amounted to about $2,800,000. It is not doubted but that the half of this sum would be more than ample for a rail road.

Upon the whole, I infer, that, over rough and difficult grounds yet such as have been pronounced practicable for a canal, the cost of the canal would be about from 50 to 100 per cent more than that of a rail road. The former to be as spacious as such works may be expected to be made on such ground, and the latter to have a double set of tracks; and that on the most favorable grounds which the country affords for such works, the ratio of expense may be expected to vary from an equality to 50 per cent in favor of rail roads.

Second. *Facilities of construction.* The answer to this part of the enquiry may be considered as almost included in the preceding one.

It may however, be added, that by reason of the supply of water necessary for canals, their number, extent, and locality, will necessarily be much more limited than rail ways. It may also be recollected that the minimum discharges of running streams become less as the country advances in Agricultural and Manufacturing Improvements.

Rail Roads can be constructed advantageously over a considerable variety of inclination and character of surface impracticable for canals, and their branches can be made to penetrate the glens and defiles of mountains, where lockage would be very great, and the supply of water for canals totally insufficient, but where extensive iron and other manufacturing establishments may be located.

Third. *Benefits to the State and advantages to the citizens.* The benefits and advantages both to the State and to the citizens composing it, it is conceived, will be greater from the rail road than from the canal system.

The following observations are offered in support of this opinion.

The capital invested in a given line of rail roads and of canals will in no case be greater in the first, and will often be only half of what the latter would require, whilst the speed on the former may be four times as great as on the latter. The resistance from friction is equal through equal spaces, whatever may be the velocity. The resistance of fluids occasioned from a body passing through them is rather more than in proportion to the squares of the velocities of the body in motion, whether it be a boat or a car, and as the density of water is to that of the air as 860 is to 1, therefore the resistance from water will be 800 times greater than the resistance from the atmosphere with an equal velocity. It is not likely therefore that velocities on rail roads will often be as high as to require a calculation for atmospheric resistance; whilst the law by