COAL GASIFICATION - SELECTED ABSTRACTS AND TITLES

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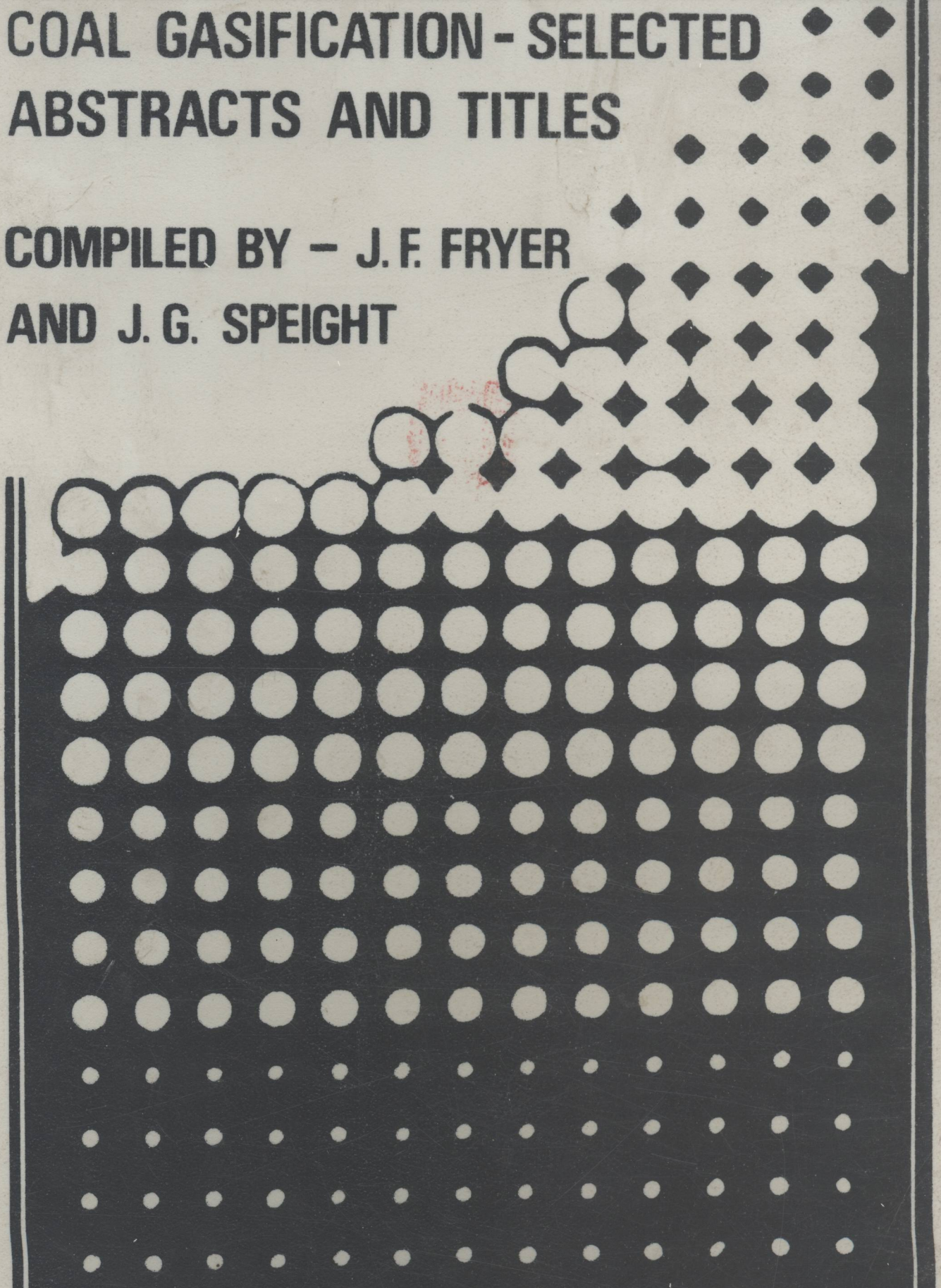

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FOREWORD

Recent "energy crises", concerns over secure future supplies of gaseous and liquid fuels, and greater recognition of the abundance of coal in North America are serving to direct increasing attention to the gasification of coal. Technology for producing a variety of fuel gases as well as feedstock for petrochemical operations, including production of synthetic liquid hydrocarbons, is for the most part well established through commercial coal gasification schemes in other countries. Indeed, the events of the past three or four years are now beginning to make similar schemes economically feasible in Canada and the United States.

Real difficulties are, however, commonly experienced in gaining access to much of the voluminous scientific and technical literature on coal gasification - especially material published before 1971. This material is not usually encompassed by currently active information services. We have therefore thought it timely to compile a collection of abstracts covering the period to 1970, and present it with the hope that it will assist individuals and agencies with active or developing interests in coal gasification.

The work is divided into three volumes. Volume 1 deals with gasification of unmined coal, i.e. in situ gasification. Volume 2 contains abstracts of literature pertaining to gasification of mined coal. Volume 3 concerns itself with gasification of peat, lignite and carbonaceous solids not classifiable as coals.

We are indebted to Dr. N. Berkowitz, Head of the Fuel Sciences Division of the Alberta Research Council, for his advice and encouragement throughout the preparation of this work.

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VOLUME 2

GASIFICATION OF MINED COAL

PART IV : EQUIPMENT - GENERAL DESCRIPTIONS AND MODIFICATIONS

2463

GAS-GENERATING APPARATUS
G. M. S. Tait
United States Patent, 843,715, February 12, 1907

A continuous-operating downdraft gas producer is described, which comprises a producer with an open-ended reduced lower portion; an annular collar surrounding the reduced portion and spaced apart therefrom to form a gas chamber - the collar extending downwardly below the open end of the reduced portion; a gas-outlet pipe tapping the gas chamber; a water-sealing device adapted to maintain a normal liquid level below the end of the producer and above the end of the collar; and an air-draft inlet pipe at the upper end of the producer.

2464

PROCESS OF HANDLING ASH IN GAS PRODUCERS
H. F. Smith
United States Patent, 846,358, March 5, 1907

A process of removing ash from downdraft gas producers is outlined, which consists of agglomerating the ash in relatively large masses or clinkers; and in removing the clinkers from above the fuel bed, out through the upper end of the producer.

2465

METHOD OF MAKING AND DELIVERING GASES
B. Loonis and H. Pettibone
United States Patent, 863,730, August 20, 1907

A method of operating a gas engine and supplying explosive mixed gas thereto is described, which consists of first passing air through a chamber containing a body of ignited fuel and drawing from the chamber a volume of producer gas. The gas is cleaned and stored in a holder, and a volume of water gas is formed by passing steam through the body of fuel which is stored separately from the producer gas. Predetermined quantities of each of the gases are then commingled in a gas holder and volumes of the mixture are withdrawn and delivered directly to a gas engine in which they are exploded.

2466

GAS GENERATOR
C. Heinz
United States Patent, 875,813, January 7, 1908

A gas generator is described which consists of a casing having a gas-delivery pipe passing down through the bottom from the fuel chamber, an air supply pipe passing up through the gas-delivery pipe and carrying a hood at its upper end, which encloses the upper end of the delivery pipe and is made hollow; as well as an upwardly extending air pipe leading from the upper side of the hood, and a caplike partition enclosed within the hood which has its annular side wall depending into the hollow part of the hood.

2467

METHOD OF MAINTAINING A CONSTANT OR APPROXIMATELY CONSTANT TEMPERATURE IN A GAS PRODUCER
E. Capitaine
United States Patent, 888,421, May 19, 1908

A method is described of maintaining a constant or approximately constant temperature in a suction gas producer working with a varying consumption of gas, due to varying load on the engine to which the gas is supplied. A greater or smaller proportion of the gas drawn off from the gas generator is delivered during periods when the engine is running with a reduced load, or with no load, to a place where it is burned; and the heat resulting from its combustion is transmitted to the gas generator.

2468

METHOD OF OPERATING GAS PRODUCERS
E. P. Coleman
United States Patent, 888,785, May 26, 1908

A method of operating gas producers is outlined, which consists of subjecting exhaust steam to a reduction of pressure, then compressing the steam and simultaneously supplying the compressed steam and air to the producer.

2469

GAS PRODUCER
G. L. Morton
United States Patent, 939,288, November 9, 1909

A gas producer is described which consists of a shell having a charging aperture, a lateral air inlet near the charging aperture, an outwardly projecting sloping portion below the air inlet (the angle of inclination of the sloping portion being the angle of the natural slope of the fuel and the portion being constructed to cover the fuel without leaving any intermediary space between the fuel and the portion), and supplementary air inlets at the height of the sloping portion.

2470

OIL GAS APPARATUS
E. N. Percy
United States Patent, 951,512, March 8, 1910

An apparatus for manufacturing gas is outlined, which comprises a retort having a vertical chamber with a gas outlet at the bottom; a solid fuel hopper at the top, having a lower cone-shaped end entering the top of the chamber (the hopper having a central tubular portion whose lower end diverges downwardly); an oil-supply pipe passing through the tubular portion of the hopper and adapted to discharge a divergent spray into the top of the chamber and downwardly thereinto; and air and steam pipes entering the central tubular portion of the hopper and discharging in the divergent portion in juxtaposition with the oil-supply pipe, whereby the steam and air may be commingled with the spraying oil and directed downwardly into the chamber of the retort.

2471

GAS GENERATOR
E. Brauss
United States Patent, 974,639, November 1, 1910

A gas generator is described which has in combination a generator chamber; a passage for the material to be treated extending downwardly into the chamber; a passage for the blast surrounding the passage for the material to be treated extending downward to substantially the level of the stack of material in the chamber and terminating in a passage of less outer diameter of the stack; and outlets for withdrawing gas near the lower part of the chamber.

2472

WATER-GAS PRODUCER
B. Spitzer
United States Patent, 981,708, January 17, 1911

An air-suction generator for the production of water gas is described, which has at its upper part a gas outlet provided with a suction fan; a bypass pipe bridging the inlet and outlet of the fan; valve devices for directing the passage of the gases or a portion thereof through the bypass pipe; a hopper for supplying the generator with coal; a steam-inlet pipe opening into the top of the generator; as well as a water-sealed dip pipe for establishing communication between the lower part of the generator and the scrubber.

2473

METHOD OF WORKING UPDRAFT GAS PRODUCERS
J. Fielding
United States Patent, 986,374, March 7, 1911

A method of working upward-shaft gas producers for the production of a pure gas from bituminous fuel is outlined, which consists in taking off the fixed gases and condensable vapors at different levels in a producer, mixing the condensable vapors with air, and burning the mixture in a steam generator furnace. The steam so produced is introduced together with the supply of air to the producer, whereby substantial self-regulation of the producer is obtained. The rate of consumption of the fixed gases is accomplished by a corresponding rate of generation of the condensable vapors and consequently of the steam supplied to the producer.

2474

PROCESS OF OPERATING GAS PRODUCERS
C. Barmore, Jr.
United States Patent, 1,012,120, December 19, 1911

An improvement in operating gas producers is described, which comprises supplying to a deep fuel bed an intimately mixed heated draft current of air, hot products of combustion and steam in excess of the quantity of carbon dioxide present; supplying heat to the mixture by the hot products and maintaining the mixture materially above the boiling point of water, thereby avoiding quenching of the fuel where the draft enters it. The temperature of the fuel bed is regulated and restricted below the objectionable clinkering point by regulating and restricting the relative proportion of air in the mixture.

2475

CONSTRUCTION OF GAS RETORTS
P. C. H. Hunt
British Patent, 12,675, May 29, 1912

In the construction of gas retorts, the retorts are formed for a short distance at the charging end of the same shape as the mouthpiece, while the roof portion for the remainder of the length of the retorts is raised so as to form a gas-passage. The exterior of the raised portion is flattened so as to form a resting ground for another retort, which is directly superimposed onto it.

2476

GAS PRODUCER
A. E. Matlack
United States Patent, 1,025,198, May 7, 1912

A gas producer is described, which consists of a body; a gas-outlet port adjacent to the lower end of the body of the producer; a rotary stirrer positioned in the top of the body of the producer; and a fixed blast pipe surrounding the stirrer and positioned to discharge thereon.

2477

METHOD OF REGULATING GENERATION IN GAS PRODUCERS AND APPARATUS THEREFOR
L. R. C. Chowning
United States Patent, 1,066,252, July 1, 1913

A process is described for regulating the feed of steam and air to a producer by variation in the pressure of the gas generated therein through the instrumentality of a steam valve controlled by the generated pressure. The method consists of interposing between the valve and the pressure of the producer a fluid piston of atmospheric air.

2478

METHOD OF OPERATING GAS PRODUCERS
H. L. Doherty
United States Patent, 1,069,866, August 12, 1913

A method of operating gas producers is outlined, which comprises charging into a gas producer a mixture of fuel and flux such that the mineral matter of the charge will form an easily fusible compound - the flux comprising a proportion of basic material other than alumina, which will establish in the charge a proportion of such bases which shall be at least equal to the alumina, free or combined, present in the mixture of fuel and flux. The fuel is then burned in the producer by introducing into the ignited fuel an oxidizing draft current to form combustible gas and liquid ash, and the gas and liquid ash is withdrawn from the producer.

2479

GAS PRODUCER
E. Fleischer
British Patent, 10,408, April 27, 1914

Bituminous fuel, after passing through a preliminary distillation chamber, is preheated in a compartment before reaching the main combustion zone from which the hot gas is withdrawn by a main outlet pipe. Air is supplied at a point near the bottom, and a secondary supply of air, preferably mixed with steam, is admitted higher up and serves to burn that portion of the gas which passes through the compartment towards a secondary outlet; the hot combustion products serve to distil the fuel in the preliminary distillation chamber.

2480

METHOD OF AND APPARATUS FOR GENERATING PRODUCER GAS
E. Servais
United States Patent, 1,098,534, June 2, 1914

An improvement in the manufacture of gas in a gas producer is outlined, which consists of maintaining a gasifying temperature at the lower portion of the fuel charge by a blast of air introduced through tuyeres, cooling the charge above the tuyers to a temperature below that of slag fusion by introducing thereinto a gas or vapor which decomposes with absorption of heat, then permitting molten slag to accumulate on a hearth below the tuyeres, and supplying additional heat to the slag to prevent solidification thereof.

2481

METHOD OF OPERATING GAS PRODUCERS
H. Koppers
United States Patent, 1,146,627, July 13, 1915

A method of operating a gas producer with discharge of the slag in a liquid state is described, which consists in causing a portion of the hot gas generated to pass with the slag through the slag discharge passage.

2482

GAS PRODUCER
G. M. S. Tait
United States Patent, 1,165,347, December 21, 1915

A gas producer is outlined which has a grate frame; a series of grate bars arranged side by side and spaced from each other; and means for mounting the bars on the frame. A second series of grate bars arranged below the first series and respectively under the spaces between the bars of the first series and having ash-supporting top surfaces of a greater breadth than the spaces, whereby the ash falling through the spaces between the bars of the first series lies in angle of repose hillocks upon the bars of the second series. The bars of the second series are formed for lateral discharge of the ash, and have means for mounting the bars on the grate frame.

2483

PROCESS OF GENERATING AND UTILIZING PRODUCER GAS
G. M. S. Tait
United States Patent, 1,175,191, March 14, 1916

A process of making producer gas is described, which comprises supplying fuel and draft current to a producer and maintaining incomplete combustion of the fuel while creating a suction or rarefied state at the outlet side of the producer by the suction of a gas engine and a pressure condition at the draft side by the pressure of the exhaust of the engine. The conditions are regulated automatically to cause the pressures to balance or equalize at a point within the fuel bed of the producer.

2484

GAS PRODUCER
L. F. Burger
United States Patent, 1,230,558, June 19, 1917

A gas producer is described which consists of the combination of a generating chamber, a fuel charger arranged at the top of the generating chamber, a tuyere surrounding the fuel charger, and a vaporizing chamber connected to the tuyere.

2485

IMPROVEMENTS IN AND CONNECTED WITH GAS PRODUCER PLANTS
E. Dolensky
British Patent, 100,843, January 25, 1917

An intermittently-operating gas producer for the manufacture of producer gas or water gas or mixed gas is described, in which the air for the hot blast is passed through a column of coke only in the lower portion of the gas producer distinguished by the feature that the coke is blasted by air passing alternately from one side to the other over a fire-bridge of suitable height and that between successive blast periods evolution of gas takes place.

2486

IMPROVEMENTS IN AND RELATING TO REGENERATORS OR HEAT INTERCHANGERS IN OR FOR USE WITH GAS PRODUCER PLANTS
A. H. Lynn, L. A. Riley and N. E. Rambush
British Patent, 108,710, August 14, 1917

A regenerator or heat interchanger separate from, but for use in connection with, a gas generator, is described, in which the combination of two or more concentrical heating chambers, preferably cylinders, through which the hot producer gas passes in serial order and two or more concentrical chambers, preferably cylinders, through which the air and steam passes in serial order to the producer and preferably in the counter direction to the gas, arranged intermediate with or both intermediate with and surrounding the heating chambers.

2487

IMPROVEMENTS IN OR RELATING TO GAS PRODUCERS
C. B. Tully and O. E. Yeo
British Patent, 109,323, September 13, 1917

A gas producer is outlined, which comprises a lower gas generating chamber and, in communication therewith; an upper fuel supply chamber made of smaller cross-sectional area and having relatively thin walls; a steam generating chamber containing refractory material and arranged in the upper part of the producer between its outer wall and the fuel supply chamber; and, in communication therewith a lower or steam super-heating chamber also containing refractory material arranged in the producer structure between its outer wall and the gas generating chamber and communicating at its lower end with the lower portion of the gas generating chamber.

2488

GENERATOR FOR GAS PRODUCER PLANTS
G. H. Allen
United States Patent, 1,254,104, January 22, 1918

A gas producer is described, which consists of a combustion chamber; an air intake extending into the chamber and communicating therewith through laterally arranged ports in the intake. The chamber has supplementary air ports in the outer wall whereby air is supplied to the interior and exterior of the mass of fuel in the chamber and means below the combustion chamber to draw the generated gas through the fuel.

2489

IMPROVEMENTS IN GAS PRODUCERS
S. Glover and J. West
British Patent, 119,723, October 17, 1918

An improvement in gas producers is outlined in which the arrangement of the lower end of the producer of a revolving member has an inwardly projecting spiral rib upon its interior which acts during the rotation of the member to draw ashes down the furnace and discharges them from the lower end, beneath which is situated a plate or the like to prevent self-discharge of the producer.

2490

IMPROVEMENTS IN OR RELATING TO THE PROCESS OF BURNING SOLID FUEL
F. Thuman
British Patent, 120,011, October 24, 1918

A process of burning fuel is described, which consists of feeding a burning fuel bed through a furnace chamber; establishing an ash fusing region and a clinker solidifying and carbon burning region by appropriate blast control; then passing a combustible admixture of residue and carbon from the ash fusing region to the clinker solidifying and carbon burning region and separating the surfaces of the furnace wall and the passing admixture by providing space at the furnace wall in the vicinity of the entrance to the ash solidifying and carbon consuming region; and thereafter burning the carbon out of the admixture in the clinker solidifying region.

2491

IMPROVEMENTS IN AND RELATING TO GAS GENERATORS
T. R. Wollaston
British Patent, 113,856, March 14, 1918

A gas producer is described which is provided with fuel supplying and coking retorts in continuous communication with, and situated above, the producer. These retorts form the only outlets for the whole of the producer gases to be afterwards collected. There is also the combination of movable controlling means within the retorts whereby not only is the fuel more evenly distributed therein, but the passage of the gases through the retorts is facilitated in a manner suitable for regulating the velocity of flow of the gases and condensable distillates therein.

2492

IMPROVEMENTS IN OR RELATING TO GAS GENERATORS
C. Clerc
British Patent, 121,290, October 2, 1919

A gas producer charged at the top is described, in which all the combustion air is admitted to a middle zone or region of the producer vessel. The zone or region above the middle zone forms a distillation chamber and has a pipe for the discharge therefrom of the products of distillation, while the zone or region below the middle zone forms a combustion chamber from which the burnt gases are evacuated.

2493

IMPROVEMENTS IN OR RELATING TO SHAFT FURNACES AND GAS PRODUCERS
E. F. Chaudiere
British Patent, 137,168, January 8, 1920

A shaft furnace is outlined, which is provided with a central core having the outward form of an upright and an inverted cone and is provided inside with two tubular columns supporting the whole (the core being provided at its base with a fan to exhaust the burnt gases from the upper part of the furnace and discharge them into the atmosphere). The low pressure thus produced results in the introduction of fresh air through openings provided in the central core, which circulates in canals or flues arranged in the core and becomes heated therein and escapes into the material under treatment at the desired points.

2494

RETORTS AND APPARATUS IN CONNECTION THEREWITH FOR USE IN THE MANUFACTURE OF GAS
J. W. Drake
British Patent, 123,323, February 12, 1920

An apparatus is described for the manufacture of gases which is so constructed and arranged that at one time coal gas may be continuously supplied, while at another time producer gas alone may be continuously supplied. These two gases may be continuously produced and mixed together in any desired proportions within the coal gas retort or retorts so that in this combined form they may be supplied continuously.

2495

IMPROVEMENTS IN OR RELATING TO GAS PRODUCERS
L. Fornas
British Patent, 123,323, February 12, 1920

A gas producer of single or multiple type is outlined, which comprises in combination a fuel feeder or feeders descending into a smoke chamber; a dryer or dryers located beneath the fuel feeder or feeders and within a chamber wherein air is introduced forming a circular current and acting as a recuperating agent. A furnace or furnaces are disposed beneath the dryer chamber or dryers within a chamber for circulation of the gas, which contains a grate disposed beneath the furnace or furnaces, and an ash pit beneath the grate. The arrangement is such that the air and gas pass downwardly through the fuel.

2496

IMPROVEMENTS IN MEANS TO GENERATE GAS OR GASES FROM COAL DUST AND/OR THE LIKE
J. H. Corthesy and S. T. Stephen
British Patent, 127,933, June 10, 1919

An apparatus for the generation of gas from fuel in pulverulent condition is described, wherein a portion of the gas generated is utilized for producing a current to maintain the fuel in suspension in the distilling chamber of the apparatus.

2497

IMPROVEMENTS IN OR RELATING TO GAS GENERATORS OR PRODUCERS AND THE METHOD OF WORKING SUCH GAS GENERATORS OR PRODUCERS
H. Francar
British Patent, 127,974, June 10, 1919

A method of operating gas producers is outlined, which consists in diluting air and steam with gas for combustion in an excess of gas in a combustion chamber situated within the furnace structure so as to obtain a large gaseous mass at lower temperature therein than without such excess of gas; and thereafter passing the gaseous mass through the fuel in order to regenerate the products of combustion. The excess of gas in the products of combustion is chemically inactive and serves to maintain the fuel in the fuel chamber at a temperature which is practically uniform laterally throughout the mass of fuel whilst restricting the temperature of the fuel mass vertically within the most efficient working limits of temperature.

2498

IMPROVEMENTS IN AND RELATING TO GAS PRODUCERS
H. V. Senior and A. D. Bates
British Patent, 131,170, August 21, 1919

A gas producer for fuels having a high moisture content is described, which has an outlet on the side of the hopper leading to a chimney and exhausting means such as an ejector fitted for withdrawing moisture from the fuel and forcing it into the chimney.