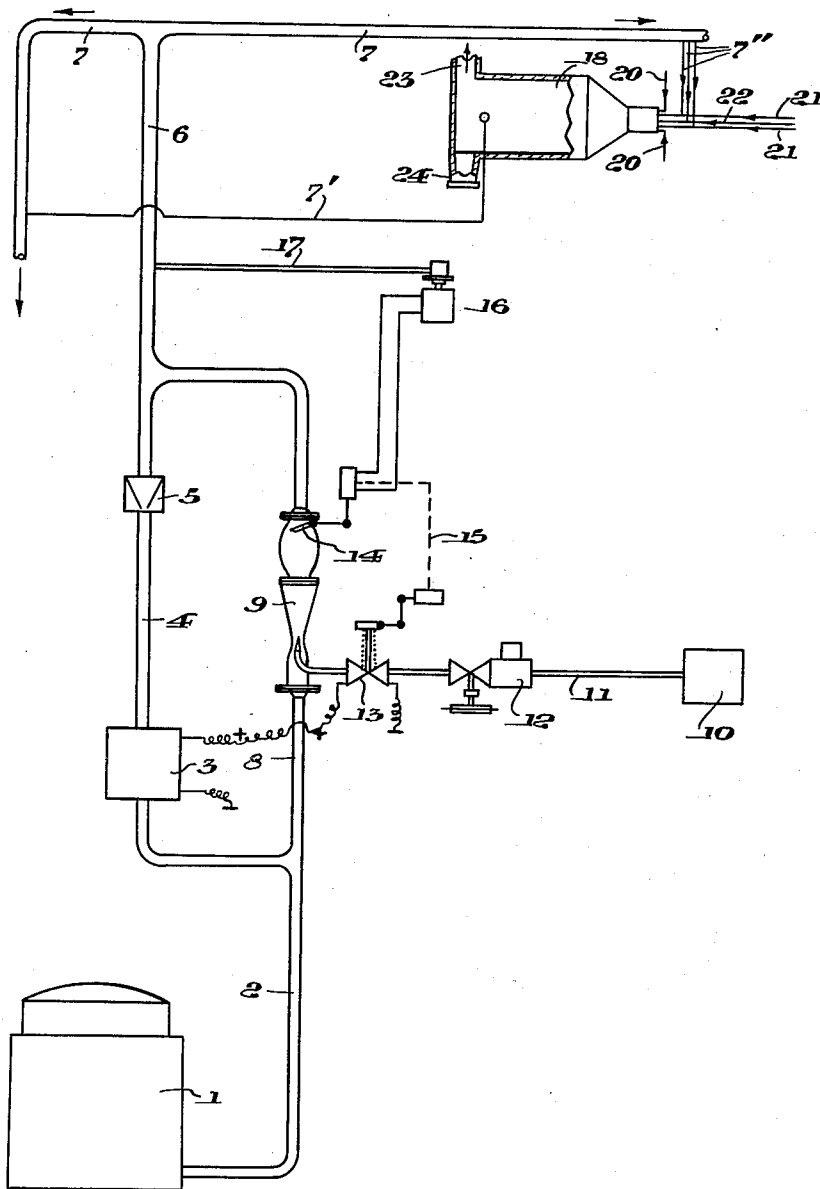


Jan. 5, 1960

A. KLAPP ET AL
APPARATUS FOR GASIFICATION OF FINELY
DIVIDED SOLID OR LIQUID FUELS
Filed Oct. 22, 1957

2,919,980



INVENTORS.
ARNOLD KLAPP, and
BRUNO ZELLERHOFF.
BY
Thomas J. P. O'Brien.
Their
ATTORNEY.

1

2,919,980

APPARATUS FOR GASIFICATION OF FINELY DIVIDED SOLID OR LIQUID FUELS

Arnold Klapp, Essen, and Bruno Zellerhoff, Essen-Werden, Germany, assignors, by mesne assignments, to Koppers Company, Inc., Pittsburgh, Pa., a corporation of Delaware

Application October 22, 1957, Serial No. 691,773

4 Claims. (Cl. 48—63)

The present invention relates to an apparatus for gasification of finely divided, solid or liquid, fuels in suspension in oxygen and endothermically reacting gasification medium, such as disclosed in the copending application of Friedrich Totzek, Serial No. 476,453, filed December 20, 1954, of which this application is an improvement continuing common subject matter owned by the common assignee. Because of the danger of explosions which exist in such an installation, in the case of operating disturbances, special means are provided in such gasification plants to flood the gasification apparatus and the connecting lines, in the case of any operating disturbance, with an inert gas, for example nitrogen. For this purpose there are provided a nitrogen tank gasometer, in which a rather large supply of nitrogen is maintained at moderate pressure, and also a continuously operating blower which maintains a certain nitrogen pressure in a nitrogen distributing line. In the case of an operating disturbance, the distributing line is opened on the critical spaces of the gasification apparatus so that the latter are well purged with nitrogen in the shortest time.

The present invention relates to a development of this apparatus to provide flow of inert gas to the gasification apparatus in case the continuously operating blower is placed out of operation by a failure of electric power. In such a case, without the present improvement, the nitrogen would flow from the gasometer to the plant at such a slight pressure, through a bypass line, that an effective rapid flooding of the plant would not be possible because of the back pressure.

The present invention consists in arranging parallel to the continuously operating blower, which conveys the nitrogen with increase of pressure from the low-pressure tank into the flooding lines connected with the gasification apparatus, an injector-like or aspirating conveying device which is connected on the suction side to the low-pressure tank and on the pressure side after the blower and which is driven by a comparatively highly compressed stream of nitrogen from a special high-pressure tank, switch means being provided which supplies the injector with high-pressure nitrogen, only when the blower does not convey any nitrogen because of power failure.

An embodiment of the apparatus of the invention is diagrammatically illustrated in the drawing.

18 indicates a gasification chamber having means in the form of conduits 20 for introducing endothermically reacting gasification media, such as steam and carbon dioxide, and conduits 21, 22, for introducing a finely divided fuel in suspension in pure oxygen or in air enriched in oxygen as more fully described in the aforesaid Totzek application and the patents and applications successively continued therein. The reacted gas leaves the gasification chamber through a gas outlet 23, and ash is removed through hopper 24. In the event of the failure of supply of finely divided fuel to the oxygen as the suspension carrier medium, the continuance of flow of oxygen lends itself to the creation of dangerous explosive conditions in the equipment beyond the gasifier chamber outlets and

2

inlets, requiring flooding of the system with inert gas to dilute the oxygen and thus avoid creation of such dangerous conditions.

The nitrogen which is required for the flooding is taken from gasometer 1. The latter is usually under a pressure of about 150 mm. water column or also somewhat higher. The nitrogen flows through line 2 into blower 3 which produces a nitrogen pressure of about 5000 mm. water column on the pressure side. The nitrogen then goes through check valve 5 and line 6 into distributing line 7 through which the nitrogen flows to the actual gasification apparatus at 7', 7". There is provided parallel to line 4 a secondary line 8 in which the injector 9 is located. The suction side of the injector is adjacent to gasometer 1, while the pressure side of the injector discharges into the nitrogen pressure line after the check valve 5. Nitrogen is maintained under a high pressure, in a high pressure tank 10, about 25 atm. or more. In case the power for blower 3 fails, the magnetic valve 13 is deenergized and is thereby opened so that nitrogen can flow from high pressure tank 10 through line 11 and reducing valve 12 into the injector 9. Because of its high flow velocity this high-pressure nitrogen entrains the nitrogen from gasometer 1 so that a sufficiently great, total amount of nitrogen with the required pressure is available for the desired flooding. After the injector there is provided a valve 14 which is regulated by a regulating device 16 and a pressure measuring line 17 so that the desired pressure prevails in lines 6 and 7. The magnetic valve 13 is connected with flap valve 14 by mechanism 15 so that flap valve 14 is opened before the magnetic valve 13 permits the high pressure nitrogen to flow into the injector 9.

The present invention is not limited to the use of nitrogen as inert gas; other inert gases or vapors such as steam or carbon dioxide can also be used.

We claim:

1. Apparatus for gasification comprising; a gasification chamber having means for introduction of finely divided, solid or liquid, fuel in suspension in a free oxygen containing gas of the group consisting of pure oxygen and oxygen enriched air and a separate flow of endothermically reacting gasification media selected from the group consisting of steam and carbon dioxide, and provided with means in the form of a continuously operating blower which conveys inert gas at an increased pressure from a low pressure tank into a flooding line connected to the gasification chamber, to flood the gasification apparatus and its connecting lines with an inert gas in case of any operating disturbance, characterized by; the arrangement, parallel to the continuously operating blower which conveys the nitrogen with increase of pressure from the low-pressure tank into the flooding line connected with the gasification apparatus, of an injector aspirator conveying means which is connected on its suction side to a low-pressure tank and is connected on its pressure side to the flooding line after the blower, and which is driven by a comparatively highly compressed stream of inert gas from a special high-pressure tank by switch means set to operate to supply the injector aspirator with high-pressure inert gas from the high-pressure tank, only when the blower fails to convey inert gas from the low-pressure tank because of power failure to run the blower.

2. Apparatus as claimed in claim 1, in which the switch means comprises a magnetic valve which is arranged between the high-pressure tank and the injector aspirator and which is operable to automatically open in the case of power failure to the blower.

3. Apparatus for gasification of finely divided, solid or liquid, fuel in suspension in oxygen and endothermically reacting gasification media, in which means as set forth before the hereinafter recited arrangement are provided

3

to flood the gasification apparatus and the connecting lines with an inert gas, for example nitrogen, in case of an operating disturbance, characterized by; parallel to the continuously operating blower which conveys the nitrogen with increase of pressure from a low-pressure tank into the flooding line connecting with the gasification apparatus, there is arranged an injector conveying means which is connected on the suction side to the low-pressure tank and on the pressure side after the blower and which is driven by a comparatively highly compressed stream of nitrogen from a special high-pressure tank, with switch means to supply the injector with high-pressure nitrogen,

4

only when the blower does not convey any more nitrogen because of power failure.

4. Apparatus of claim 3, characterized by the switch means comprising a valve which is automatically opened in the case of power failure and which is arranged between the high-pressure tank and the injector.

References Cited in the file of this patent

FOREIGN PATENTS

9,154 Great Britain ----- 1914

10