

# AN INTERNAL COMBUSTION STEAM GENERATOR

By H. W. McKernan

WHILE thinking of the various ways of converting potential energy into actual power, it has often occurred to me that in spite of its rivals, steam is still the best working fluid for the prime mover. The steam turbine is, I believe, the most reliable form of prime mover, the power plant engineer's chief troubles arising from the boilers.

I have often thought that if a more simple plant could be devised for generating steam, the usefulness of the steam turbine would be greatly extended. It was while thinking on these lines that a possible method of steam generation occurred to me, and while I very much doubt its practicability, it has been an interesting subject for speculation.

The chief factors which brought the idea to my mind were the underwater cutting of steel, by means of the oxy-acetylene, or oxy-hydrogen cutting blowpipe, and the combustion chamber used in connection with the gas turbine.

If an oxy-hydrogen flame can be made to burn while submerged in a considerable depth of water, it

should be possible to maintain combustion in an enclosed chamber containing medium pressure steam.

The steam generator consists of a cylindrical vessel, enclosed at one end and tapered off to a narrow outlet at the other, the vessel being surrounded by a water jacket. In the centre of the closed end is an oxy-hydrogen burner nozzle, this having a hood forming an annular space round the outside of the nozzle, through which the compressed air can be blown to form a shield round the flame.

Round the burner nozzle several water spray nozzles are arranged, through which hot water from the water jacket can be pumped; the spray entering the chamber should flash into steam, and by the time it has travelled the length of the chamber, be superheated and would, with products of combustion, pass at high velocity through the outlet.

Pressures would be low, but it might be possible to achieve the high velocities necessary to drive a steam turbine. As I have already stated, I am extremely doubtful of

the practicability of the idea, but if it was a feasible proposition, it would offer several advantages over the steam boiler.

Some of these advantages would be:—

- (1) Safety: an increase in pressure in the chamber would automatically retard the flow of gas and water spray from the nozzles.
  - (2) Compactness: the generator could be coupled direct to the turbine.
  - (3) Availability: the plant could be started up at very short notice.
  - (4) The arrangement should be economical, the heat gathered by the water jacket being returned to the chamber *via* the spray nozzles, the exhaust from the turbine being passed through a condenser and the condensate pumped back to the water jacket. The chief loss of heat would be *via* the condenser cooling water.
- The chief apparent disadvantage is that the generator would require oxygen and the cost of this would probably make the idea uneconomic, even if it was practicable.

