Massachusetts, eleven have curves whose radii are occasionally from five to eleven hundred feet, although such small radii are considered objectionable, except near stopping places, where the speed would not be great.

On the Halifax and Windsor route, although the table of curvatures exhibit a great length of curved route, all the larger curves may be considered as virtually straight lines. On the Boston and Worcester Railroad, there is a curve of about 2200 feet radius, which is passed daily by trains running between twenty and thirty miles an hour with perfect safety, and without slackening speed.

*Mode of performing the Work.* As respects the ultimate completion, this question is easily answered: there is no doubt that it should be governed by the same rules as govern road-making of any other kind—making due allowance for difference of use. If we put a few inches of gravel or broken stones upon the ground, it will answer very well for common carriages, but if we want a road to bear the action of carriages of 20 tons weight, moving at great velocity, we must have a road of strength proportionate to the stress. Another subject to be attended to in these northern latitudes, is the liability to heave with the frost. In the first American roads those matters were not sufficiently attended to: experience, however, has shown that a perfect foundation is absolutely necessary, but the most proper time for establishing this must depend upon the command which may be had of materials in any given locality. The more common plan, after establishing a good drainage, is to dig out a trench of a proper width for a roadway, and fill up with stone or gravel, which should go below the heaving action of the frost. This foundation requires a good deal of attention to keep the supports of the rails at a proper height: whether the expense exceed or fall short of the interest of the sum required for a more permanent structure, is uncertain; it must depend mainly on the means of obtaining the proper materials in any locality.

The Romans, in their road-making, built a *rock* of concrete and flags in alternate layers, and their roads have proved indestructible. Possibly the expense may be too great for imitation, but the line from Halifax to Windsor offers a fair field for the experiment, the materials are immediately on the spot. The estimates, however, are predicated upon the usual plan, leaving the consideration of the more perfect plan to some future time.

*Superstructure.*—This includes the rails and their immediate supports. The whole history of Railroads, so far as this subject is concerned, is to be considered in some measure as a series of experiments.

On the first English Roads, Iron rails were fastened upon square stone blocks imbedded in gravel; on some of the more modern roads longitudinal timbers have been substituted. On the American roads a great variety of plans have been tried and abandoned, but that which is generally acted upon at the north, is the use of the H rail, about 56 pounds per yard laid upon cross pieces of timber imbedded in the surface of the road at from 2½ to 3 feet from centre to centre. This keeps the road effectually in guage, although the cross sleepers require, as already observed, frequent re-adjustment in height.

The first rails, upon the H. plan were about 40 pounds per yard, but were found too light, and were replaced with the rails of 56 to 60lbs. On all the roads in Massachusetts, eighteen in number, the returns of which were made to the Legislature in 1847, thirteen had rails of 56 pounds per yard, and the remaining five ranged from 54 to 64, except the 'Western,' on a part of which they ranged as high as 70 lbs. We may therefore take 56 lbs. as the weight that has been generally settled upon in Massachusetts, after an experience of 15 years. I have not been able to learn whether they have tried the continuous bearings similar to the Great Western and other roads of the kind in England. It would be proper before determining upon any definite plan for Nova Scotia, to ascertain the effect of both descriptions of roads.

*Weight of Engine.*—Closely connected with the weight of rail is the weight of engine, or rather they are correlatives, the weight of engine being that which governs the weight of rail. On the earlier roads the engines were light, generally about eight tons—never exceeding ten tons. These engines answered pretty well under ordinary circumstances, but occasionally contingencies arose in which the want of greater power was much felt. Gradually the engines have been enlarged, until at the present day they range ordinarily from 12 to 23 tons. The advantages of heavy engines are said to be—

1st. That while they cost no more for train hands, they take, under ordinary circumstances, heavier loads, and in emergencies, such as snow, frost, &c. on the rails, are still equal to the business required.

2d. That the fuel required to draw a light load with a heavy engine is but a little greater than that required to draw the same load with a light engine—the difference being only that required to move the extra weight of the engine and tender.

3d. That the parts of a heavy engine being more massive, and being but seldom drawn upon to their full strength, are not so liable to get out of order, and therefore they cost less for repairs.

4th. That with light engines going fully loaded, whenever any emergency happens, the only remedy is to put on more engines, the hands of which must be kept in pay whether there is work for them or not: whereas, with heavy engines going ordinarily lightly loaded, there is always a surplus power immediately at command by merely applying a little fuel.