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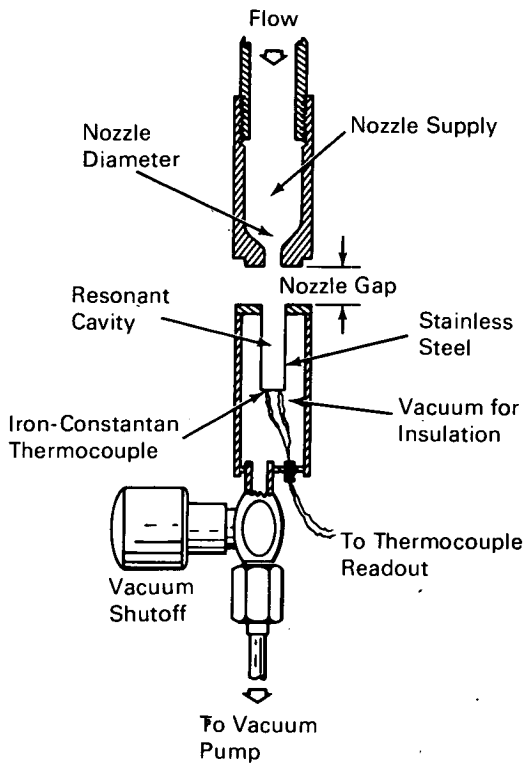
NASA TECH BRIEF

Resonance Tube Igniter

Resonance induced in stoichiometric mixtures of gaseous hydrogen-oxygen has been shown to produce temperatures high enough to cause ignition; these temperatures exceeded 1100°F. The phenomenon can



Insulated Resonance Cavity

be used for rocket engine ignitors and has other potential applications for the ignition of combustible gases in a variety of devices including burn-off of combustible gas leaks, replacement for spark ignition in combustors, and built-in ignition for torches.

The resonance tube phenomenon occurs when a high pressure gas is forced through a sonic or supersonic nozzle into a short cavity. An intense sound and high temperature result in the cavity, and great turbulence is produced in the region between the nozzle and the cavity.

Data have been obtained which show the effect of geometric variables on the temperature attained at the resonance cavity bottom. The apparatus for an insulated cavity is shown in the figure. Maximum temperature was achieved for a stoichiometric mixture of hydrogen and oxygen with a nozzle gap of 19/64 inch and a cavity depth of 0.925 inch. The nozzle gas supply pressure was 65 psig. The most promising configuration featured the axis of the sonic nozzle coincident with the axis of the resonance tube. The temperature generated by resonance tubes was found to be sensitive to heat leaks; thermal insulation of the resonance cavity will reduce this effect.

Notes:

1. The following documentation is available from:
   Clearinghouse for Federal Scientific and Technical Information
   Springfield, Virginia 22151
   Single document price $3.00
   (or microfiche $0.65)

   Reference:
   NASA-TM-X-1460, (N67-40082), A Resonance Tube Igniter for Hydrogen-Oxygen Rocket Engines

(continued overleaf)

2. Technical questions may be directed to:
Technology Utilization Officer
Lewis Research Center
21000 Brookpark Road
Cleveland, Ohio 44135
Reference: TSP70-10618

Patent status:

No patent action is contemplated by NASA.

Source: E. William Conrad, Albert J. Pavli and Bert R. Phillips
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