XXIII. Report of the committee of natural philosophy, appointed by the Dublin Society, on the experiments upon wheel-carriages, made by Mr. Edgeworth, on the 28th of May 1816, and succeeding days, at the Dublin Society's house, kildare-street

R.B. Bryan, Thomas Brown & F. Fox

To cite this article: R.B. Bryan, Thomas Brown & F. Fox (1816) XXIII. Report of the committee of natural philosophy, appointed by the Dublin Society, on the experiments upon wheel-carriages, made by Mr. Edgeworth, on the 28th of May 1816, and succeeding days, at the Dublin Society's house, kildare-street, Philosophical Magazine Series 1, 48:220, 92-96, DOI: 10.1080/14786441608637621

To link to this article: http://dx.doi.org/10.1080/14786441608637621
And lastly, that wooden springs may be advantageously applied to common carts.

I have employed them in four one-horse carts, that have been in daily use, for nearly four years. These carts are usually loaded with fourteen hundred weight, and are much employed in carrying stones for the repair of roads.

I have tried straight and elliptic springs, and have employed both sorts successfully.

A piece of common tough ash, five inches and a half deep in the middle, two inches deep at each end, and three inches broad, mounted on fixed shackles at one end, and with linking plates at the other, is cheap and durable.

The iron work of the shackles may last for many years. The wooden springs may be renewed at any time for about ten shillings; and I am well satisfied that these springs will soon be in common use among common carriers.

I have the honour to be, gentlemen,
Your obliged and obedient servant,
RICH. L. EDGEWORTH.
the rope which goes round it, the whole machine was so raised as to place the wheel in a vertical situation, and one hundred weight being suspended at each end of a rope that went round this pulley, their equipoise was overcome by placing half a pound on either one side or the other.

To compare the draft of two carriages by means of this wheel, one end of a rope passing round it must be fastened to one carriage, and the other end to another; if, then, the perimater be drawn forward, the carriage which moves the easiest will get before the other, and by adding weights to that which gets foremost, until both proceed together, the weight thus added becomes a measure of the advantage in the construction of one of these carriages over the other, or of the roads upon which they move. It must be observed, that the draft of carriages thus compared, is not to be determined by one of them preceding the other, but by the weight which produces an equality of draft.

Two parallel roads, or trackways of deal plank, were laid so as to be level in every direction; all the carriages used in these experiments were guided upon the roads by a guide-rail placed between the planks. The pole of each carriage was provided with brass rollers, which ran on each side of the guide-rail to prevent the friction, and uncertainty of flunchees, and guide the carriage when drawn forward.

To overcome the vis inertiæ of the carriages before they were brought into competition, a detent was applied to the perimater, so as to prevent it from revolving till the carriages had advanced some yards. Pieces of wood, five-eighths of an inch in height, were nailed upon each of these trackways, to represent the mean inequalities of a road, which had been ascertained by Mr. Edgeworth, by a contrivance of his invention, to be equal to that height.

Comparison of Axletrees by means of the Perimater.

A carriage with a straight axletree, greased with anti-attrition composition, was compared with a carriage having Collinge's patent axletree, each weighing 3 cwt. 3 qrs. 7 lbs.

The straight axletree was loaded with \( \text{cwt. qrs. lbs.} \)

Collinge's with \( \text{3 : 0} \)

When drawn forward on the smooth plank road, by the perimater, they kept together.

Comparison of Axletrees by means of a fixed Pulley.

A carriage of equal weight, mounted on wheels, of Messrs. Bourne, was compared with the two former; each was loaded with 6 cwt.
A carriage with straight axletree, was \( \frac{19}{11} \) lbs. by \( \frac{11}{11} \) lbs.

Ditto, patent axletree, \( \frac{15}{11} \) lbs. — \( \frac{11}{11} \) lbs.

Ditto, Messrs. Bournes' axletree 21 lbs. — 12 lbs.

N. B. Messrs. Bournes' wheels were of the kind called double-dished.

Comparison of the Modes of Greasing.

The patent and straight axletrees being brought to an equality of draught, when drawn forward by the perimeter, and grease being substituted for anti-attrition composition on the straight axletree, the patent, though loaded with two quarters of a hundred more, proceeded the straight.

Your committee cannot vouch for the accuracy of this experiment, on account of the pressure of the crowd.

On the Effect of bending the Arm of the Axle downwards, so as to produce what is termed a Creep.

A two-wheeled carriage with the axle bent downwards, was drawn on iron by \( 14 \) lbs.; on wood by \( 14 \) lbs. or \( 14\frac{1}{2} \) lbs. The axle of this carriage was so altered as that the horizontal gather in front was four inches and a half, and the points of the circumference, of the wheels in front, nearest to each other, were six inches above the road. The carriage was then just drawn on wood by 26 lbs.; on iron by 20 lbs.

On the Effects of Springs on Two-wheeled Carriages.

Two carriages of equal weight and similar construction, were tried by the perimeter, one having grasshopper springs, the other without springs; that with springs carrying 8 cwt. 2 qr. preceded the one without springs, carrying 4 cwt. 2 qr. 7 lbs.

The same carriages were again compared, substituting elliptic for grasshopper springs; 2 qr. 7 lbs. being added to the carriage without springs; when the springs were prevented from acting, the carriages kept together; the springs being permitted to act, there were added to the carriage with springs, 2 cwt. 1 qr.—they then kept together; on 2 qr. being added to the carriage with springs, it preceded; the springs being by this brought more perfectly into play.

Comparison of wooden with steel Springs.

\[
\begin{array}{ccc}
\text{cwt.} & \text{qr.} & \text{lbs.} \\
\text{A carriage with wooden springs, carrying} & 3 & 3 & 0 \\
\text{A carriage without springs} & 2 & 2 & 7 \\
\end{array}
\]

were
were of equal draft, moving at a quick rate. At a slower rate judged to be about 2½ miles an hour; the wooden springs carried 3 cwt. 2 qrs.—being 1 qr. less.

The Efficacy of Springs in aiding Animal Exertion.

A man drew, with his utmost exertion, a two-wheeled carriage with wooden springs blocked, which was loaded with 2 cwt. a given space in nine seconds;—1 cwt. 2 qrs. were added and the springs permitted to play;—with a similar exertion, he drew it over the same space in 8½ seconds.

N. B. It is to be observed, that in all these experiments the load on the guide-rail was made as nearly the same as could be judged by lifting; but in order to ascertain how far a difference in this respect might affect the results, the following experiment was made.—In a carriage having the entire load 9 cwt. 7 lbs. the weight on the guide-rail was 40 lbs.; the carriage was just put in motion by a weight passing over a pulley of 14½ lbs. when the load on the guide-rail was only 20 lbs. the carriage was put in motion by 14 lbs.

On Four-wheeled Carriages.

Two four-wheeled carriages, as nearly similar as possible, were placed on the wooden platform. They were constructed in such a manner that the load on either of them might be placed within eighteen inches of the ground, or raised to the height of three feet and a half, or even eight feet above the road. The distance between the fore and hind axletrees in these carriages, was nine feet nine inches, and they were so made, that each of them could be shortened so as to bring the fore and hind axletrees within six feet of each other. Of these two carriages, one had the springs allowed to play, the other not. The first was loaded with 8 cwt. the other with 6 cwt. Both were connected with the perimater, and the carriage with springs carrying the 8 cwt. preceded the other.

The springs of the former carriage were prevented from acting, and the carriage loaded with 6 cwt.; the springs of the other carriage were made free, and it was loaded with 8 cwt.; when this carriage preceded. This experiment proved that the draft of these carriages was the same.

The springs of both carriages were then made free, and the axles of one of them brought within six feet of each other; those of the other carriage remaining at nine feet nine inches asunder. The weight of both was brought to an equality, and both were loaded at bottom.
The carriage with the short perch was loaded with 6:0
That with the long perch with ... 5:0
When put in motion they kept together.
The load in the short perch carriage was placed at
the top. They both kept together.
The springs of both were then prevented from acting.
The short carriage had a load at top of ... 6:0
The long carriage was loaded at bottom with ... 5:3
The long carriage rather preceded.

Comparison of Roads.

Two roads were formed, one of gravel, the other of broken
stones; two carriages without springs were connected with the
peirameter, one running on gravel, the other on stones; the
former having a load of 7 cwt. the other of 4 cwt.; they kept
nearly together.
The same carriages were made to run, one on the broken
stones, the other on coarse pavement:
The former had a load of ... 5 cwt.
The latter ... 17 cwt.
The latter preceded.
In another experiment,
The 1st had a load of ... 1 cwt.
The 2d of ... 10 cwt.
They kept together.
Experiments were also tried in order to ascertain the advan-
tage of covering the stones with straw, but little advantage
seemed to result.
Your committee cannot close this Report without returning
their sincere thanks to Dr. Litton, for the zeal and intelligence
with which he attended and reported these experiments; and
also their perfect approbation of the unwearied attention and
skill with which Mr. William Edgeworth conducted the detail.

R. B. BRYAN.
THOMAS BROWN.
F. FOX.

XXIX. On the Anatomy of Vegetables; intended to substitute
many important Truths in Phytology. By Mrs. AGNES
IBBETSON.

To Mr. Tilloc.

Sir, — Having now completed the foundation of vegetable
life, I shall hope to send you a more regular series of dissections,
corrected from many of the errors, doubt and astonishment which (often