

Collins' steamers not excepted, is the want of room necessary for a due mixture of the gases, and a full development of the blaze.

Large quantities of fuel in a narrow and low furnace cannot be consumed without waste. In order to become fully excited and most positive in its action, the blaze of a fire must be at liberty to extend and elongate in the direction of the draught to a distance corresponding to its bulk, and without meeting absorbing obstructions. For illustration I again refer to heating and puddling furnaces. This fact can be readily ascertained in an experimental furnace with adjustable roof. The brightest fire will burn under the highest roof, while the depressing action of a low roof will damp it, and reduce the temperature of the furnace.

Economy of space is an important consideration in the planning of a marine boiler; but this may be carried so far as to seriously interfere with the grand object of the boiler. In an efficient boiler the extension of the furnace should form an empty area, which serves as a receptacle for the caloric stream, where the gases become thoroughly mixed and fully ignited before their caloric is expended upon the boiler surface; and for the purpose of allowing ample time to the heat to be absorbed by the tubes, the above space, together with the tube area, should be as large as possible. The arrangement must be so that the draught between the furnace and the chimney should be very slow, so that all the caloric, or nearly all, may be absorbed before the unconsumed gases are allowed to escape.

The boilers of the *Arctic* have 33 feet of heating surface for one foot of grate surface: this allowance is scarcely enough for hard coal—40 to 1 will not prove an excess. But this proportion depends, in a great measure, upon the velocity of the draught through the area which contains the tube or heating surface. The larger this space, or the longer its extent, the slower the motion of the gases will be; or the more extended their travel, consequently the longer they will remain in contact with the tubes. It is a very general defect in marine boilers, that the draught from the furnace to the chimney through the tube area, or through the flues, is nearly uniform, and too rapid. The "hanging-sheets" in the boilers of the Collins' steamers were designed to arrest this rapid flow, but they are not sufficient. The fact is, that the common plan of flue or tube boilers does not admit of a thorough application of the important principle in question; hence the necessity of a radical change.

Other questions of importance have to be considered in the planning of a marine boiler. Strength, facility of construction and repairs, provisions against unequal contractions and expansion, against incrustation, facility of blowing out and of cleaning, safety against exposure of heating surface when the ship is rolling or careening—all these are important points, but more or less understood. By the above remarks I have only attempted to direct attention to such points as are not generally understood, and consequently neglected. In a new plan of boilers which I have invented, all the essential conditions of perfect combustion, radiation, and absorption are fulfilled, and are calculated to produce much higher results than have been obtained heretofore.

In conclusion, I will yet remark that the subject of artificial draught is, in a great measure, an open question yet. The common fan-blast will answer very well under certain conditions; but in marine boilers, I am satisfied, exhaustion by proper me-

chanical means will work better. The control of large and connected fires can be better maintained by exhaustion than by blast, and also more economically.—*Scientific American*.



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CANADIAN INSTITUTE.

SESSION 1854-55.

First Ordinary Meeting—Saturday, December 2d, 1854.

The names of the following candidates for membership were read:—

Charles Fitzgibbon.....	Toronto.
Richard Forneri.....	"
Arthur A. Farmer.....	Woodstock.
Lawrence Laurason.....	London.
John T. Newton, M.D.....	Sault Ste. Marie.
Hector Cameron.....	Toronto.
Rev. W. Leach, LL.D.....	Montreal.
W. Kingston, M.D.....	"
Alex. Rennie.....	"
Andrew Dickson.....	Packenham.
Hewith Bernard.....	Barrie.

A communication from the Council was read, being the "Report of the Special Committee appointed to consider Major Lachlan's suggestions with respect to the establishment of a series of Meteorological and other Observations throughout British North America."

REPORT.

The Committee appointed to consider Major Lachlan's suggestions with respect to the establishment of a series of simultaneous Meteorological observations throughout the British American Provinces, beg leave to report, that after giving due consideration to the plan suggested by Major Lachlan, they have thought it advisable, before recommending any special steps to be taken, that correct information should be procured with reference to the working of a similar system in the United States, which has now been in operation for some years. The Committee have requested one of their members to communicate with Professor Henry, the Secretary of the Smithsonian Institution, as well as with other gentlemen in the United States and Canada, whose views on this subject the Committee consider it essential to obtain. Not having yet received the required information, the Committee are unprepared to recommend to the Council any definite course of action.