

ordinary conditions, 4 square feet to the horse power, and under extreme conditions, but 2 square feet.

The draft in a stationary plant having a chimney 50 feet high is less than 0.5 of an inch of water. The locomotive frequently runs under a draft as heavy as six inches, making it necessary for the fireman to keep a very thick fire on the grates.

With such great differences existing between the conditions apparently required by economy and those actually found in locomotive practice, it would be expected that the evaporative efficiency of the latter would be small by comparison. It is interesting to note, however, that in spite of the disadvantages under which the locomotive labors, its evaporation is seldom less than 50% of the best evaporation given by stationary plants.

THE INFLUENCE OF HEAT, THE ELECTRIC CURRENT AND MAGNETISM UPON YOUNG'S MODULUS. MARY CHILTON NOYES.

A series of experiments were carried out in the physical laboratory of Western Reserve University to determine the effects of heat, of an electric current and of magnetism upon the elasticity of piano wire, and of copper and silver wire. The wires were heated by means of an electric current from a storage battery, the current sometimes going through a magnetizing helix surrounding the wires, sometimes through a non-inductive coil, and sometimes through the wires themselves. The methods of heating were used in different order with different pieces of wire, in order to detect, if possible, any temporary or permanent effect which was not due to the heat, but no such effect could be found.

The thermal co-efficient of elasticity for the piano wire was found to be 4.6% for 100°. For the silver wire it was about 8% and for the two specimens of copper wire tested 13% and 7%. The permanent change in elasticity produced by repeatedly heating the wires was from one to two per cent.

With the silver and copper wires the effect of heat upon the elastic limit was determined. The limit was found to decrease quite rapidly and regularly as the temperature was raised. The two specimens of copper wire tested were found to give quite different results for the thermal co-efficient of elasticity, the co-efficient of expansion and the co-efficient of decrease in the elastic limit with rise of temperature.