counterpart. Whether it possesses the elements of desirability, sufficient to win its way as a commercial article, your Committee cannot determine. The process is certainly a novel one and the results obtained are so well defined that it would seem the fabric must eventually find its place in the ordinary household economy, its cheapness and durability being factors that count largely in its favor.

Its cleanliness is undeniable, as the nature of the material is to sift dust rather than retain it.

As before stated, your Committee are unable to properly judge of the practical results likely to follow this invention, but they are quite unanimous in their approval of the effort thus made by Mr. Lance to not only further diversify our manufacturing interests, but to give commercial value to that which has hitherto been valueless and everywhere recognized as a waste material.

All of which is respectfully submitted.

T. C. SEARCH,

WM. MCDEVITT,

LOUIS H. SPELLIER,

H. W. SPANGLER.

Amended by the award of a Certificate of Merit.

Adopted April 4, 1888.

GEORGE A. KOENIG, *Chairman.*

THE DOUGHERTY RAILROAD SIGNAL.

[No. 1391.]

HALL OF THE FRANKLIN INSTITUTE,

PHILADELPHIA, December 19, 1887.

The Sub-Committee of the Committee on Science and the Arts, constituted by the FRANKLIN INSTITUTE of the State of Pennsylvania, to whom was referred for examination

THE DOUGHERTY RAILROAD SIGNAL SYSTEM,

Report: That the object and aim of the device is that a passing train shall automatically set signals and combinations for the guidance and control of trains following, in such a manner, that while the train setting the signal is notified

at the same time by a suitable alarm that the signal is properly displayed, it cannot alter the position of the same.

The signal being set, devices are provided connecting with the building occupied by a train operator, who alone can return the signal to its normal position. Should the office be vacant or operator off his guard, an alarm is given, and a corresponding signal displayed in the office, which will so remain until the operator has returned to his duty and has received notification that the train setting the signal has passed out of block. Thus following trains are brought to a halt until the signal is changed by the operator, allowing another train to pass.

The object is commendable and gives security from accidents. Any device that has the automatically-setting feature absolutely, and depending on an operator to change the signal back to normal position, is worthy of notice and theoretically seems perfect.

Your Committee do not deem it necessary to go through all the minute details of the signalling system presented, but take the initial or operating box that starts the machinery in motion as the real point of consideration. The device is constructed and operated as follows:

A box is provided, located alongside the rail and fastened to the ties with an opening in the top, through which a lug projects, that is secured to a semi-elliptic spring with elongated slots, the spring being secured to the bottom of box by bolts. The elongated slots allow the spring to expand freely. The lug projects upward and on the inner side of the rail, so that the flanges of wheels will strike and depress the spring, causing a downward movement, depressing a lever which is connected to the main lever, the latter being provided with a ball and tram-way. When the lever is in normal position, the ball or weight is located at or near the centre of motion. As soon as the lever is disengaged, the ball by gravity will roll along the tram-way out from the centre of motion, causing the lever to be depressed by the weight of the ball. The connections to operate the signal are at the opposite end of the lever. The lever with ball cannot be set, or returned, or set to normal position, without

the aid of the operator, connection being made with a building at any distance required for convenient signalling.

Your Committee are of the opinion that the device is mechanically practicable and effective and fully able to accomplish the object desired, and, although not seeing the device in practical use, believe the principle to be good, and worthy of commendation.

Therefore, your Committee would suggest that the device be tried practically on some road to develop the mechanical working of the same.

For further information as to details, the patent papers and illustrated pamphlet of the inventor are appended hereto.

RUFUS HILL,

W. BARNET LEVAN,

LUTHER L. CHENEY,

C. CHABOT,

CHAS. E. RONALDSON.

Adopted April 25, 1888.

GEORGE A. KOENIG, *Chairman.*

SCIENTIFIC NOTES AND COMMENTS.

MECHANICS.

A VIBRATING ENGINE.—There is being built in Portland, Me., an engine which is the invention of Mr. Lidback, which has quite a number of novel features. I have called it a vibrating engine to distinguish it from a rotary, as the driving apparatus turns through part of a circle. The piston consists of a hollow cylinder, having four wings on its outer side. The outer edge of these wings carry packing pieces, which bear against the inner surface of the steam cylinder proper. Between the wings rectangular plates extend inwardly from the steam cylinder, which are made to bear against the outside of the cylindrical part of the piston. Each wing of the piston is therefore between two of these plates, and moves backward and forward as the piston vibrates. *Fig. 1* will give a fair idea of the arrangement of the parts. *AA* is the piston carrying the wings *BBBB*, each of which is packed by the rectangular piece *C*, against the interior of the cylinder *D*. *EEEE* are the plates fitting into recesses in the cylinder *D*, and set up by set screws, two of which are shown at *FF*. *H* is the valve chamber, and steam is admitted through the centre of the piston. Ports are cut through the piston *A*, at *GG*. Two ports, one for steam and one for exhaust, are in each corner, but one lies at one end and one at the other of the piston *A*. The valve used is represented in *Fig. 2*. It consists of a cone-shaped piece of cast iron, *H*, having steam