

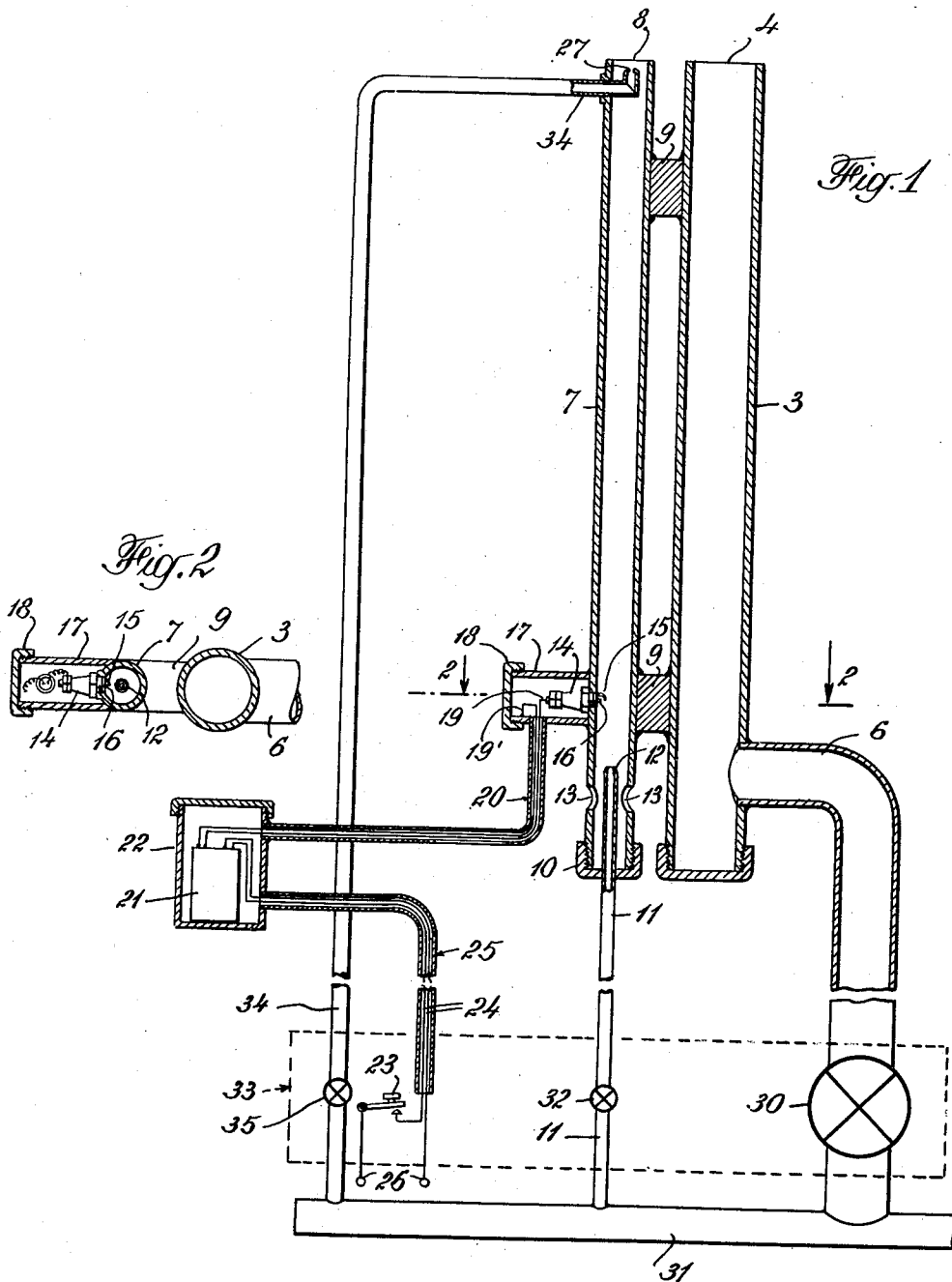
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FLARE IGNITION APPARATUS

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FLARE IGNITION APPARATUS

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This invention relates to apparatus for igniting waste gas flares and other gas burners.

In the refining of petroleum and natural gas, certain inflammable waste gases cannot be economically utilized and must be disposed of. Such gases are customarily burned in flares in the atmosphere as they issue from open-ended substantially vertical flare pipes. Such flares are sometimes extinguished by high winds, temporary interruptions in gas supply, decreases in gas pressure or other causes. The hand lighting of such flares is a hazardous operation. The gas flows in large volumes from the flare pipe opening and forms a highly inflammable or explosive mixture with the air which extends for a considerable distance from the pipe. In order to light the flare, the operator must apply a torch at a point close to the pipe opening, and this ignites the surrounding air-gas mixture and produces a sudden flash or explosion that endangers the operator and may be destructive to the equipment.

It is the object of the present invention to provide apparatus for igniting waste gas flares and similar gaseous fuel burners. More particularly, the invention contemplates the provision of ignition apparatus which is readily operable from a remote point, which is capable of igniting the flare without dangerous flashes or explosions and which is effectively protected both from the heat of the flare and from the deteriorating effects of the weather.

In describing the invention in detail, reference will be made to the accompanying drawing in which an embodiment thereof has been illustrated. In the drawings:

Fig. 1 is a diagrammatic and simplified representation of an ignition system including a sectional elevation of an ignition apparatus constructed in accordance with the invention; and

Fig. 2 is a sectional view of the flare pipe and ignition device of Fig. 1 taken along the line 2-2 of Fig. 1.

Referring to the drawing, a substantially vertical flare pipe is shown at 3. It is supplied with waste gas from a pipe line 31 through a supply pipe 6 connected adjacent its lower end. The upper end of the flare pipe is open as shown at 4, and in normal operation, waste gas issues from this opening and burns in the atmosphere.

In accordance with the invention, an elongated ignition tube 7 is disposed in a vertically extending position with its open upper end 8 adjacent the open end 4 of the flare pipe 3. The ignition tube 7 may be disposed substantially parallel to the

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flare pipe 3, and as shown, may be secured thereto by spaced blocks 9 welded or otherwise suitably secured to the pipe and tube surfaces. The lower end of the tube 7 is suitably closed, as by a cap 10, and a gas pipe 11 extends through a central opening in the cap and ends in a gas jet 12 disposed centrally within the tube. A plurality of air inlet openings 13 are formed in the tube 7 just below the jet 12. The gas pipe 11 is connected to the waste gas pipe line 31 and is provided with a valve 32 located at a remote control station indicated by the dotted line 33 and disposed at a point fifty feet or more away from the flare. A valve 30 in the gas supply pipe 6 for the flare is also located at the remote control station.

Suitable electric ignition means is provided above but adjacent the jet 12. The ignition means preferably takes the form of a spark plug 14 secured in an opening in the wall of the tube 7 with spaced electrodes 15 and 16 extending into the interior of the tube. A housing 17, having a removable cap 18, is fixed to the outer surface of the tube 7 over the spark plug 14 and high tension cables 19 and 19' passing through a conduit 20 connect the electrodes of the spark plug 14 to an ignition coil 21 located in a housing 22 which may be disposed beneath the ground or otherwise protected against the heat of the flare. The high tension circuit to the spark plug 14 is completed through the housing 17 and the tube 7. Electrical energy from a source indicated by the terminals 26 is supplied to the low tension side of the ignition coil 21 under control of a manually operable switch 23 through wires 24 enclosed in a conduit 25. The switch 23 is located at the remote control station 33, and may comprise a normally open push button type switch.

A gas jet 27 is disposed substantially centrally within and spaced from the inner wall of the ignition tube 7 adjacent its upper end. The pipe 34 leading to the jet 27 may be welded or otherwise fixed in an opening in the wall of the tube 7. The pipe 34 is connected to the waste gas pipe line 31 and is provided with a control valve 35 at the remote control station 33.

In operating the disclosed embodiment of the invention to ignite the flare, the valve 32 is first opened, admitting gas to the jet 12 through the pipe 11. The flow of gas from this jet induces a flow of air into the tube 7 through the openings 13, and an inflammable mixture of gas and air flows upwardly in the tube 7 past the spark plug 14. The switch 23 is then momentarily closed, energizing the ignition coil 21 and causing a

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spark to jump between the plug electrodes 15 and 16 in the tube 7, thus igniting the gas and air mixture in the tube 7. The valve 35 is then opened, supplying gas to the upper jet 27, and the burning gas and air in the tube 7 ignites the gas issuing from the upper jet. As soon as the upper jet is ignited, the valve 32 is closed, cutting off the supply of gas to the lower jet 12. The valve 30 is then opened, admitting gas to the flare pipe 3, and this gas is ignited as it issues from the open upper end 4 of the flare pipe by the flame from the adjacent jet 27.

The described sequence of operations may be readily controlled by an operator located at the remote control station 33 from which the flare and ignition pipe can be observed.

The flame from the jet 27 acts as a pilot light in that it continues to burn while the flame is burning. This flame does not, however, ordinarily perform the usual functions of a pilot light, since factors which extinguish the flame usually also extinguish the flame from the jet 27. However, the flame from the jet 27 serves a useful function in that it acts to induce a flow of relatively cool air upward through the tube 7, past the plug electrodes 15 and 16, and so keeps the lower section of the tube, including the jet 12 and the plug 14, relatively cool. This prevents injury or deterioration of the ignition apparatus by the heat of the flare. As a consequence of the described construction and arrangement, the ignition apparatus operates dependably over considerable periods without servicing.

By the use of my improved ignition apparatus, waste gas flares may be readily lighted without hazard to the operator or damage to the equipment, since flashes and explosions are substantially avoided and the operator is located at a safe distance from the flare. Although described in connection with the ignition of flares, my apparatus is also useful for igniting other gaseous fuel burners, and particularly those which handle large volumes of gas.

I claim:

1. Flare ignition apparatus comprising a vertically extending tube having an open upper end and an opening for the admission of air adjacent its lower end, two gas jets within and spaced from the wall of said tube, one of said jets disposed adjacent the upper end and acting both to supply an ignition flame extending from the upper tube end and to induce a flow of cooling air through the tube, and the other of said jets disposed adjacent the lower air opening and acting when lighted to ignite said first mentioned jet, and a spark ignition device in said tube adjacent and above said second mentioned jet.

2. Flare ignition apparatus comprising a vertically extending tube having an open upper end and an opening for the admission of air adjacent its lower end, two gas jets within and

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spaced from the wall of said tube, one of said jets disposed adjacent the upper end and acting both to supply an ignition flame extending from the upper tube end and to induce a flow of cooling air through the tube, and the other of said jets disposed adjacent the lower air opening and acting when lighted to ignite said first mentioned jet, a spark ignition device in said tube adjacent and above said second mentioned jet and separately controllable means for supplying gas to the respective jets.

3. In a flare ignition apparatus, in combination, a vertically extending tube having an open upper end and an opening for the admission of air adjacent its lower end, a gas jet within and spaced from the wall of said tube adjacent its open upper end, a second gas jet within and spaced from the wall of said tube adjacent and above said air admission opening, a spark ignition device in said tube above said second jet, means for supplying electrical energy to said spark ignition device, means for supplying gas to said gas jets and means for separately controlling the supply of energy to said electrodes and the supply of gas to each of said jets.

4. Flare ignition apparatus comprising a vertically extending ignition tube having an open upper end and an opening for the admission of air adjacent the lower end thereof, two gas jets within and spaced from the wall of said tube disposed respectively adjacent the upper and lower ends of said tube, a spark ignition device in said tube above and adjacent the lower of said jets, means for controlling the energization of said ignition device, and means for separately controlling the supply of gas to said respective jets.

5. Flare ignition apparatus comprising a vertically extending ignition tube having an open upper end and an opening for the admission of air adjacent its lower end, a gas jet in said tube substantially at its open upper end, a second gas jet in said tube adjacent said air inlet opening, a spark plug extending into said tube above said second jet and a housing on the outer wall of said tube enclosing the outer part of said spark plug.

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