red hot iron at 1172 degrees, has heat enough to convert one cubic inch of water into 1700 cubic inches of steam.

Hence it appears extremely easy to produce explosions from throwing water on hot iron, as indeed is proved by Perkins' steam gun. If that gentleman's generators had been no stronger than ordinary boilers, they would have been destroyed by one-third of the power which he produced by throwing water on their red hot iron: and strong even as they were, they would have exploded had he pumped in a sufficient quantity of water, without giving vent to the steam produced.

A cubic foot of hot iron by being reduced to 32 degrees, would furnish heat sufficient to convert a cubic foot of ice cold water into 13,600 gallons of steam, at atmospheric pressure: and a single square foot of boiler-iron, $\frac{1}{16}$ of an inch thick, if only at a bright red heat, has caloric enough to make 88 gallons of steam. It is probably not very uncommon for boilers to become so destitute of water, that 10 or 15 square feet become red hot. This surface, by losing only half its heat, would produce steam enough in addition to that already existing, to explode almost any boiler.

The sudden cooling of a part of the boiler, no doubt weakens it very much, and hence we find some boilers in their rupture following the water line, which line was probably made by a fresh supply of water, or by a motion of the steam boat raising the water upon the heated iron of one side.

The explosions which have occurred about the period of coming to, or leaving a wharf, may be attributed to the boat's being thrown partly on one side, either in turning, in striking the wharf, or under the weight of passengers shifting their position, so that the water is thrown upon hot iron of the boiler.

The conclusion to which I come, is, that a considerable proportion of the explosions which occur, is occasioned by water being thrown on highly heated iron. The proper preventives, are, care in engineers, and such construction of boilers, that the part exposed to the greatest heat will not be soonest laid bare, nor a large surface either suddenly laid bare, or suddenly covered by water: also to throw the water into the bottom of the boiler, rather than by a jet into the upper part.

FRANKLIN INSTITUTE.

Monthly Meeting.

THE stated monthly meeting of the Institute was held at their Hall on Thursday evening, February 24, 1831.

THOMAS FLETCHER, vice president, in the chair.

The minutes of the last meeting were read and approved.

The following donations were presented to the Institute, viz.

By Mr. A. B. Hutton.

The Mechanics' Journal, or Artisans' Miscellany of Inventions, Experiments, Projects, and Improvements in the useful Arts.

By Mr. Zachariah Allen.

The Science of Mechanics as applied to the present improvements in the useful Arts in Europe and in the United States.

By Mr. Josiah Copley.

Letter from the Secretary of the Treasury, transmitting the information required by the House of Representatives in relation to the growth and manufacture of Silk, adapted to the different parts of the Union.

By the Board of Managers of the Institute, for 1830.

Précis, Elémentaire de Physique Expérimentale, par J. Biot, Vols. 1 and 2.

By Professor A. D. Bache.

Catalogue of the Officers and Students of the University of Pennsylvania, January, 1831.

The corresponding secretary laid on the table the following works, received in exchange for the Journal of the Institute, viz.

The Mechanics' Magazine, and Journal of Public Internal Improvements, for January, 2 copies.

Journal of the Philadelphia College of Pharmacy, for January.

American Annals of Education and Instruction, and Journal of

Literary Institutions, for February.

The Magazine of Useful and Entertaining Knowledge, for January.

Bulletin de la Société d'Encouragement pour l'Industrie Nationale, for August, 1830.

Professor A. D. Bache stated, on the part of the committee on explosions of steam boilers, that the preparatory arrangements for experiments had been made, and apparatus for further prosecuting the objects of their appointment was in progress.

Professor Johnson from the same committee stated, that the committee had taken measures to obtain specimens of American iron for the purpose of experimenting on the strength of the different kinds of that material employed in the formation of steam boilers.

Mr. D. H. Mason made some remarks on the application of the power of steam engines to locomotive carriages.

Thomas Earle, Esq. read a paper "on the causes of some Explosions of Steam Boilers," which, after some remarks, was referred to the committee on publications.

The following queries were proposed for discussion, and ordered to be entered on the minutes.

1st. The subject of rapid and slow motions of boats in abrading the banks of a canal.

2nd. What are the relative advantages of stationary and locomotive power, in propelling carriages on planes of any elevation?

3d. What are the best means of securing the boilers, cylinders, and all other parts of steam engines, whether employed for stationary purposes, for navigation, or for locomotive carriages, against loss of power by radiation and conduction?

THOMAS FLETCHER, *Vice President.*

J. H. BULKLEY, *Recording Secretary.*