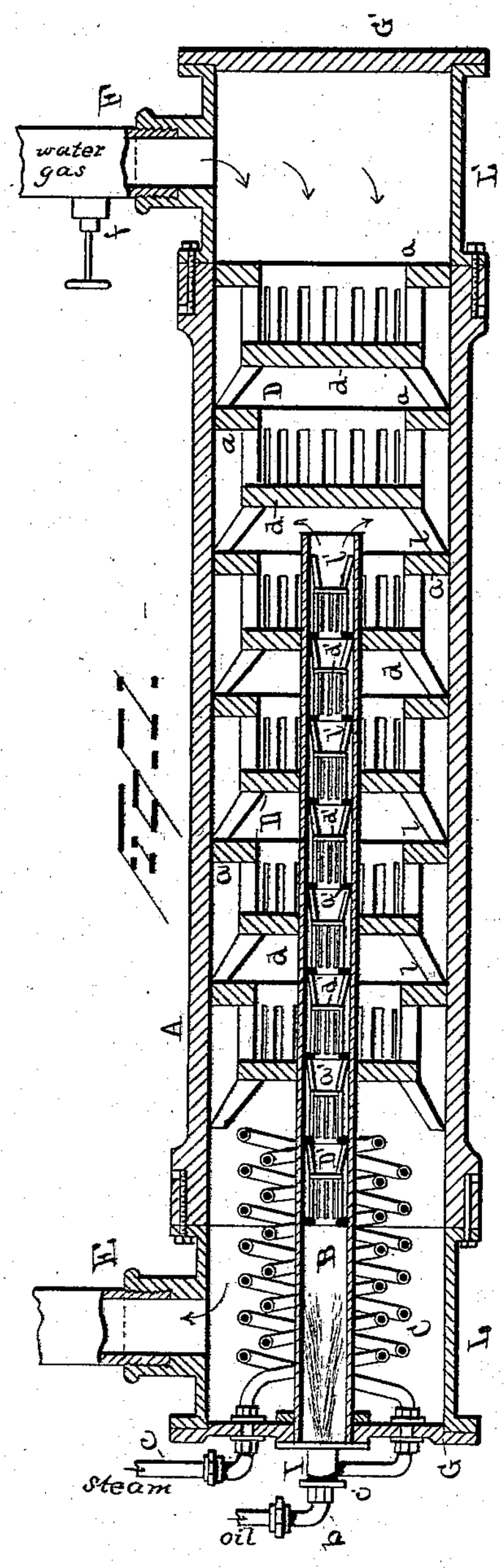
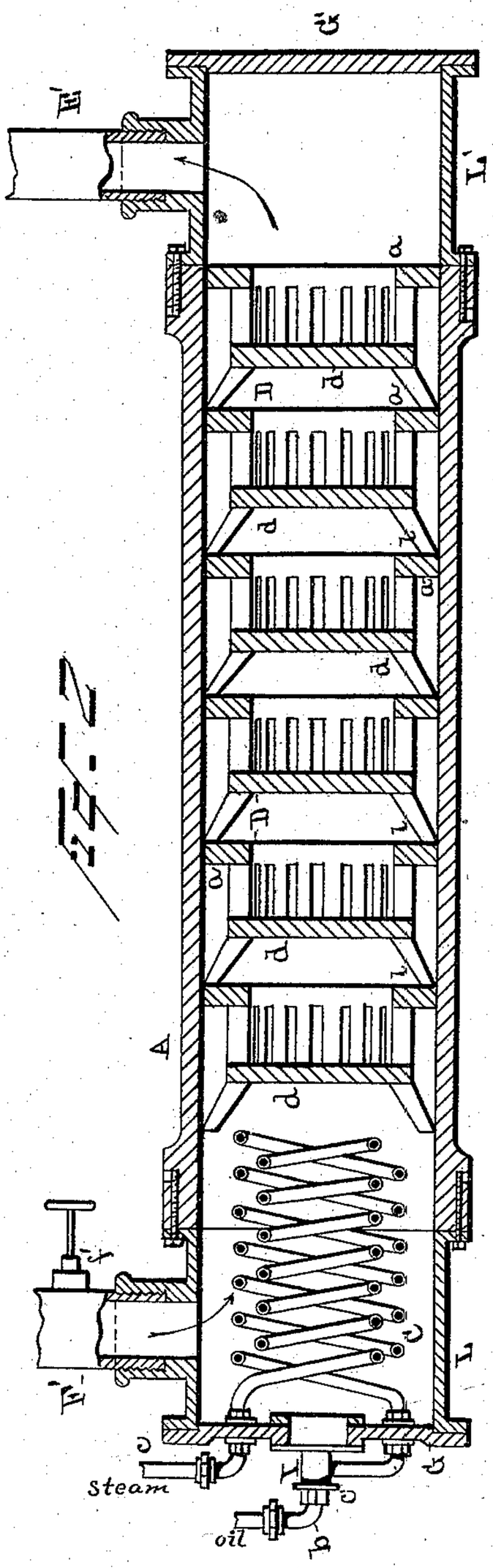
(No Model.)

A. G. MEEZE.

APPARATUS FOR THE MANUFACTURE OF GAS.

No. 382,375. Patented May 8, 1888.





WITNESSES.

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APPARATUS FOR THE MANUFACTURE OF GAS.

SPECIFICATION forming part of Letters Patent No. 382,375, dated May 8, 1888.

Application filed December 8, 1887. Serial No. 257,341. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR G. MEEZE, a subject of the Queen of Great Britain, residing at Redhill, in the county of Surrey, England, have invented certain new and useful Improvements in Apparatus for Manufacturing Gas; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to apparatus for the manufacture of illuminating-gas by the mutual decomposition of steam and hydrocarbon fluid in contact with suitable heated surfaces—such as deflecting and impact devices—and by combining with the nascent gases and vapors of such decomposition a suitably-regulated proportion of natural gas, hydrogen, carbonic oxide, or mixture of hydrogen and carbonic oxide, commonly known as "water-gas," preferably in a heated condition.

The object of the invention is to provide an improved apparatus adapted to produce thorough decomposition and recomposition of steam and hydrocarbon fluid, and means wherewith the rich hydrocarbon gas and vapor in the nascent state may be combined with a chemically-active or combustible diluting agent—such as hydrogen, marsh-gas, or carbonic oxide—and caused to form fixed light-giving compounds of high candle-power.

My apparatus will be described in detail with reference to the accompanying drawings, and the matter constituting my invention will be defined in the claims.

In the drawings, Figure 1 represents a vertical longitudinal section of a double or through retort containing a steam-superheating coil, an ingression-pipe, and deflecting and impact devices. Fig. 2 represents a longitudinal vertical section of a through-retort of modified form, in which the ingression-pipe is omitted and the gas-inlet pipe is connected to the same end of the retort as the steam and oil injector.

I preferably use a fire-clay retort, A, of the double-length variety, having a mouth-piece, L L′, and lid G G′ at each end, and of any convenient cross-section, such as round, elliptical, or D shape. A number of retorts may be set in a bench and fired like ordinary gas-coal-distilling retorts. It is also my purpose to fit up existing coal-gas retorts with the internal devices and connections herewith described. In connnection with my retorts suitably set in benches, I provide a steam-boiler, an oil-tank, and preferably an exhauster and motor. (Not shown in the drawings.)

The body of the retort is filled with deflecting and impact devices D, each composed of an annulus, *a*, disk *d*, a connecting body having numerous narrow longitudinal openings, and inclined spacing or separating legs *l*. The deflecting devices D are made of a shape to correspond with the cross-section of the retort, so as to provide uniform passages between them and the walls of the retort. Two or more of the deflectors at the right hand or rear end of the retort, where the water-gas is supplied, are made with solid disks *d*, to act as heaters for the inflowing water-gas; but the remaining deflectors have their disks *d* provided with central perforations to receive the ingression-pipe or small retort B. This internal retort, B, is preferably made of thin wrought-iron or other suitable metal and of about one-fourth to one-sixth the diameter of the surrounding retort A, and long enough to extend from the front to about two-thirds or three-fourths the length of such outer retort, as shown in Fig. 1. It is neatly fitted at its front end in an opening in lid C, and is provided with a flange or ring shrunk thereon, which may be bolted to the lid, and is supported centrally in retort A by deflectors D, as shown. Deflectors D′, made with rings *a′*, disks *d′*, and legs *l′*, and preferably of cast-iron, are fitted in retort B from its rear open end to near its front end, leaving sufficient space at front for the proper injection of steam and oil. The injector I is fitted by a flange to lid G, so as to open centrally into retort B. The double steam-superheating coil C is preferably arranged at or near the front of retort A, around retort B, and steam-supply pipe *c* connects with its induction end through the lid, while pipe *c′* leads from its outlet end through the lid to injector I. A supply-pipe, *b*, for petroleum, shale-oil, or other hydrocarbon fluid, also connects with injector I. The steam-pipe may connect with

the front end of the injector, while the oil-pipe connects with its top or side. A pipe, F, Fig. 1, having controlling-valve *f*, connects with mouth-piece L′ for supplying hydrogen, natural gas, or water-gas. Stand-pipe E, leading to the hydraulic main or seal-box, connects with mouth-piece L′. The lid G, steam-coil C, and injector I may be so connected that they may be removed together without disturbing the ingréssion-pipe or retort B.

The deflectors D in the outer retort are preferably made of refractory material, though they will do good service if made of metal. Vapors and gases—such as steam, oil-vapor, and gas—cannot be effectually heated, decomposed, and combined by radiation from contiguous hot surfaces, and I have found it necessary to cause the vapors and gases to pass by direct and repeated impact in contact with the hot surfaces extending through the area of the retort in order to effect their uniform and economical decomposition and combination to form a homogeneous fixed gas. For securing the improved results above stated, I have found the deflecting and impact devices D D′ to admirably answer the purpose. They are important features in my gas apparatus.

In the modified form of apparatus represented in Fig. 2 the ingression-pipe or small internal retort is dispensed with, and the injector arranged to discharge steam and hydrocarbon fluid directly into the large retort A in contact with the deflecting and impact devices D.

The supply-pipe F′, having valve *f′* for admitting a chemically-active diluting agent—such as natural gas, hydrogen, or water-gas—connects with the front end of the retort, so that the steam, hydrocarbon fluid, and diluting-gas are caused to pass together in contact with the deflectors throughout the whole length of the retort.

There being no ingression-pipe, the disks *d* are solid throughout, and present a larger and more efficient heating-surface than where the ingression-pipe is used; but of course the special advantages of the ingression-pipe itself are sacrificed. The gas take-off pipe or stand-pipe E connects with the rear mouth-piece, L′.

In order to manufacture gas, the operation is as follows: The retorts are fired in the ordinary way, and when heated to the proper gas-making temperature, well known to engineers, a supply of high-pressure steam from the boiler is admitted by pipe *c* through an ordinary regulating-valve to the superheating-coil C, where it is highly superheated, and thence to injector I. The hydrocarbon oil is then admitted in regulated quantity from the supply-tank by pipe *b* to the injector, from which it is thrown in a vapor-spray by the jet of superheated steam into ingression-pipe or retort B. The steam and oil-vapors are thoroughly mixed and highly heated, nearly to the point of decomposition, by contact with the deflecting and impact devices D′ in their passage through retort B, and are discharged therefrom into outer retort, A, where the production of fixed gas at once begins. After gradually admitting oil to the injector, hydrogen, light carbureted hydrogen, such as natural gas or water-gas, is admitted in regulated quantity from a holder or other source of supply through pipe F into the rear of retort A, where it is heated by contact with deflectors D. The heated gas meets the highly-heated current of oil-vapor and steam flowing from retort B, and the mixture flows in contact with the deflecting and impact devices surrounding retort B, resulting in their complete decomposition and recomposition to form a fixed high-grade illuminating-gas. In this reaction hydrogen gas chemically unites with the rich hydrocarbon vapor or gas in the nascent state to form fixed carbureted hydrogen gas of a merchantable character, and some of the carbonic oxide and marsh-gas enter into new combinations, by which the light-giving quality of the final product is improved. The hydrocarbons are thus all utilized and prevented from being destructively decomposed with the formation and deposit of lamp-black or hard carbon on the one hand, or, on the other hand, from passing off in the form of tarry condensable vapor.

The exact proportion of oil and steam admitted through the injector are readily determined by the operator by means of a test light or other suitable test, and will necessarily vary considerably with the character of the hydrocarbon oil used and the candle-power of gas desired. An exhauster and motor are preferably used for drawing off the gas as generated.

I am aware that gas-retorts have been connected by pipes extending inward from their ends, and that retorts have also been filled with hollow cones having perforated flanges at their bases, and I make no claim to such devices. My invention includes a gas-supply pipe at one end of the retort and a gas-eduction pipe at the other end of the retort, in combination with certain internal devices for heating the admitted gas, for heating the injected steam and oil, and for subjecting the mixed hot gas, steam, and oil-vapors to direct and repeated impact against hot deflecting-surfaces for better mixing them and causing their conversion into a fixed gas, all as clearly defined in my appended claims.

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

1. In combination with a retort, an ingression-pipe or smaller internal retort extending from the front end of the outer retort, a steam and oil injector connecting with such internal retort, a gas-supply pipe connecting with the rear end, and a gas-eduction pipe connecting with the front end of the outer retort, for the purpose described.

2. In combination with a retort, an ingression-pipe or smaller internal retort extending

inward from its front end, a steam and oil injector connecting with such internal retort, a series of deflecting and impact devices arranged in the outer retort and supporting the inner retort, a pipe for supplying water-gas connecting with the rear end, and a gas-eduction pipe connecting with the front end of the outer retort, for the purpose described.

3. In combination with a retort, a steam-superheating coil, a steam and oil injector connecting with the coil and discharging into the retort, a series of deflecting and impact devices arranged in the retort, a gas-supply pipe, and a gas take-off pipe connecting with opposite ends of the retort, for the purpose described.

4. In combination with a retort, a gas supply connecting with its rear end, a gas-eduction pipe leading from its front end, an ingression-pipe or small internal retort extending inward from its front end, a steam and oil injector connecting with such ingression-pipe, and deflecting and impact devices placed in the outer retort around the ingression-pipe and between its discharge end and the rear end of the retort, whereby the inflowing gas is first heated in contact with such devices, and then combined and fixed with the heated steam and oil-vapors flowing from the ingression-pipe, as described.

In testimony whereof I affix my signature in presence of two witnesses.

ARTHUR G. MEEZE.

Witnesses:
E. B. CLARK,
JNO. C. SCHROEDER.