

*Report on Naglee's Railway for Short Curves.*

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 a plan of a Railway for Short Curves, invented by Mr. Henry M. Naglee, Civil Engineer, of Philadelphia, Pennsylvania, REPORT,

That in Mr. Naglee's plan the inner curved rail is formed of a common flat bar or edge rail, without a groove, while the outer rail is composed of cast iron segments, with a surface three inches in width, inclined or bevelled inwards and downwards, and containing on the outer edge a flat rim, raised one inch above it, and two inches wide.

By this arrangement it appears that the wheels are kept within the rails by their flanches, as in ordinary roads. The inner wheels always move on their treads. As to the outer ones, since by the motion in the curve the wheels are thrown towards the outer rail, the flanches ride upon its bevelled surface, and may rise higher and higher upon it, until they are checked in this lateral motion by the rim.

A short curve of this kind has been laid at the Willow street dépôt in Philadelphia, and has been seen by several members of the Committee in successful operation. Indeed it contains the essential condition of success—namely, that the car is constrained, by the mechanical bonds with which it is confined, to pursue the path marked out for it. All the other plans in use for turning short curves (viz: Stimpson's, Malcom's, and the common track,) have this indispensable character, and with it all succeed, and seem to operate *almost equally well*.

Great importance, indeed, has been attached to the device of virtually increasing the diameters of the outer wheels, by making them rest on their flanches, and thus bringing into action what is called the "conical principle." And it is, certainly, true that if a single pair of wheels, of different diameters, firmly attached to an axle, were to roll freely over a plane, they would move in a circular arc, the centre of which would be the point in which the line of the axle produced would meet the plane. But in every practical case, there are at least two pairs of wheels, attached to axles parallel to each other; and the curves in which they would severally move, if alone, having different centres, cannot possibly be described at the same time. Hence it is evident that when wheels of different diameters are attached to parallel axes, they cannot move at all, either in straight or curved lines, without some of them sliding. There may, certainly, be less sliding where curves are described, with the outer wheels of greater diameter; but if any advantage be thus gained, it does not seem to be of much practical value.

The most usual position for railways of short curves is in the public streets, where they are used for turning corners, or for leading into dépôts. In such situations, it is a matter of great importance that the curved ways should be so constructed as not to interfere with the safe passage of common carriages and horses. One of the conditions re-

quired for this object is, that the rail be placed as nearly as possible upon a level with the street, and in this case, when the wheel moves on its tread, there must be a grooved depression along the inside of the rail, to admit the flanch. In the plan under consideration, no such groove is admitted, and hence even the inner rail must be sufficiently elevated to keep the flanch above the pavement of the street. As to the outer rail, its elevation will be still greater, in consequence of its bevelled surface and its raised rim.

The Committee do not feel called upon to consider the much agitated question of the comparative merit and originality of the different plans devised for turning short curves on railroads; but, having presented what believe they to be a candid and correct view of the construction and action of that submitted to them, they here close their report.

August 11th, 1842.

By order of the Committee,

WILLIAM HAMILTON, Actuary.

### *Report on Hill's Occultator.*

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 model of an Instrument for Calculating Occultations, invented by Mr. Thomas Hill, of Cambridge, Massachusetts, REPORT,

That they have examined the model of Mr. Thomas Hill's Occultator, together with his demonstration of the principles on which it is constructed and used; both of which are entirely satisfactory, and show that by the use of the Occultator, without a table of logarithms, and with the elements given in the Nautical Almanac, or still more convenient, with those of Downes' United States Almanac, the time of beginning and end of an occultation or eclipse may be found with sufficient accuracy for practical purposes. The instrument must be highly useful to those who are desirous of observing occultations, and are not familiar with the use of logarithms and trigonometric formulae. They would merely remark that instead of the moon's true hour angle and declination, it would be more precise to use those of the star in case of occultations. The model and process are founded on true geometrical principles, and furnish, in the opinion of the Committee, a new application of those principles, and an original invention of an instrument called the Occultator. They respectfully recommend to the Committee on Science and the Arts to advise the bestowment of one of the Scott's medals on its highly meritorious inventor.

By order of the Committee,

October 13th, 1842.

WILLIAM HAMILTON, Actuary.

### *Report on French's Spark Arrester.*

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 a Spark Arrester for the Chimneys of Locomotive Engines, invented by Mr. Richard French, of Philadelphia, Pennsylvania, REPORT,

That this contrivance for preventing the emission of sparks from