THE FIRST SOO CANAL.

In view of the fact that next month there will be a ceremony at Sault Ste. Marie, Mich., in celebration of the fiftieth anniversary of the opening of the canal there, it is interesting to recall the fact that the first canal lock on the continent was that constructed on the Canadian side of the same river about the year 1798.

The following extract from a recently published history, The Annals of Sault Ste. Marie, by Edward Capp, gives the particulars of this early canal of the north.

"In 1670 Prince Rupert of England had been granted by King Charles II. a charter for a new company which called itself the Company of Merchant Adventurers trading into Hudson's Bay. To this association was given the control of all that vast territory whose lakes and rivers drain eventually into Hudson's Bay and to the posts which they established at various points did the natives bring their packs of furs for barter.

For nearly a century the work of the company's agents was uninterrupted from the interior save for a raid at long intervals by the French, but with the establishment of peace in 1763, the country became a field of operations for great numbers of independent barterers. For eleven years little notice was taken of these, but their traffic grew to such an extent that, in 1774, the Hudson's Bay Company found it necessary to establish outposts in its own defense.

This movement, however, was not sufficient, for the "independents" continued to grow in strength, until 1783 three of them, Peter Pond and Thomas and Joseph Frobisher, formed themselves into a rival organization, which has come down to us under the name of the North-West Company.

The new institution was peculiarly Canadian, and with its 5,000 agents throughout the country, most of whom were in some measure identified with the natives, it gradually assumed the control of the great district.

The North-West Company erected a post at Sault Ste. Marie, at the foot of the Rapids, on the north shore, where were the house of the bourgeois, or chief factor, the men's house, a magazine, and a number of stores for the reception of merchandise, and here came all the furs bound from the west to Montreal and all goods en route from Montreal to the interior.

To facilitate the traffic, a canal was cut for the passage of bateaux and canoes between the islands and the mainland, and a lock, the first in the West, the forerunner of the present wonderful engineering triumphs, was constructed, having a lift of nine feet.

The lock was 38 feet long and 8 feet 9 inches wide, the lower gate letting down by a windlass and the upper folding gates working with a sluice. The sides were held in place by vertical timbers tied together by horizontal pieces at the top and high enough for the boats to pass beneath them. A leading trough of timber framed and planked, 300 feet long, 8 feet 9 inches wide and 6 feet high supported and levelled on beams of cedar through the swamp was constructed to conduct the water from the canal to the lock. The canal itself was 2,580 feet long, and along the whole length of lock, trough and canal a roadway was cut 45 feet wide, and there was also laid a log towpath the full way, 12 feet wide for oxen to track the boats.

In the construction of the work 20,000 feet—board measure—of 2-inch plank were used as well as 5,000 feet—running measure—of hewn timber.

Whatever year after 1783 it was begun, it was completed by 1798.

No record exists of the lock ever having been used, and as a saw-mill was built at the foot of the canal used as a raceway, it may have proved unsuccessful for its original purpose because of the great fall of water which it was necessary to overcome. However that may be, it is not mentioned later than 1803 and at the time of the American occupation of the Sault it seems to have been completely forgotten.*

Impressed with the governmental report of Captain Bruyeres referring to the lock and adjoining land, which report is reproduced by the Canadian Archivist, three gentlemen, His Honor Judge Steere, Mr. Joseph Cozens, D.L.S., and Mr. A. S. Wheeler, General Superintendent of St. Mary's Falls Canal, Michigan, proceeded to the site of the old lock and were successful in unearthing it.

The measurement and details exactly corresponded with those of the report of 1802, and the lock, through the generous patriotism of Mr. Clergue, was restored in form, if not in material, and may be seen to-day to the north of the Lake Superior Power Company's offices."

*Canadian Archives, 1886 and 1889.

A SMOKELESS CITY.

At the regular meeting of the Engineers' Club of Toronto, on May 11th, A. M. Wickens read a paper under the title, "A Smokeless City," which was followed by some discussion. Below is a summary of the paper and discussion:

If a city is to grow, it must become a manufacturing centre. A purely commercial city is an impossibility in a young country. Even our business blocks become in a measure factories—they must have their power plant for the operation of elevators, the supply of heat, etc. To make the city smokeless is a desirable and laudable end toward which to strive. As we are situated, it seems that we must burn soft coal, on account of first cost, and soft coal is proverbially smoky. As soon as our city by-law came into force, we had a number of men, all profoundly versed in combustion and fuels, and all supplied with perfect apparatus for overcoming the smoke nuisance. Some discharge a jet of steam over the coal; others have air ducts to supply heated air to the fire; while others introduce fuel oil and other oils with the steam jets. All these so-called new ideas have been experimented with, and some discarded, years ago—some as early as 1837. Most of them mimimize the smoke to some extent, but usually at the expense of some extra coal. In the test which I conducted, the arrangement was such that the steam jets blew for about six minutes after each fire was put on. There were 15 jets, ⅛-in. in diameter. After a six hours' run we found that the amount of steam we used for improving the combustion was 7 per cent. of all the steam made. The apparatus was guaranteed to cure 90 per cent. of the smoke and save 10 per cent. of the fuel. The first thing it had to do was to save 7 per cent. to make up for the steam used, consequently it would have to save 17 per cent. to make a net saving of 10 per cent. Again, during 70 per cent. of the time, the fire was normal, so that during the 30 per cent. of the time, when this apparatus was on, it would have to make the total saving, which would be nearly 55 per cent. during that time, to make up for the time it was not on. The result was, when we came to sum up the test, the apparatus was 5.6 per cent. behind. But it killed 90 per cent. of the smoke. There is no apparatus using live steam for a jet that is making any real saving in fuel.

In burning fuels of any kind, if we get perfect combustion, we have no smoke. The oxygen of the air must be thoroughly mixed with the carbon of the fuel. This may be demonstrated with a lamp. Air and carbon meet and there is no smoke; but turn up the wick, and you have smoke for lack of air; the same result would follow if you close the air ducts at the bottom of the chimney. It is the carbon in the coal that burns; two atoms of oxygen combine with one atom of carbon, forming carbonic acid, which burns perfectly and represents 14,800 British thermal units per pound. Let the quantity of air be reduced until one-half the quantity of oxygen that is required is supplied to the furnace, and then one atom of oxygen combines with one atom of carbon and the result is carbonic oxide. The heat value of one pound of carbon converted into carbonic oxide is only 7,800 heat units, and it is a very smoky substance; so when we supply only half the quantity of air we lose nearly half the heat units in the fuel. The air must be thoroughly mixed with the coal and the furnace heat must be kept at a high temperature. If we put in too much air we carry away too much heat. Theoretically coal requires 12 pounds of air per pound for consumption, but practically we use from 18 to 24 pounds. The reason is that we cannot get the air and coal to mix properly and thoroughly. When the minimum amount of air is used, the stack losses per pound of coal are 1,400 heat units, if the temperature of the escaping gases is about 400 deg. F. If we use twice the quantity of air without reducing the stack temperature, the loss increases to