

connection in which it was made. To  
whatever extent it justifies the ignoring  
of part of the cycle of operations through  
which steam and water in a steam  
engine necessarily pass I entirely  
disagree with it and don't believe  
that any such thing can have been  
intended.

Yours truly  
Geo. Don. Fitzgerald



16. Oct. 1889

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Dear Sir

1<sup>o</sup>: Nobody has a right to change the  
meaning of a word. If you wish to talk  
of a new thing you should call it by  
a new name.

2<sup>o</sup>: That steam does not behave like  
a perfect gas has nothing on earth to  
do with the way in which practitioners  
like Rankine, Kennedy ~~we~~ apply  
the  $\frac{T-t}{T}$  formula.

3<sup>o</sup>: That the efficiency of the steam  
in a steam fire engine is zero is a  
reduction of absurdum of your proposed

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method of measuring efficiency

4<sup>o</sup> The adiabatic expansion being only a small part of the whole cycle of operations through which the water and steam pass, every part of which is concerned in the efficient working of the engine, it is obviously absurd to measure the efficiency of the steam by what occurs during this very small part of the cycle.

5<sup>o</sup> You have not yet given any algebraic formula ~~for measuring~~ defining <sup>your</sup> efficiency in terms of heat or work, for you have not defined

with sufficient accuracy for numerical calculations what is the <sup>whole</sup> heat in the steam, so that (except in perfect gas <sup>(alone you say engines where)</sup> the  $\frac{T-t}{T}$  rule applies)

there is no way of measuring numerically your efficiency. In fact this is done it is impossible to discuss whether your efficiency is of any value at all from a theoretical or practical point of view.

I am glad to see that you acknowledge that there is a complete cycle of operations in a steam engine. I could not criticize your friend's statement unless I knew a great deal more about the circumstances and