

THE HIGH PRESSURE STEAM BOILER.

E. RICHARDS, '99.

In these days of fierce competition in the carrying trade on the Great Lakes, every effort is being made to increase the efficiency of the steamers, engaged in this trade, and one tendency has been toward the substitution of high boiler pressures for those in vogue at present. It is the purpose in this short paper to deal more particularly with the boilers to be used with these higher pressures.

It occurs to me, however, that it will be interesting and profitable to form an estimate of the actual, or probable, advantage to be derived from an increase of steam pressure, above that commonly used with the triple expansion engine. Let us suppose the case of the ideal engine, working in a Carnot's cycle, without loss, with an initial pressure of 168 pds. per sq. in. gauge pressure, the pressure commonly used in the triple expansion engine, and a final pressure of 26 in. vacuum, or about 2 pds. absolute pressure. The absolute temperatures, corresponding to these two pressures are 835° and 587° Fahr. respectively. The thermodynamic efficiency, in such an ideal or typical case, would be $\frac{835^{\circ}-587^{\circ}}{835} = 29.7\%$; the difference between the in-

itial and final temperatures, divided by the absolute initial temperature, giving the percentage efficiency of the Carnot's cycle.

The ideal engine, using steam at 250 pds. per sq. in. gauge pressure, would have a corresponding efficiency of $\frac{867^{\circ}-587^{\circ}}{867^{\circ}} = 32.3\%$

The higher pressure gives an efficiency 8.7 greater than the lower.

As to the comparison of the efficiencies of different types and pressures, probably the experiments of the British Admiralty Committee are the most exhaustive, embodying, as they do, the results of over five hundred trials of ninety-five ships. The trials were all