ENGINEERING

Engine Without Boilers Runs On Water in Place of Steam

Invention of British Engineer Upsets 300-Year Tradition And is Expected to Give Cheaper Mechanical Power

A NEW kind of engine that uses liquid water instead of steam, discards boilers and condensers, develops more power in less space than ordinary steam and gas engines, with freedom from explosion hazards and heat wastes, will shortly be offered for experimental commercial use in England.

It is the invention of J. F. J. Malone, engineer, of Newcastle-on-Tyne, who has experimented with the water engine for several years. Details of its operation have just been revealed.

Since steam and other engines have been worked always by the expansion of gases of one kind or another for some 300 years, this new kind of prime mover that is operated by expansion of liquid instead of expansion of gases has created much interest in engineering circles.

Both the new water engine and conventional steam engines use water, but in the case of the steam engine the water must be changed to steam before any work can be done. In the Malone engine the water stays liquid even under pressures of tons per square inch created within the engine.

Rapid Temperature Change

Rapid heating and cooling of the liquid water are necessary in order that the water engine will operate. This was accomplished by Mr. Malone through the development of a novel form of heat transferer within one of the cylinders of the water engine.

Other advantages claimed for the engine are:

Only a small amount of water is needed and this reduces the size of the engine and allows it to be used where water is scarce.

It runs and changes speed more noiselessly than conventional engines.

It loses less heat than other engines and its outside shell is cool to the touch.

Its mechanism is simpler and the working parts need be opened for inspection only once in four years.

There is no incessant boiler cleaning, no water gauges, no risk of shortness or foulness of water.

The control system is simpler than in the steam engine.

It has no exhaust as the water is used over and over.

All bearings within the engine are cold and lubricated by the water itself.

The hot air engine which was used in scientific laboratories before the electric motor became common, is the nearest approach to the water engine in its method of working. Two cylinders are used with pistons connected to the same shaft and the water is pushed back and forth from one cylinder to the other.

One cylinder, called by the inventor the "thermodynamic pile," has one end heated by hot gases from the fire to a temperature of 900 degrees Fahrenheit. The other end is cooled continuously by a stream of cold water or air to about 70 degrees Fahrenheit and the water in this cylinder circulates continuously through a series of concentric tubes being alternately heated and cooled in its motion. The layers of heated and cooled water pass in opposite directions through the neighboring layers of the pile which are only about one-hundredth of an inch in thickness. By this means a very rapid and complete transfer of the heat of the hot gases of the furnace to the water is obtained so that there is no difficulty in running the engine up to 250 revolutions per minute.

While the water in the heating pile is being heated the pressure rises and pushes some of the working water over into the larger second cylinder where it pushes the piston outwards against the applied load. At a later part of the cycle the circulating water in the pile is being, on the whole, cooled and the working piston in the (cool) second cylinder moves inward with the decreasing pressure. The use of a liquid intead of a vapor allows great changes of pressure with smaller relative changes of temperature.

"A liquid engine locomotive," said Mr. Malone, "could give the same power for half the coal consumption and no water consumption, have a greater starting effort, being free of gears would be as elastic, would occupy the same space, and would weigh and cost the same as a good type steam locomotive."

For an engine of 100 horsepower or over, the "indicated" efficiency as measured by three different engineers, was 27 per cent. In comparison with this, a superheated steam locomotive working between 550 degrees and 230 degrees gives 8 per cent. and the best type of superheated steam marine engine working between 550 and 125 degrees, give a maximum "indicated" efficiency of 14.7 per cent.

A huge power station steam turbine would give a slightly greater over-all efficiency than the small water engines already constructed, but the efficiency of the water engine would increase as the size is increased.

Mr. Malone expects that his new engine will be adapted to highway traction engines, ships, small power stations, locomotives, as well as more conventional uses. It promises to be particularly useful in isolated and desert locations where water and good grade fuel are scarce.

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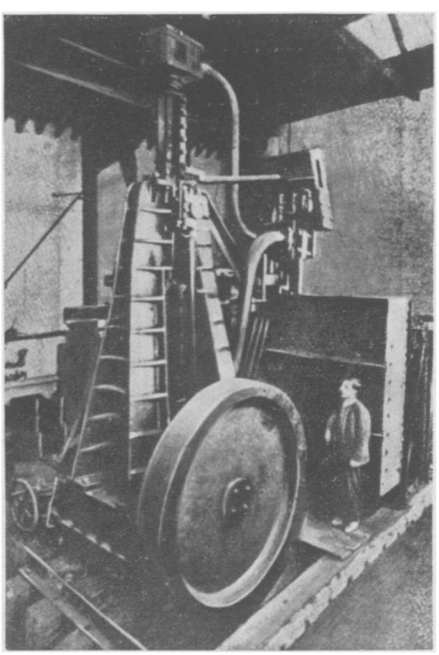

WHAT WILL IT DO?

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