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 PRODUCTION OF ACETYLENE BY INCOMPLETE
 COMBUSTION OF HYDROCARBONS
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2,630,461

FIG. 1

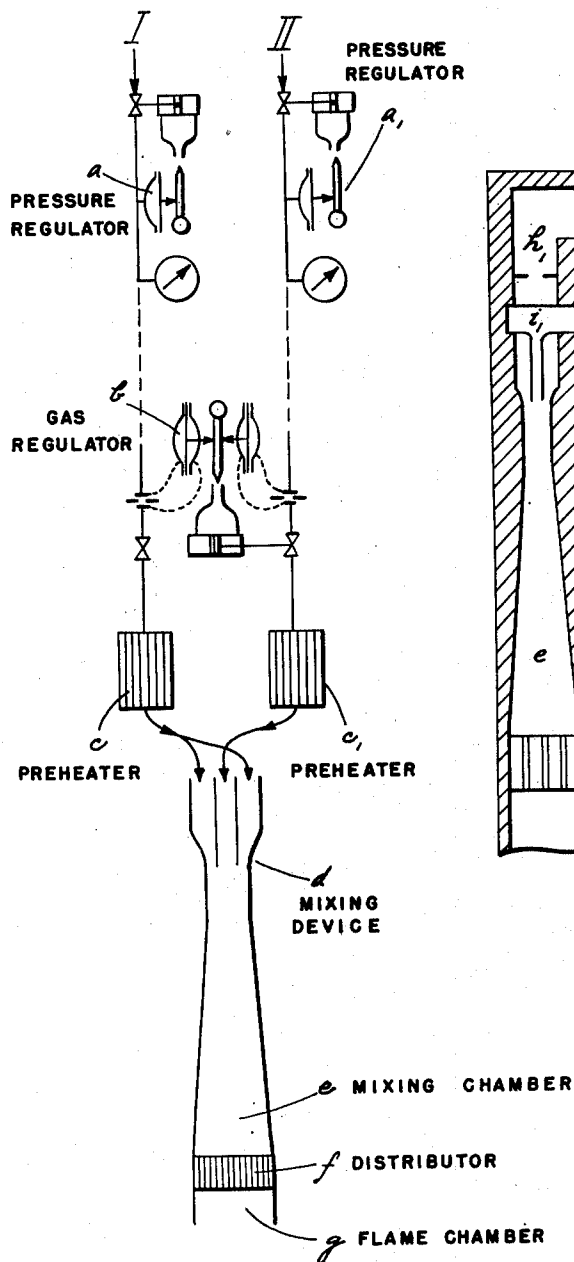
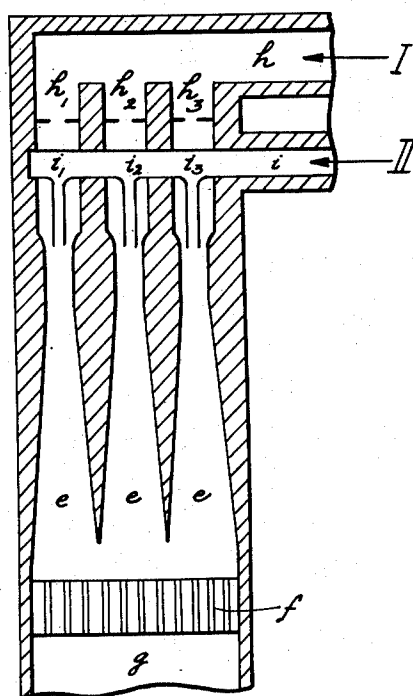


FIG. 2



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PRODUCTION OF ACETYLENE BY INCOMPLETE COMBUSTION OF HYDROCARBONS

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4 Claims. (Cl. 260-679)

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The present invention relates to the production of acetylene by the incomplete combustion of hydrocarbons, and the object of this invention consists in providing improvements of this art and of the apparatus hitherto proposed for carrying out the said process.

Acetylene may be produced in known manner by the incomplete combustion of hydrocarbons with oxygen by heating each reactant separately, uniting the two gases and allowing the mixture to flow into a reaction chamber in which the formation of acetylene proceeds in a flame reaction. The difficulty encountered in this particular process is to produce a flame which burns stably and does not strike back into the mixing chamber causing trouble in operation and damaging the apparatus through excessive heat. For example the flame is very sensitive to even slight fluctuations in pressure which may arise owing to disturbances in the suction device for the conveyance of the acetylene-bearing gases formed or owing to sudden changes of resistance within the filter for the purification of the gases or by the manipulation of other devices connected to the flame chamber. Such fluctuations in pressure give rise to changes in the composition of the mixture flowing into the flame chamber and often cause the flame to strike back, even when high-precision gas regulators are used to maintain the desired relative proportions, as these regulators cannot compensate the fluctuations as quickly as required.

We have now found, and this is the object of the present invention, that the said disturbances can be very effectively countered by placing the reactants prior to mixing them, under as equal as possible a pressure. With this object in view, the conduit for the hydrocarbons and the conduit for the oxygen are both provided with pressure reservoirs which are adjusted to the same absolute pressure and the pressure of which is practically unaffected by the counter-pressure fluctuations. These regions of constant pressure may be constituted by gas holders or, in their simplest form, by conduits of sufficient width and length, in which are located pressure regulators which are adjusted to the same rated value. Under these conditions the loss of pressure of the hydrocarbons from the region of constant pressure to the point of mixing is equal to the loss of pressure of the oxygen from the region of constant pressure to the point of mixing. When sudden fluctuations in the counter-pressure occur the amounts of the two gases can only vary to the same proportional extent so that the relative proportions are unaffected.

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The invention will be further described with reference to the accompanying drawings which show embodiments of apparatus according to the invention.

Referring to Figure 1, the two gases entering at I and II are brought to the same pressure by means of pressure regulators *a* and *a*₁ and set to the desired mixing ratio by means of a gas regulator *b*. They then flow through preheaters *c* and *c*₁ and only then are contacted in a mixing device *d* and completely mixed in a mixing chamber *e*. The hot gas mixture passes through a gas distributor *f* into a flame chamber *g*. In an apparatus of this type, methane and oxygen may be burned to form acetylene-bearing gases in a manner free from trouble, with both the hydrocarbon stream and the oxygen stream being kept under an excess pressure of about 0.4 atmosphere by means of the pressure regulators *a* and *a*₁.

The process according to the present invention also allows of speeding up the mixing of the reaction components and thus preventing most efficiently a premature initiation of the reaction in the mixing chamber, by splitting up one or both reactants into partial streams and to unite all the individual streams in mixing devices arranged parallel to each other. This technique could not so far be used because such split-up gas streams are liable to cause rhythmic fluctuations in pressure with consequent rapid changes in the mixing ratio and striking back of the flame. None of these disadvantages, however, will occur when splitting up the gas streams as shown in Figure 2. Parts *e*, *f* and *g* correspond to the same parts in Figure 1, the mixing chamber *e* consisting of a plurality of almost rotation-symmetrical parallel mounted elements. The two reactants enter through channels *h* and *i* and are split up into partial streams by throttles *h*₁, *h*₂ and *h*₃ and jets *i*₁, *i*₂ and *i*₃. The throttles are so chosen that the gas streams received by them undergo the same loss of pressure as the gas streams of the other reactant passing through the jets. If pressure fluctuations should occur owing to repulsion of the flame into the mixing chamber *e*, the relative proportions of the two reaction components, once adjusted, remain constant. Whereas, in the reaction of methane with oxygen, the throughput of methane cannot, in the absence of throttles as aforesaid, be carried above about 600 cubic meters per hour unless the flame is to strike back into the mixing chamber and destroy this in a short time, it is possible by providing the throttles to carry on a continuous operation with a throughput per hour of 1000 cubic meters of methane.

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What we claim is:

1. A process for the production of acetylene by the continuous incomplete combustion of a stream of hydrocarbons and oxygen with the formation of a flame after preheating the reactants, wherein the two reactants, prior to mixing them, are brought to the same pressure.

2. A process for the production of acetylene by the continuous incomplete combustion of a stream of hydrocarbons and oxygen with the formation of a flame after preheating the reactants, wherein the two reactants, prior to mixing them, are brought to the same pressure and at least one of the two reactants, after they have been brought to the same pressure, is split up into partial streams and all the partial streams are united in mixing devices arranged parallel to each other.

3. A process for the production of acetylene by the continuous incomplete combustion of a stream of methane and oxygen with the formation of a flame after preheating the reactants, wherein the two reactants, prior to mixing them, are brought to the same pressure.

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4. A process for the production of acetylene by the continuous incomplete combustion of a stream of methane and oxygen with the formation of a flame after preheating the reactants, wherein the two reactants, prior to mixing them, are brought to the same pressure and at least one of the two reactants, after they have been brought to the same pressure, is split up into partial streams and all the partial streams are united in mixing devices arranged parallel to each other.

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