

friction of  $\frac{1}{13.7}$ , and when the surfaces moved from rest of  $\frac{1}{6.2}$ .\*

The greatest value of the coefficient of friction found by the committee, is  $\frac{1}{15.2}$ ; the average of the two experiments, upon the Raritan and Princeton is  $\frac{1}{29.8}$ . All the errors, if any exist, in the experiments

of the committee, would tend to make the coefficient appear greater than it really is, and yet it is less than one-half the average determined by the experiments of Morin.

The thickness of the coating of grease, in these cases, was more than one-fourth of an inch; and the great pressure must have rendered it liquid as the vessel passed over it—the heat generated being so great as to produce much smoking of the tallow, near the end of the launch.

TABLE A.

TABLE B.

Measurement by Mr. SAXTON'S Tape.			Measurement on Mr. LUKENS' Tape. The first mark on this tape is at the distance of 16 feet 9 inches from zero. The corresponding time is taken from the other tape.		
Time in seconds.	Distance in feet and inches.	Interval in feet and inches.	Time in seconds.	Distance in feet and inches.	Interval in feet and inches.
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	5	16 9	4 2
$\frac{3}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$	5 $\frac{1}{2}$	20 11	4 3 $\frac{1}{2}$
1 $\frac{1}{4}$	9 $\frac{1}{4}$	6 $\frac{3}{4}$	6	25 2 $\frac{1}{4}$	4 4 $\frac{1}{2}$
1 $\frac{3}{4}$	1 8 $\frac{1}{4}$	11	6 $\frac{1}{2}$	29 6 $\frac{3}{4}$	6 4 $\frac{1}{2}$
2 $\frac{1}{4}$	3 0 $\frac{3}{4}$	1 4 $\frac{1}{2}$	7	35 11 $\frac{1}{2}$	5 6 $\frac{1}{2}$
2 $\frac{3}{4}$	4 8 $\frac{3}{4}$	1 8	7 $\frac{1}{2}$	41 6	
3 $\frac{1}{4}$	6 11	2 2 $\frac{1}{4}$	8	no mark.	12
3 $\frac{3}{4}$	9 5 $\frac{1}{2}$	2 6 $\frac{1}{4}$	8 $\frac{1}{2}$	53 6	
4 $\frac{1}{4}$	12 5 $\frac{1}{4}$	3 0 $\frac{1}{4}$	9	61 5 $\frac{1}{2}$	7 11 $\frac{1}{2}$
4 $\frac{3}{4}$	15 9 $\frac{1}{8}$	3 3 $\frac{3}{8}$	9 $\frac{1}{2}$	68 0 $\frac{1}{2}$	6 7
5 $\frac{1}{4}$	19 7 $\frac{3}{8}$	3 10 $\frac{1}{4}$	10	75 5 $\frac{1}{2}$	7 5
5 $\frac{3}{4}$	23 5 $\frac{3}{4}$	3 19 $\frac{3}{8}$	10 $\frac{1}{2}$	83 2 $\frac{1}{2}$	7 9
6 $\frac{1}{4}$	28 1 $\frac{1}{8}$	4 7 $\frac{3}{8}$	11	91 5 $\frac{1}{2}$	8 3
6 $\frac{3}{4}$	32 6 $\frac{3}{8}$	4 5 $\frac{1}{2}$	11 $\frac{1}{2}$	99 8 $\frac{1}{2}$	8 3
7 $\frac{1}{4}$	37 8	5 1 $\frac{3}{8}$			
7 $\frac{3}{4}$	42 6 $\frac{1}{2}$	4 10 $\frac{1}{2}$			
8 $\frac{1}{4}$	48 8	6 1 $\frac{1}{2}$			

By order of the Committee,

WILLIAM HAMILTON, Actuary.

Philadelphia, January 11th, 1844.

### On Thomas Shriver's Bow-Spring for Carriages.

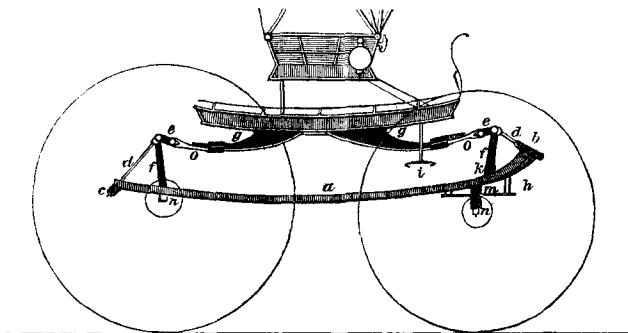
The Committee on Science and the Arts, constituted by the Franklin Institute, of the State of Pennsylvania for the Promotion of the Mechanic Arts, to whom was referred for examination the Bow-Spring for Carriages, invented by Thomas Shriver, of Cumberland, Maryland, REPORT:—

That they have examined two carriages constructed upon Mr. Shriver's plan, which may be described as follows, having reference

\* In a note appended to his table of friction, given in the "Aide Memoire," page 309, Morin remarks, that when the unguent is continually renewed, and uniformly distributed, this ratio can be reduced to 1-20th. In a table published in the same work, on page 307, he states the friction of rest, between woods having unguents of tallow, at 1-10th.

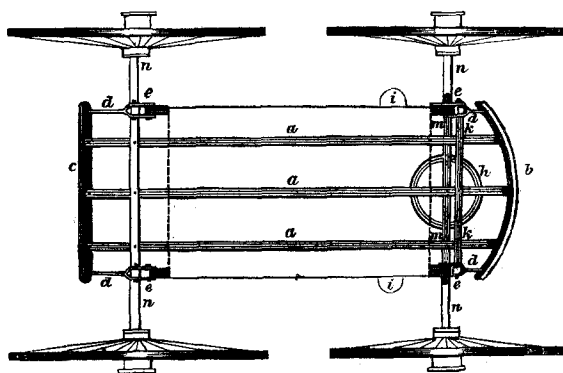
to a drawing hereto attached. The running gears, or frame, which supports the carriage body, mainly consists of three longitudinal pieces, or bows, of wood, *a, a, a*, framed to the bolster, *n*, which is attached to the hindermost axletree, and to two transom pieces, or bolsters, *m* and *k*, fixed over the front axletree—the piece, *m*, being under the pieces *a*, and resting on the pivot of the front axle—and the piece *k*, being on the pieces *a*, and extending upon each side about six inches beyond them. Upon the ends of the transom-piece *k*, and upon the bolster of the hindmost axle, posts, *f*, are framed, which are

Fig. 1.



- |   |                                      |
|---|--------------------------------------|
| <i>a, a, a</i> , Longitudinal Bow-Springs.              | <i>h, h</i> , Iron pivot ring.       |
| <i>b, b</i> , Front cross bow-spring.                   | <i>i, i</i> , Steps.                 |
| <i>c, c</i> , Back do. do.                              | <i>k, k</i> , Spring bolster.        |
| <i>d, d</i> , Iron stays.                               | <i>m, m</i> , Pivot bolster.         |
| <i>e, e, e, e</i> , Iron links connect'g leather brace. | <i>n, n</i> , Axle, wooden part.     |
| <i>f, f</i> , Wooden suspension posts.                  | <i>p, p</i> , Axle, iron part.       |
| <i>g, g</i> , Body springs.                             | <i>o, o</i> , Leather susp'g braces. |

Fig. 2.



connected to the ends of the two cross pieces, *c* and *b*, by iron rods, *d*; the cross pieces, *c* and *b*, being framed and secured to the ends of the bow pieces, *a*, at a suitable bevel, to resist the tension strain of the rods, *d*. The upper ends of the posts, *f*, the rods, *d*, and the links, *e*,

are connected by bolts to the leather straps, *o*, and springs, *g*, which are attached to, and support, the carriage body. In light carriages, the front piece, *b*, is curved, as represented in the drawing, but in heavy vehicles, or stage coaches, it is usually made straight. The whole carriage frame operates as a spring, when pressed by the weight and action of the carriage body. The points, *e, e*, are drawn towards the centre, and cause the posts, *f*, to act upon each of the axles as a fulcrum, bending the bows, *a*, downwards in the centre, and upwards at the ends, by the tension of the rods, *d*.

The committee, after a minute examination of the subject, feel justified in expressing a very favorable opinion of these springs, combining, as they certainly do in a high degree, the essential qualities of lightness, simplicity, cheapness, and durability. This opinion is sustained by the written testimony of some who have extensively used them, and by the experience of several members of the committee, who have ridden in, and examined, both heavy stage coaches, and light carriages, equipped with bow-springs, all of which are successful, and received their decided approbation.

In the drawing attached, fig. 1, is a side elevation of the body of a light carriage constructed with these springs; and fig. 2, a horizontal projection, or plan.

By order of the Committee,

WILLIAM HAMILTON, Actuary.

*Philadelphia, December 14th, 1843.*

### *On Calderhead's Carpet Loom.*

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania, for the Promotion of the Mechanic Arts, to whom was referred for examination the question of the novelty of the Loom devised by Alexander Calderhead, for weaving carpets, REPORT :—

That the main features of this invention, are placing the pattern cylinder under the warp, and causing it to act upon perpendicular needles, each of which has an eye through which a thread of the warp is passed, thus enabling each particular thread to be lifted by the pattern, at the proper moment, to produce a shed for the weft to pass through, and form a point in the figure of the fabric in hand.

The committee have not the slightest doubt, that Alexander Calderhead actually invented the improved loom before them, and think he deserves the highest credit for the ingenuity and perseverance with which, through many discouragements, he has labored to bring his loom to its present state of simplicity and perfection; and the committee will here incidentally observe, that they have good reason to believe that looms upon this simple plan will be found highly useful for weaving carpets, and similar fabrics of a coarse texture.

Nevertheless, an examination of previous patents has brought the committee to the conclusion, that the same form of loom, in all its essentials, has been before devised, and made the subject of a patent, by C. M. H. Molinard, which passed the Great Seal of England on