APPARATUS FOR DELIVERING WASTE FLUIDS FOR COMBUSTION

Inventors: Robert W. Evans; David M. Simmons, Jr., both of Sweeny, Tex.

Assignee: Phillips Petroleum Company, Bartlesville, Okla.

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ABSTRACT

An apparatus and method for passing waste fluids into a flare stack for combustion, passing air substantially continuously into said stack while passing waste fluids thereinto, and controllably passing additional air into the flare stack in response to the flow rate of waste fluids into said stack.

8 Claims, 1 Drawing Figure
APPARATUS FOR DELIVERING WASTE FLUIDS FOR COMBUSTION

It is desirable to provide apparatus and method for decreasing the smoke emitted during the combustion of waste fluids. A sample use would be in the combustion of waste oil vapor and other waste hydrocarbons from a hydrocarbon processing plant.

In heretofore utilized similar apparatus, a single blower will inject air into the stack to support combustion of the fuel. However, at low rates of injection of the waste fluid, the blower will not be actuated owing to the fluid flow rate sensing apparatus not being sufficiently sensitive at the low rates of fluid flow. This is particularly true where the waste fluid flow varies between, for example, 100 scfm to 2,000 scfm. In such situations, the piping necessary to handle 2,000 scfm will be so large that when the low values are passing the control equipment will not be actuated.

This invention, therefore, resides in an apparatus and method for passing waste fluids into a flare stack for combustion, passing air substantially continuously into said stack while passing waste fluids thereinto, and controllably passing additional air into the flare stack in response to the flow rate of waste fluids into said stack.

Other aspects, objects, and advantages of the present invention will become apparent from a study of the disclosure, the appended claims, and the drawing.

The drawing is a diagrammatic view of the apparatus of this invention. Referring to the drawing, a flare stack 2 is connected in fluid communication with a waste fluid conduit 4. A first air injecting means 6, for example a fan, compressor, or other apparatus known in the art, is connected in fluid communication with the flare stack 2.

The first air injecting means 6 has a first power source 8, for example an electric motor, connected thereto for operating said air injecting means 6. A control means 10 is connected to the first power source 8 and to measuring-signaling means 12 associated with the waste fluid conduit 4. The control means 10 can be a mercoid switch or pressure switch, for example, and the measuring-signaling means can be a Pitot tube, orifice meter, or other flow measuring means having a signal transmitted for delivering a signal responsive to the measure of flow.

A second air injecting means 14 having a second power source 16 is connected in fluid communication with the flare stack 2 for substantially continuously passing an air stream into the stack while waste fluid is passing into said stack. It is preferred that the discharge of the second air injecting means 14 be connected to the suction of the first air injecting means 6.

In the method of this invention, a first stream of air from the third means is substantially continuously passed into the flare stack 2 while passing waste fluids into the stack and into contact with the air stream for mixing therewith. The mixture passes upwardly through the stack and is combusted. A pilot light (not shown) is associated with the stack for ignition of the waste fluid-air mixture. As the flow of waste fluid into the stack 2 increases, the rate of flow through conduit 4 will become sufficient to be detected by the measuring-signaling means 12 which will in turn deliver a signal via line 18 for actuating power source 8 and first air injecting means 6 via control means 10.

An example operation is as follows:

In the operation of a flare at a terminal storing ethylene, propylene, natural gas liquids, debutanized natural gas liquids, isobutane, and normal butane, a maximum release of 1,900 standard cubic feet per minute of combustible gases was expected. Small continuous releases of approximately 150 to 200 scfm occurred. The velocity measuring device which obtained these measurements through use of a three-position Pitot tube would not actuate the mercoid switch to initiate operation of the blower which provided 9,280 scfm of combustion air and 4 inches of water head into the stack. The vapors when burned without excess combustion air produced smoke. A continuously operating one-half horsepower blower blowing through the suction of the main blower was installed and provided adequate air (1,560 scfm of combustion air at 1 inch of water head) for smokeless operation in the range below that at which the large volume blower did not operate. During operation, the large volume blower operated approximately one percent of the time while the small blower operated continuously.

Other modifications and alterations of this invention will become apparent to those skilled in the art from the foregoing discussion and accompanying drawing, and it should be understood that this invention is not to be unduly limited thereto.

What is claimed is:

1. An apparatus for delivering waste fluid for combustion comprising a flare stack, means for passing waste fluids into said flare stack, measuring means for measuring the flow rate of said waste fluids passing into said flare stack and delivering a signal in response to said rate, first means for passing air substantially continuously into said flare stack while passing waste fluid into said flare stack, and second means for passing additional air into said flare stack being arranged in operational relationship with said measuring means so as to be actuated by said signal.

2. Apparatus in accordance with claim 1 wherein said second means comprise
a first air injecting means connected to said flare stack so as to inject air into said flare stack when actuated, a first power means connected to said first air injecting means, and control means receiving said signal from said measuring means and actuating said first power means.

3. Apparatus in accordance with claim 2 wherein said first means comprises a second air injection means connected to said flare stack and a second power source connected to said second air injecting means so as to substantially continuously pass air into said flare stack while passing waste fluids into said flare stack.

4. Apparatus in accordance with claim 3 wherein a discharge of said second air injecting means is connected to the suction of said first air injecting means.

5. Apparatus in accordance with claim 2 wherein said control means is arranged in such operational relationship between said measuring means and said first power means that said control means actuates said first power
3. A method for delivering waste fluids for combustion, comprising:
   passing waste fluids into a flare stack;
   measuring the flow rate of the waste fluids passing into said flare stack,
   delivering a signal in response to said measured flow rate,
   passing a first stream of air substantially continuously into the flare stack while passing waste fluid into
   the flare stack, and
   passing a second stream of additional air into the flare stack in response to said signal.
4. A method, as set forth in claim 6, wherein the first and second streams of air passed together into the flare stack.
5. A method, as set forth in claim 6, wherein the first air stream passes into the flare stack in response to the flow rate of the waste fluids being greater than a preselected value.

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