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DETECTION OF FUEL GASES

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This invention relates to the manufacture of improved fuel gases and to improvements in the detection of fuel gases. Certain fuel gases, namely, blast furnace gas such as is obtained in iron manufactories, blue water gas, carburetted water gas, producer gas, some kinds of coal and coke oven gases, oil refinery gas, natural gas of the kind containing large proportions of the lower paraffin hydrocarbons, and carburetted air made by adding to air the butane fractions from gasoline manufacture, contain toxic or asphyxiating components, and yet when mixed with air are not readily detected by smell, taste or sight, or by any convenient apparatus. Hence leaks which may develop in the containers and the pipes through which the gases are conveyed are often only discovered when the health of workmen or others in the neighbourhood has become impaired or when a serious loss of gas is found to have occurred.

The object of the present invention is to overcome these disadvantages, by providing a means whereby leakage of such gases may be detected, by introducing into the gases, at a suitable stage in their manufacture or transport, an odorous substance, the odorous substance being such that there is no disadvantage likely to arise from its use in this way.

According to the invention there is provided a process for improving fuel gases of the kind described, whereby leakage of such gases is easily detected, which comprises adding to the said fuel gases a proportion of oenanthal vapour. The invention also comprises the so-obtained improved fuel gases.

By the expression oenanthal as used herein we mean heptaldehyde or the crude oenanthal-containing distillate obtained from the destructive distillation of castor oil, preferably from distillation under reduced pressure, the so obtain distillate being then advantageously fractionated at ordinary pressure to obtain the fraction boiling at between 90° C. and 180° C.

In carrying the invention into practical effect the vapour of oenanthal may be added to the gas either by direct spraying of the liquid or of solutions of it in some volatile solvent such as ethanol, benzene or a paraffin hydrocarbon into the gas mains; or by passing a portion of the fuel gas through a bye-pass, fitted with a device whereby the bye-passed portion of the gas is caused to bubble through the oenanthal or the oenanthal may be introduced by means of a wick which dips into a reservoir of oenanthal and hangs in the gas main or in a bye-pass.

In England, blast furnace gas ordinarily contains about 30% by volume of carbon monoxide and is often used within the factory where it is produced, for heating and the further treatment of iron and steel. To such a gas there is added according to the invention oenanthal vapour in the proportion of about 6–10 ounces per million cubic feet of gas. This proportion suffices when the product may leak into the gas directly from a hole or fissure in a pipe or container, but when the hole or fissure is buried deeply in the earth a greater amount of oenanthal vapour may be needed to permit of rapid detection of underground leaks by the odor of oenanthal. In order to increase the rapidity of the detection of leaks, higher proportions of oenanthal vapour are added, for example, a proportion of 2–2½ pounds per million cubic feet of gas. Such proportions of oenanthal vapour, when added to blast furnace gas mains, enable the odour of escaping gas to be very easily perceived some 20–30 feet away from the point at which the gas is leaking into the air. Still higher proportions may be added if desired, although if much higher proportions are added the cost of the added odorant becomes excessive.

By a further feature of the invention an advantageous means of combining high odorant efficiency with economy in detecting small or buried or remote leaks is provided. This comprises the fitting of a bye-pass or a main pipe with an intermittent injection device, whereby oenanthal vapour is added to the gas at regular intervals of time, and the amount of oenanthal vapour introduced at each injection is adjusted to maintain the safe average content in the whole of the gas. By way of illustrative explanation, in the case of a blast furnace gas to which there is to be added oenanthal vapour in the proportion of 6–10 ounces per million cubic feet of gas, injection may be made during 5 seconds in each minute, and during these 5 second periods there will then be introduced oenanthal vapour at the rate of 4½–7½ pounds per million cubic feet of gas passing along the mains in that period of time. In this way there may be made to travel along the gas mains waves of gas highly concentrated with oenanthal vapour, and leaks will thus be more readily detected by the periodic effusion of strongly smelling gas.

In carrying the invention into practical effect in relation to carburetted air and similar cases of gas production by vaporisation of a liquefied combustible material contained under pressure in a container, the oenanthal vapour may be

added to the gas by introducing it into the gas pipes as described above or by dissolving it in the liquefied fuel in the containers prior to vaporisation of the fuel.

Oenanthal has remarkable odorant efficiency. Its chemical composition and general physical properties permit its use according to the invention without disadvantage. Oenanthal contains only carbon, hydrogen and oxygen and accordingly burns to give only carbon dioxide and water. Thus its use entails no danger to metal furnace linings, the surfaces of special steels annealed or otherwise treated by it, as would be the case if it contained such elements as selenium, phosphorus, sulphur, chlorine or nitrogen. Moreover, it is physiologically not dangerous, and its combustion products are innocuous.

Although oenanthal has so powerful an odour that it may be detected by the human nose in a concentration of one pound in two thousand five hundred million cubic feet of gas, the invention contemplates for reasons of security the addition to the fuel gas of oenanthal in such quantity as to give a concentration of at least about five times this. The amount to be added to the fuel gas in actual practice will of course depend on how highly concentrated their mixture with air may be before they become toxic to mankind, and in some cases on the value of the fuel gas.

Oenanthal is a liquid of volatility suitable for it to be added to the gas as described, and for its addition to be easily controlled. Its sparing solubility in water allows it to be used according to the invention in systems where water traps and regulators are installed. Its capillary properties are such that it rises in a cotton wick readily, and it is readily soluble in ethanol, benzene and ligroin.

I claim:

1. Process for improving fuel gases of the kind hereinbefore described, whereby leakage of such gases is easily detected, which comprises adding to the said gases a proportion of oenanthal vapour.

2. Process for improving fuel gases as claimed in claim 1, wherein oenanthal vapour is added to the gases at regular intervals of time.

3. A fuel gas of the type described containing oenanthal.

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