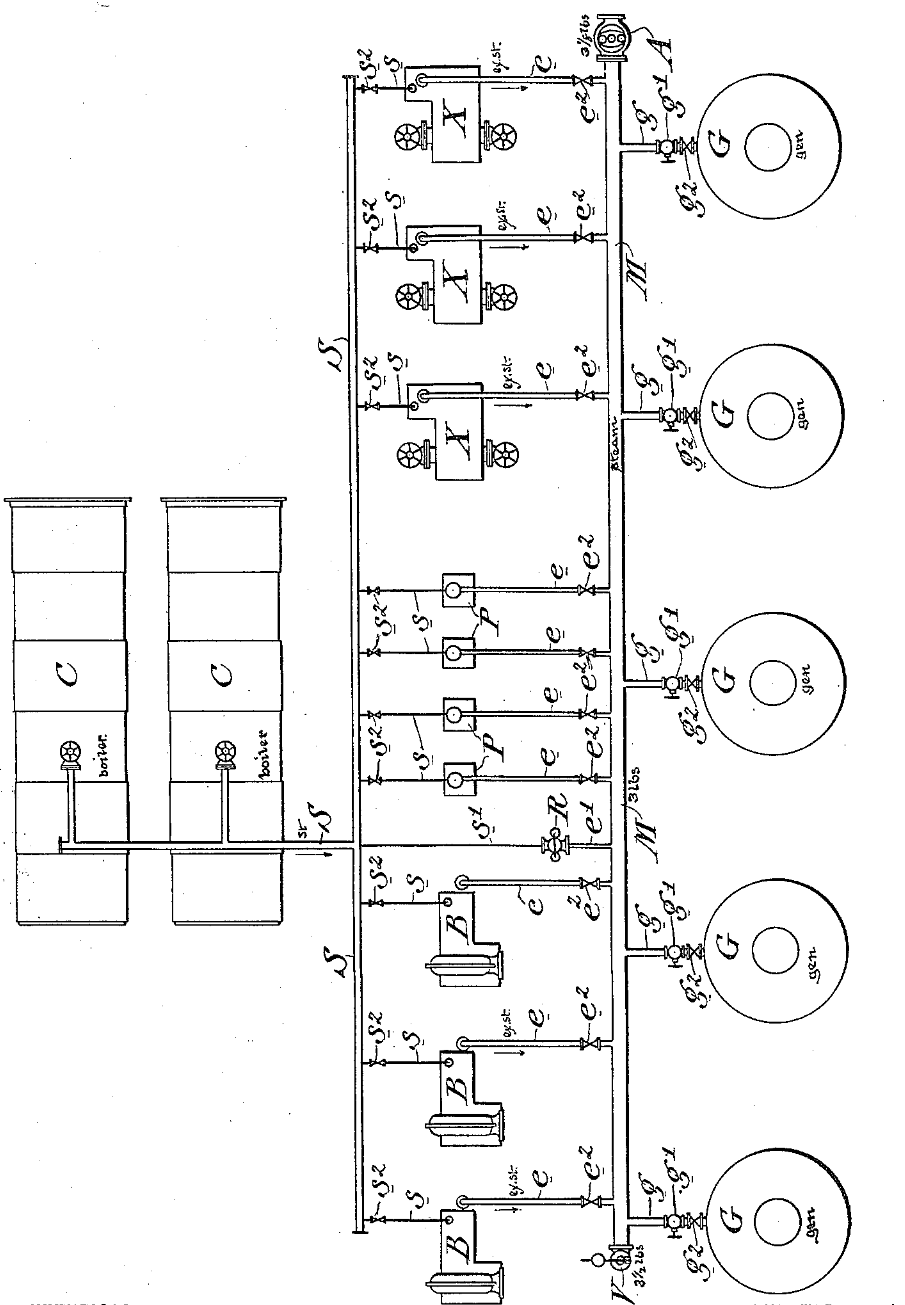
A. G. GLASGOW.

MANUFACTURE OF WATER GAS.

APPLICATION FILED APR. 16, 1909.

1,043,822. Patented Nov. 12, 1912.



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MANUFACTURE OF WATER-GAS.

1,043,822. Specification of Letters Patent. Patented Nov. 12, 1912.

Application filed April 16, 1909. Serial No. 490,214.

To all whom it may concern:

Be it known that I, ARTHUR G. GLASGOW, a citizen of the United States of America, a resident of the city of Richmond, State of Virginia, but temporarily a resident of the city of Westminster, county of London, England, have invented certain new and useful Improvements in the Manufacture of Water-Gas, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

The present invention relates to the manufacture of water gas and has for its object to increase the efficiency of a water gas plant by so arranging it that the amount of high pressure steam necessary for a given output of water gas is reduced with a consequent increase in heat economy and reduction in the amount of high pressure steam generating apparatus required in a plant of a given output.

In carrying out my invention, I collect the exhaust steam from the various steam operated power supplying devices—blast supplying blowers, pumps, exhausters, or the like—used in the plant, and utilize this exhaust steam as a source of steam fed into and decomposed in the gas generators in the formation of the water gas.

Heretofore in the manufacture of water gas it has been the general practice to draw steam for direct use in the gas generators, and for operating the various steam engines of the gas plant from the same boiler or boilers. In the past, boiler pressures of eighty pounds per square inch or less were common, but practice has favored a continual increase in boiler pressure in the general belief that these higher pressures lead to better economy, not only in the steam engines, but also in the gas generators, and now the boiler pressures employed are seldom less than one hundred pounds per square inch and even considerably exceed that pressure.

It is, of course, true that an increase in the boiler pressure increases the efficiency of operation of the power supplying steam engines; but I have found through wide experience in the construction and operation of a great number of water gas plants and by a close study of this phase of the industry that equally good generator working can be obtained with steam of the same temperature at any pressure, provided the speed of blasting the fuel bed be maintained at its most economical rate.

Now according to this invention, while I preferably supply the blowing engines with steam at a relatively high pressure, in order to obtain an economical generation of a blast sufficient to blast the fuel bed rapidly enough for the satisfactory and economical production of gas, I utilize the exhaust steam from the blowing engines as well as from the other steam engines of the plant as the steam directly employed in the manufacture of the water gas. The economy in the amount of high pressure steam used and in the apparatus necessary for the production of the steam used resulting from the use of the same steam twice over, first in the production of power, and secondly, in the manufacture of gas, is obvious. Prior to its admission to the gas generators, the exhaust steam may or may not be superheated, as the conditions of the plant may make desirable.

When my invention is applied to a single generator I prefer to automatically divert the exhaust steam directly to the atmosphere during the blowing period, thus decreasing to a minimum the steam consumption of the engines during the time when no steam is used in the generator and the blowing engines are working at full load; but it will, of course, be understood that in the ordinary gas plant, illustrated and hereinafter described more in detail, there are a plurality of gas generators or generator sections and that the blast takes place in some of the generator sections, while the "run" or generation of water gas takes place in other sections, and in general, the blowing engine supplying air for a blast in one generator section at one instant, at the same instant supplies exhaust steam to another generator section in which water gas is then being formed.

In the claims annexed to and forming a part of this specification, I have aimed to point out with particularity the various features of novelty which characterize my invention. For a better understanding of the invention, however, reference may be had to the accompanying drawing and descriptive matter, in which I have illustrated and described one form of apparatus for carrying out the invention.

The one figure of the drawing is a dia-

grammatic representation of the essential features of a gas plant arranged in accordance with my present invention.

In the plant shown by the drawing, there is a set of gas generators G, a set of steam operated blower pumps B, a set of exhaust pumps X, a set of water pumps P and a battery of boilers C. The boilers C, which may be heated in any suitable manner, as by independent fires or by heat derived from the gases passing out of the gas generators, are connected to a steam supply main S. From the main S the supply pipes s run to the various blowing engines B, pumps P and exhaust pumps X. The power supplying, steam using devices B, P and X exhaust through pipes e into a low pressure or exhaust steam assembling main M. Pipes g run from the main M, one to each of the generators G, to supply the steam directly used therein in the manufacture of water gas.

It will, of course, be understood that the various live steam and exhaust steam pipes s, e and g should be supplied with suitable stop valves or cocks s^2, e^2, and g^2 conventionally illustrated in the drawing. In addition, I preferably provide regulating or throttling cocks or valves g' in the pipes g. The pressure existing in the exhaust steam assembling main M is directly controlled by an adjustable or regulating relief valve A which can be set to open at any desired point to thereby limit the maximum pressure obtained under normal conditions in the pipe M. Preferably, also, an ordinary safety relief valve V is provided which automatically puts the main M in communication with the atmosphere when the pressure in the main exceeds the pressure at which it should be maintained by the regulating valve A. Any excess of steam required in the main M over that supplied through the exhaust pipes t may be supplied from the live steam main S through the pipes s', e' and the automatic pressure reducing valve R inserted between the pipes s' and e' and set to open at a pressure in the pipe M slightly below the pressure at which the valve A opens.

I have not thought it necessary to illustrate in the drawing or to describe in detail the connections to and from the water pumps P, the blowing engines B, or the exhaust pumps X. All those skilled in the art will understand that the pumps B deliver compressed air into a suitable compressed air supply main or mains, from which air is conveyed to whichever of the gas generators G in which the fuel charges are then being blasted, and that the pumps P supply water to the boilers C and to the gas scrubbing and washing apparatus and to such jackets or the like as may be water cooled. It will also be understood that the exhausters X when used may be employed to directly facilitate the flow through the gas generating apparatus of the gas produced by reducing the pressure at the outlet ends of the gas generating and cleaning apparatus during the "run" or gas producing operation, or these exhausters may be used in other ways in handling the gas generated.

The pressure maintained in the main M should be sufficient, say three pounds per square inch, to cause the gas to pass at the proper rate through the generating and cleaning apparatus. Assuming that a pressure in the exhaust main M of about three pounds per square inch is desirable, I prefer to set the valve A to open at about three and one-eighth pounds per square inch and to set the valve R to open at about two and seven-eighths pounds per square inch pressure and to set the safety valve V to open at say three and one-half pounds pressure. The regulating cocks g' should then be set to pass the required quantity of steam to the generator at a pressure in main M of three pounds, the steam being turned on and off from the generators by the ordinary cocks g^2. By adjusting the various valves or cocks, the pressure in the supply main M and the rate at which steam is supplied to any particular generator may obviously be varied as desired, thus making possible a very satisfactory and desirable regulation of the operation of the plant.

When the invention is applied to a single generator, I prefer, as already stated, to open the engine exhausts directly to the atmosphere during the period when no steam is being used in the generator, thus relieving the engines of all back-pressure against their exhausts during the period of maximum steam consumption. To effect this, various automatic arrangements may be adopted, such as interlocking this exhaust steam atmospheric valve and the generator blast valve, so that the opening or closing of the generator blast valve automatically opens or closes the exhaust steam outlet to atmosphere.

It will, of course, be obvious to those skilled in the art that many changes may be made in the form and arrangement of the apparatus disclosed without departing from the spirit of the invention, and I do not wish the claims hereinafter made to be limited to the particular apparatus disclosed more than is made necessary by the state of the art.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a water gas plant, the combination with a water gas generator adapted for alternate runs and blasts, a steam motor, a high pressure steam generator supplying steam to said motor, a connection through which the exhaust steam from said

motor is passed to said gas generator during the run, a conduit including a reducing valve connecting said steam generator to said connection through which the latter is supplied with live steam at a reduced pressure, and means for limiting the combined pressure of the exhaust and live steam in said connection.

2. In a gas making plant, the combination with a steam generator, of a water gas generator, a steam driven motor receiving steam from said steam generator, a receptacle into which said motor exhausts, a live steam connection including a pressure reducing valve leading to said receptacle from said steam generator, a connection including a cut-off valve through which steam is supplied to said gas generator from said receptacle and means for limiting the steam pressure in said receptacle.

3. The combination of apparatus for the manufacture of gas including a source of exhaust steam, a gas generator and its steam inlet connection, a live steam connection to the inlet connection, a pressure reducing valve in the live steam connection, an exhaust steam connection from said source to the steam inlet connection on the low pressure side of said reducing valve, means for limiting the combined pressure of the exhaust and live steam, and a valve arranged in the inlet connection for controlling the admission of steam to the generator, whereby an economy in the use of live steam is effected.

4. In a water gas plant, the combination of a plurality of gas generators, a plurality of power supplying steam engines, a common reservoir into which said engines exhaust, a steam generating apparatus, a supply connection including a pressure reducing valve between said steam generating apparatus and said reservoir, connections between said reservoir and said generators through which steam for decomposition is supplied to the latter, and regulating means for limiting the steam pressure in said reservoir.

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