

RAIL ROADS AND STEAM-CARRIAGES.

(RESUMED FROM OUR LAST).

The several witnesses have estimated the probable saving of expense to the public, from the substitution of steam power for that of horses, as from one-half to two-thirds. Mr. Farey gives, as his opinion. "That steam coaches will very soon, after their first establishment, be run for one-third of the cost of the present stage coaches."

Perhaps one of the principal advantages resulting from the use of steam, will be, that it may be employed as cheaply at a quick as at a slow rate; "this is one of the advantages over horse labour, which become more and more expensive as the speed is increased. There is every reason to expect, that in the end the rate of travelling by steam will be much quicker than the utmost speed of travelling by horses; in short, the safety to travellers will become the limit to speed." In horse draught the opposite result will take place; "in all cases, horses lose power of draught in a much greater proportion than they gain speed, and hence the work they do becomes more expensive as they go quicker." On this and other points referred to in the report, the committee have great pleasure in drawing the attention of the House to the valuable evidence of Mr. Davies Gilbert.

Without increase of cost, then, we shall obtain power which will insure a rapidity of internal communication far beyond the utmost speed of horses in draught; and although the performance of these carriages may not have hitherto attained this point, when once it has been established, that at equal speed we can use steam more cheaply in draught, than horses, we may fairly anticipate that every day's increased experience in the management of the engines, will induce greater skill, greater confidence, and greater speed.

The cheapness of the conveyance will probably be for some time a secondary consideration. If at present it can be used as cheaply as horse power, the competition with the former modes of conveyance will first take place as to speed. When once the superiority of steam carriages shall have been fully established, competition will induce economy in the cost of working them. The evidence, however, of Mr. Macneill, showing the greater efficiency with diminished expenditure of fuel by Locomotive Engines on Railways, convinces the committee, that experience will soon teach a better construction of the engines, and a less costly mode of generating the requisite supply of steam.

Nor are the advantages of steam power confined to the greater velocity attained, or to its greater cheapness than horse draught. In the latter, danger is increased, in as large a proportion as expense by greater speed. In steam power, on the contrary, "there is no danger of being run away with, and that of being overturned is greatly diminished. It is difficult to control four such horses as can draw a heavy carriage ten miles per hour, in case they are frightened, or choose to run away; and for quick travelling they must be kept in that state of courage, that they are always inclined for running away, particularly down hills, and at sharp turns of the road. In steam, however, there is little corresponding danger, being perfectly controllable, and capable of exerting its power in reverse in going down hills." Every witness examined has given the fullest and most satisfactory evidence of the perfect control which the conductor has over the movement of the carriage. With the slightest exertion it can be stopped or turned, under circumstances where horses would be totally unmanageable.

The committee have throughout their examinations been most anxious to ascertain whether the apprehension, very commonly entertained, that an extensive use of these carriages on roads would be the cause of frequent accidents and continued annoyance to the public, were well founded.

The danger arising from the use of steam carriages, was stated to be two-fold; - that to which passengers are exposed from the explosion of the boiler, and the breaking of the machinery, and the effect produced on horses, by the noise and appearance of the engine.

Steam has been applied as a power in draught in two ways; in the one, both passengers and engines placed on the same carriage; in the other, the engine carriage is merely used to draw the carriage in which the load is conveyed. In either case, the probability of danger from explosion has been rendered infinitely small, from the judicious construction of boilers which has been adopted.

These boilers expose a very considerable surface to the fire, and steam is generated with the greatest rapidity. From their peculiar form, the requisite supply of steam depends on its continued and rapid formation, no large and dangerous quantity can at any time be collected. Should the safety valve be stopped, and the supply of steam be kept up in greater abundance than the engines require, explosion may take place, but the danger would be comparatively trifling, from the small quantity of steam which could act on any one portion of the boilers. As an engine invented by Mr. Trevithick, has not been as yet applied to carriages, the committee can do no more than draw the attention of the House to the ingenuity of its contrivance. - Should it in practice be found to answer his expectation, it will remove entirely all danger from explosion. In each of the carriages described to the committee, the boilers have been proved to a considerably greater pressure than they can ever have to sustain.

Mr. Farey considers that the danger of explosion is less than the danger attendant on the use of horses in draught; that the danger in these boilers is less than in those employed on the railway, although there even the instances of explosion have been very rare. The danger arising to passengers from the breaking of the machinery, need scarcely be taken into consideration. It is a mere question of delay, and can scarcely exceed in frequency the casualties which may occur with horses.

It has been frequently urged against these carriages, that, wherever they shall be introduced, they must effectually prevent all other travelling on the road; as no horse will bear quietly the noise and smoke of the engine.

The committee believe that these statements are unfounded. Whatever noise may be complained of, arises from the present defective construction of the machinery, and will be corrected as the makers of such carriages gain great experience. Admitting even that the present

engines do work with some noise, the effect on horses has been greatly exaggerated. All the witnesses accustomed to travel in these carriages, even on the crowded roads adjacent to the metropolis, have stated, that horses are very seldom frightened in passing. Mr. Farey and Mr Macneill have given even more favourable evidence in respect to the little annoyance they create.

No smoke need arise from such engines. Coke is usually burnt in locomotive engines, on railways, to obviate this annoyance; and those steam carriages which have been hitherto established also burn it. Their liability to be indicated as nuisances will sufficiently check their using any offensive fuel.

There is no reason to fear that water steam will cause much annoyance. In Mr. Hancock's engine it passes into the fire, and in other locomotive engines it is used in aid of the power, by creating a quicker draught, and more rapid combustion of the fuel. In Mr. Trevithick's engine it will be returned into the boiler.

The committee, not having received evidence that gas has been practically employed in propelling carriages on common roads, have not considered it expedient to inquire as to the progress made by several very scientific persons who are engaged in making experiments on gases, with the view of procuring a still cheaper and more efficient power than steam.

The committee having satisfied themselves that steam has been successfully adopted as a substitute for horse power on roads, proceeded to examine whether tolls have been imposed on carriages, thus propelled, so excessive as to require legislative interference, and also to consider the rate of tolls by which steam carriages should be brought to contribute in fair proportion, with other carriages, to the maintenance of the roads on which they may be used.

Mr. Gurney has given the following specimens of the oppressive rates of tolls adopted in several of these acts:- On the Liverpool and Prescott road, Mr. Gurney's carriage would be charged £2.8s. while a loaded stage coach would pay only 4s. On the Bathgate road the same carriage would be charged £1.7. Id. while a coach drawn by four horses would pay 5s. On the Ashburnham and Totnes road, Mr. Gurney would have

to pay £2, while a coach drawn by four horses would be charged only 3s. Or the Teignmouth and Dawlish roads the proportion is 12s to 2s.

Such exorbitant tolls on steam carriages can only be justified on the following grounds. First, because the number of passengers conveyed on, or by, a steam carriage, will be so great as to diminish (at least to the extent of the difference of the rate of toll) the total number of carriages used on the road; or, secondly, because steam carriages induce additional expense in the repairs of the road.

The committee see no reason to suppose that, for the present, the substitution of steam carriages, conveying a greater number of persons than common coaches, will take place to an[^] very material extent; and as to the second cause of increased charge, the trustees, in framing their tolls, have probably not minutely calculated the amount of injury to roads likely to arise from them.

The committee are of opinion that the only ground on which a fair claim to toll can be made on any public road, is to raise a fund, which, with the strictest economy, shall be just sufficient, first, to repay the expense of its original formation; secondly, to maintain it in good and sufficient repair.

.....is not far distant when, in framing a scheme of toll for steam carriages, their general adoption, and the great number of passengers which will be conveyed on a small number of vehicles, will render it necessary not only to consider the amount of injury actually done to the road, but also the amount of debt which may have been incurred for its formation or maintenance; yet at present they feel justified by the limited number of such carriages, and by the great difficulties they will have to encounter, in recommending to the House, that in adopting a system of toll, the proportion of "wear and tear" of roads by steam, as compared with other carriages, should alone be taken into consideration.

Unless an experiment were instituted on two roads, the one reserved solely for the use of steam coaches, the other for carriages drawn by horses, for the purpose of ascertaining accurately the relative wear of each, it would be quite impossible to fix with certainty the proportion

of tolls to which, on the same road, each class of vehicles should be liable. To approximate, however, as nearly as possible to the standard of relative wear, the committee have compared the weights of steam carriages with those of loaded vans and stage coaches. They have tried to ascertain the causes of the wear of road; also the proportion of injury done by the feet of horses, and the wheels of coaches; how far that injury is increased by increased velocity, and also in what degree the wear of roads by loaded carriages may be decreased by any particular form of wheel.

The committee would direct the attention of the House especially to the evidence of Mr. Macneill, whose observations on this branch of the subject, being founded on a long course of very accurate experiments, are peculiarly interesting and useful. He estimates that the feet of horses drawing a fast coach, are more injurious to the road than the wheels, in the proportion of three to one nearly; that this proportion will increase with the velocity; that by increasing the breadth of the tires of the wheels, the injury done to roads by great weights may be counteracted. He considers that on a good road, one ton may be safely carried on each inch of width of tire of the wheels.

Mr. McAdam and Mr. Telford have given corresponding evidence as to the greater wear caused by horses' feet than by wheels of carriages.

Each of the above witnesses agrees, that, adding the weight of the horses to that of the coach, and comparing the injury done to a road by a steam carriage of a weight equal to that of the coach and horses (the wheels being of a proper width of tire), the deterioration of the road will be much less by the steam carriage than by the coach and horses.

The weight of the steam carriages at present in use varies from 53 to 80 cwt. ; but it must be recollected that they are mere models; they were made with attention to strength only, to bear the uncertain strain to which they would be exposed in the course of experiments, and a very considerable diminution of weight may be anticipated.

The weight drawn, at the rate of ten miles per hour, by Mr. Gurney's engine, has not, on any extent of road, exceeded the weight of the drawing carriage; nor is it likely, with the difficulties to be encountered on the present lines of road, from their quality and

the numerous ascents, that the weight drawn will be in excess of the strength of the road. The immense quantity of spare power required to surmount the different degrees of resistance likely to occur, would render the engine too unmanageable. This will appear evident from the force of traction required to draw a wagon over the Holyhead and Shrewsbury road, which varied from 4 0 to upwards of 3 00 lbs.

In considering the effect on roads, we must not overlook one peculiarity, in which they have a great advantage over other carriages. In coaches drawn by horses, the power being without the machine to be moved, it becomes an object of the greatest importance to give as much effect as possible to the power, by diminishing the resistance, arising from the friction of the wheels upon the surface of road. For this purpose, the proprietors of coaches and wagons have adopted every possible contrivance, so to reduce the tires of their wheels, that a very small portion of them may press on the road; in some coaches they are made circular in their cross section, so that the entire weight of the carriage presses on a mere point; should the materials be soft, such wheels cut their way into the road like a sharp instrument. The owners of wagons too have adopted a similar plan. Mr Macneill states that the actual bearing part of the tire of apparently broad-wheel wagons, is reduced to three inches, by the contrivance of one band of the tire projecting beyond the others.

With steam, on the contrary, a certain amount of adhesion to the roads is required to give effect to the action of the machinery, or the wheels would slip round, and make no progress. It appears of little importance therefore, so far as relates to the engine, whether the requisite amount of friction be spread over a broad surface of tire, or be concentrated to a small point; but as the wheels, by being too narrow, would have a tendency to bury themselves in every soft or newly made road, and thus raise a perpetual resistance to their own progress, it actually becomes an advantage to adopt that form, which is least injurious to the road. The proprietors who have been examined on this point, seem to be quite indifferent as to the breadth of tire they may be required to use.

(To be continued)