

interest and sinking fund on the debt contracted for this railway is provided, and it is elsewhere estimated that under the present system a surplus revenue of \$250,000 might be expected. By another estimate it is shown that \$477,420 might be obtained by the sale of the railway, thus reducing the deficit to \$103,185. We may remark that in this estimate credit is taken for \$79,570 of sinking fund, which is clearly incorrect, and if this be deducted the deficit will be \$182,755. It is high time that consideration were given to the question of throwing at least a portion of the expenses connected with the administration of justice on the municipalities, also to the abolition of the Legislative Council, which would reduce the heavy cost of legislation, now \$170,000. The serious existing defalcation must be boldly met, and it will never do to treat the sinking fund as ordinary revenue.

We shall for the present defer criticism on the Ministerial budget as announced very irregularly by a contemporary. An increase of taxation is absolutely necessary, and the reluctance of all Governments to impose direct taxes on a people, most unwilling to endure them, will, we feel assured, lead to the imposition of taxes that will by many be deemed objectionable. One thing, however, we trust will be borne in mind, which is that a sufficient revenue must be raised to meet the enormous railway expenditure which, when the subsidy balances, and the contractor's claims are adjusted, will exceed \$17,000,000. The contrast between the financial management in Ontario and Quebec is most marked, and yet the former province has aided railways in a much more judicious manner than the latter. Ontario has no debt and no Legislative Council. Considerable allowance ought doubtless to be made for assumption by the Government of the Quebec, Montreal, Ottawa and Occidental Railway, which was in a manner forced on it, and which is a public work of necessity. Among other statements we find one, which gives the amount yet to be raised, even if the sales of the railway be confirmed, at \$1,371,848; while, if they be not sanctioned it will require \$2,381,848 to meet the public demands. We do not suppose that many will envy the Treasurer of Quebec a position entailing such fearful responsibility. It appears that there were no less than six tenders for the Government railway, all but one of which was for the entire line. The price offered by Mr. Robert N. Hall and by Messrs. Allan, Rivard & Co. was the same (\$8,500,000) as the joint tender of the Pacific Co., and of the Senécal Mc-

Greery Syndicate. It seems, however, that those offers were better by \$102,800 than those accepted, owing to the capitalization of a difference of interest between 7 and 5 per cent. on \$257,000 permanent stock of the city of Québec. We presume that the sales will be confirmed, and we shall then look with interest for the budget.

IRON TRADE AND MANUFACTURE.

MALLEABLE OR WROUGHT IRON.

There are two methods by which iron may be produced in such a state as to be capable of being wrought by hammering or rolling, as referred to in a former article. According to the one method, which was formerly the only one adopted, the metal is obtained by heating a suitable iron ore in contact with charcoal burning under the influence of a blast of air, as in a blacksmith's forge. The reduction of the iron in this case is probably effected entirely by carbonic oxide, and since the temperature is not high enough to determine the carburization of the metal to such an extent as is requisite for the formation of cast iron, the reduced iron is obtained in the state of a coherent spongy mass, termed a "bloom," which is then rendered compact by hammering it while red hot so as to weld or unite together the particles into one mass. Only the richer kinds of iron ore can be worked in this way, and even with such ore the production of malleable iron by the direct method is always attended with very considerable waste, since a large portion of the metal escapes complete reduction, and, in the state of ferrous oxide, combines with the silicious and earthy portions of the ore, giving rise to the production of a readily fusible slag, consisting chiefly of ferrous silicate.

The other method, by which malleable or wrought iron is now chiefly produced, consists in operating upon fusible carburized pig iron in such a way as to deprive it of the greater part of the carbon and silicon it contains. This is in all cases effected by a partial oxidation of the pig iron, the excess of carbon being burnt together with the silicon, while a portion of the iron is at the same time oxidized. A fusible slag consisting of ferrous silicate is thus formed, which reacts upon the remaining carburized iron, oxidizing and separating a further portion of the carbon, as well as other substances which are frequently present in pig iron, and would be prejudicial to the quality of malleable iron.

By the direct method, the production of malleable iron is chiefly practised according to what is termed the Catalan method, which consists in heating the roasted ore in a charcoal fire urged by a blast in a manner very similar in its general character to that adopted in working a blacksmith's forge. If the laudable experiments about to be made in this city under the Duryee patent should fall short of the expectations, this method will still remain: at any rate it is the intention that the smelting works shall go on. The most important part of the arrangement for the Catalan method is the hearth, which is a nearly cubical chamber built of stone and lined with slabs of iron at the back and front. The hearth is placed against a wall through which the tuyere of the blowing machine projects into the hearth. The ore to be reduced is broken into pieces the size of a nut and placed against the front of the hearth, while the remaining space is filled with charcoal, and when the hearth is filled in this way the upper part of the heap of ore forms a ridge, the surface being partly covered with a layer of closely packed charcoal dust. The fire is then urged by the blast, and the ore becomes gradually deoxidized, while the earthy substance contained in the ore combines with a portion of ferrous oxide, forming a fusible silicious slag which runs down to the bottom of the hearth. Fresh charcoal and finely divided ore are constantly supplied to the fire meanwhile, and eventually the deoxidized metal sinks down in a pasty condition to the bottom of the hearth, where the fragments are worked together by a workman into a spongy mass, which is taken from the fire and rendered solid by hammering while red hot, so as to crush the metallic particles; it is then drawn out into bars under a forge hammer. In the reduction of iron ore by this method the consumption of fuel is considerable, and as charcoal must be employed, it can only be practised where wood is very abundant and cheap.

SUN LIFE ASSURANCE CO.

ANNUAL REPORT.

The Annual Statements called for by Charter are appended hereto, and the Directors have pleasure in inviting attention to them. The Life Applications submitted during the year were 1,158, for \$2,142,343.92. Of this amount \$1,955,010.67 under 1,052 applications was accepted and Policies were issued therefor. The Life Policies in force at the close of the year were 3,047 for \$5,010,156.81. The Accident Applications received were for \$1,053,000.00, the Policies issued covered \$1,024,000.00, and the amount in force at the close of the year