## 22 Discussion on the Warming, etc., of Railway Cars.

That steam, at such low pressure as 2 to 5 lbs., will warm a train, or that the fractional opening of an  $\frac{1}{2}$  in. valve will pass steam enough, is no proof that the consumption of steam is small in quantity, or that there is no loss of power to the locomotive; all tests of the definite amount condensed contradict this statement.

It is the heavy expense and necessity for skilled attention that will restrict the use of the Electric light on trains. Even when primary batteries are used as a source of electricity for equal candle power, the cost is equivalent to coal gas at \$3.25 per thousand feet; there is a possibility of risk to life, for it is not yet proven that a charged storage battery—or even a primary battery—is not a source of danger to passengers at time of a passing thunder storm.

It may be remarked that in all discussions on the cost of lighting by Dynamo, worked from coach axle that have come under Mr. Barnett's notice, the factor of expense involved in giving motion to the machine is ignored, it being tacitly assumed that the resistance to the train is not increased, although a Dynamo so coupled up is a most effective electric brake.

The extreme cost for lighting the "Olga" is qualified by the consideration that it is to some extent an advertisement, its 24 electric lamps when all alight giving 384 candle power, 120 candle power being enough to permit reading in any part of an ordinary coach. This may be obtained by 8 oil lamps, using argand burners of 15 candle power, which is about the quantity of light given out by a first-class argand student lamp. The consumption of about one pint of oil per hour will develop 120 candle power.

There may be risk in the presence of reservoirs of compressed gas in time of accident; but although the Pintsch systsm has been used in Germany since 1770, and 40,000 vehicles are now equipped with it, no case of injury to life or property in time of railway accident is attributed to it.

Mr. McIllwain's statement as to lack of success in electric lighting is probably limited to experiments made on this continent; the Pacific Railway Co. having made more than any other railway, and the Co. is still experimenting.

That special ventilation is not required when car is standing, is open to question. It is often asked for by passengers, and the conditions of the problem are such as to scarcely justify elaborate machinery or extensive outlay to attain perfect ventilation, only when the coach is in motion. If train motion is to be a factor in the equation, the outlook