BENSON SUPER HIGH PRESSURE GENERATION. No I

For the benefit of non-technical critics the following explanations may be of interest.

The principles under which steam is raised in a Benson Generator and the principles under which steam is raised in what may be termed a normal boiler, are vastly different.

To understand the problem in a normal boiler, James Watt's kettle might advantageously be studied. It is alleged he was convinced of the dynamic properties of steam by stopping the spout of a kettle and observing the movement of the lid.

This simple experiment demonstrated that when cold the water occupied a certain volume in the kettle, when heat was applied and the water began to boil, steam was given off, and as this steam occupied at low pressures a volume several times that of the water, then if it were not allowed to escape by the spout, a higher pressure would build up inside the kettle and lift the lid, or even burst the kettle if the lid were fastened down.

This principle still applies to present day boilers of any kind and the pressure generated is limited by the relief valve (lid) and the steam engine (spout).

Whatever the type of boiler (Lancashire or water tube) heat is applied to the water in a boiler till its temperature is raised and corresponds with that of steam at the desired pressure. Additional essential heat has then to be added (known as the latent heat of evaporation) to boil the water at the desired pressure and the same temperature. Steam known as dry saturated steam is then given off by this ebullition, and as the cycle is continuous the amount of steam given off is continuous. It is useful to note that the boiling point temperature of water is higher the higher the pressure.

For instance,	at atmos. pressure the boiling temp.	is	212°F.
	at 200 lbs.pressure "	is	382°F.
	at 1000 lbs.pressure "	is	545°F.
	at 3200 lbs.pressure "	is	706°F.

It will be seen that in a normal boiler ebillition is necessarily associated with steam formation and at pressures above, say, 700lbs.per square inch, then ebullition is most violent and will cause what is known as priming or the passing over of water with the steam.

This priming is highly detrimental and causing a pitting or erosion of the working parts of the engine or turbine.

It is now useful to note the amount of latent heat that is needed at different pressures, and as this latent heat does not increase the temperature even by 1 degree F. it might for our purpose be considered useless heat.

At	28" vacuum	the latent heat is	1036	heat	units.
"	atmospheric pressure	"	971	"	"
"	200 lbs. per sq. inch.	"	844	"	"
"	1000 lbs. " " "	"	752	"	"
"	2000 lbs. " " "	"	480	"	"
"	3000 lbs. " " "	"	230	"	"
"	3200 lbs. " " "c	"	0	"	"

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