

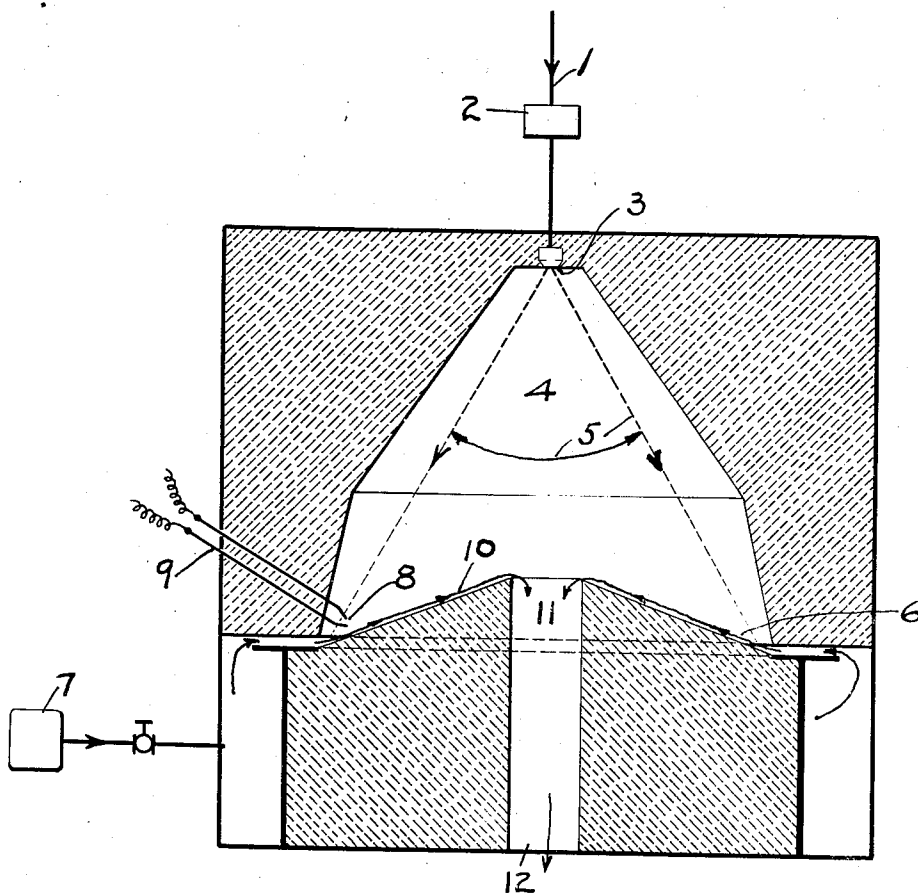
July 2, 1940.

T. NAGEL

2,206,552

METHOD OF BURNING LIQUID FUEL OR THE LIKE

Filed Oct. 4, 1938



INVENTOR
Theodore Nagel
BY
Liddle, Reine and Montgomery
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,206,552

METHOD OF BURNING LIQUID FUEL OR
THE LIKE

Theodore Nagel, Brooklyn, N. Y.

Application October 4, 1938, Serial No. 233,228

2 Claims. (Cl. 158—117.5)

This invention is directed to a method for burning liquid fuel and the like, and is applicable to industrial and house heating furnaces, for example, equipped with the necessary automatic controls. The method is continuous and effects practically complete conversion of oil to combustion products at any desired temperature ranging from 2000° F. to approximately 3750° F. which is practically the theoretical combustion temperature of oil and air without air preheat.

More specifically my invention comprises continuously atomizing a controlled flow of oil in a diverging stream into a chamber the oil charging end of the chamber being practically free of oxygen. The atomized oil is continuously dispersed obliquely into a continuously flowing converging film of air, the atomized oil, on entering the air stream, being ignited thereby producing a sheet flame converging toward and flowing into a relatively much smaller area channel outlet, producing a high velocity, turbulent, high temperature combustion zone. Through this sequence oil, atomized at high velocity and flowing toward a zone of increasing heat intensity, is uniformly dispersed into air and ignited, the ignited mixture, in increasing velocity and flowing in a sheet flame, converging toward and flowing into a narrowed outlet channel. The sheet flame flowing into the narrowed outlet channel produces turbulence under high temperature conditions, which taken in connection with the confined conditions incident to the narrowed outlet channel effects flash decomposition of existing hydrocarbons accompanied by flash oxidation of the preheated combustible matter.

The oil and air in controlled continuous flow are so proportioned as to regulate the temperature of the combustion products. For example, when a temperature of approximately 2000° F. is desired, air in excess of that necessary to produce complete combustion is employed, so that the combustion products are diluted with air to produce this temperature. By decreasing the air supply in proportion to the oil supply, the temperature of the combustion products increases, owing to this decreased air dilution. With sufficient reduction in air to produce combustion products practically free of air dilution the temperature of the combustion products approaches practically theoretical combustion temperature of the oil.

The accompanying drawing, a flow diagram, illustrates the operations employed in the practice of this invention for the production of controlled temperature combustion products.

Referring to the drawing, a controlled continuous flow of oil 1 from any suitable source of supply is subjected to pressure by pump 2 and the oil atomized at 3 through release of pressure. The atomized oil is continuously projected at high velocity through a zone 4 that is practically free of oxygen and in which the atomized oil is dispersed preferably in the form of a diverging stream or hollow cone 5. Flowing from the zone 4 the atomized oil enters obliquely into a continuously flowing converging film of air 6 that is supplied by air blower 7. This air, it will be seen, is introduced about the periphery of the atomized oil stream and is converged across the path of the diverging oil stream at a point beyond the oil charging end of the chamber.

Ignition of the atomized oil on entering the air stream takes place at 8, ignition being effected by any suitable standard ignition system shown at 9 as a high tension electric spark device.

The resulting sheet of flame 10 converges toward and flows through a relatively narrowed and short outlet channel 11, beyond the outlet 12 of which are produced controlled temperature combustion products.

From the foregoing it will be seen that my invention provides a process for the continuous conversion of oil to controlled-temperature combustion products, the desired result, flash decomposition of the hydrocarbons accompanied by flash oxidation of the preheated combustible matter being effected through instant conversion of atomized oil to vapor which is turbulently mixed with air under high temperature conditions that flash decomposes the hydrocarbons accompanied by flash oxidation of the preheated combustible matter.

What I claim is:

1. The method of continuously burning oil, which method comprises continuously atomizing a controlled flow of oil in a diverging stream into a chamber, introducing into said chamber in a continuous controlled flow and under pressure all of the air necessary for complete combustion of the atomized oil, said air being introduced about the periphery of the atomized oil stream out of contact with the diverging oil stream, converging the air stream across the path of the diverging oil stream at a point beyond the oil charging end of the chamber, igniting the mixture of oil and air, and continuously discharging the burning mixture from the chamber.

2. The method of continuously burning oil, which method comprises continuously atomizing a controlled flow of oil in a diverging stream into a

chamber, the oil charging end of the chamber being free of oxygen, introducing into said chamber all of the air necessary for complete combustion of the oil, said air being introduced under pressure and in a continuous controlled flow about the periphery of the diverging oil stream but out of contact with it, converging the air stream

across the path of the diverging oil at a point beyond the oil charging end of the chamber, igniting the mixture of oil and air, and continuously discharging the burning mixture in a contracted central axial stream.

THEODORE NAGEL.