Robinsón Companies, whose annual reports will be found well worth perusal by those of you to whom the subject of this paper may especially appeal.

The main divisions into which the head office accounts are divided are *Expenditure* and *Revenue*, of which we need only concern ourselves with the former.

At the outset, we are met with the question of "Capital" account, which usually occupies (especially with English companies) a very prominent position on the balance sheet; this, however, is not in the province of the manager, but of head office, and nothing need be said about it further than that the capital of a mine decreases each day that it is worked, since each day it contains less and less of the mineral for which it is wrought, and hence, each day its actual value is diminished.

All expenditure properly comes under one of the following headings, viz: Construction, Maintenance, and Operation; in some of the Lake Superior mines, construction is charged to operating expense, and the Alaska Treadwell Company (whose accounts are models) charge both construction and maintenance directly to operating, *i.e.*, all expenses are charged directly against the unit of one ton produced, which is unquestionably the soundest way. The number of expense accounts to be kept is a matter that must vary with the character of the mine, and the requirements of the directors.

In the case of milling ores, the South African companies referred to, have the following classification.

MINE COSTS.

(1) Stoping,
(2) Tramming,
(3) Hoisting,
(4) Pumping,
(5) Development,
(6) Timbering,
(7) Tracklaying.

SURFACE COSTS.

(1) Tramming,
(2) Crushing,
(3) Sorting.

MILL COSTS.

(1) Milling,
(2) Power,
(3) Concentration,
(4) Cyaniding,

with general charges, amongst which are put stationery, rents, hospital fees, directors' and audit fees, sundry expenditures, additions to plant, machinery and buildings, and road or surface improvements.

For general use I would suggest the following list, which can be added to or modified according to wants and conditions:

(1.) *Prospecting or Exploration*—which should include all expense incurred in surface prospecting, exploration by means of diamond drills, or men sent out to test new or undeveloped claims.

(2.) *Construction.*—This account covers the first cost of all roads, tramways, buildings, foundations, machinery, ditches, pipe-lines, &c., &c., necessary to put the property on a producing basis. Each road, building or machine should have its own account, to be closed in to construction account at proper intervals. In building itemize grading, dry wall, mortar wall, lumber, plank, boards, hardware, glass, paint, etc.; and in Plant, the excavation, concrete or rock foundation, invoice cost of machine, freight and duty on same, with all attachments of piping, belting, etc., etc. The labor and supplies used in construction are obtained as previously indicated.

When the work is finished and closed into construction its connection with this account ceases, all repairs or renewals should be directly charged against operation. In many cases it is possible to charge off a certain amount each month, for example, in the case of a wire rope which previous experience has shown you will only hoist a certain number of tons before renewal, an amount corresponding to the number of tons hoisted can be charged off each month.

(3.) *Development.*—This account covers the cost of all shafts, winzes, levels, cross-cuts and raises, and is easily made up from the cost ledger.

(4.) *Output*—Into this account is closed all stope accounts.

(5.) Pumping.

(6.) Hoisting.

(7.) Tramming. These accounts are easily gotten from the cost ledger.

(8.) Timbering is an account which need not be kept separate unless the width of ore body, softness of walls and other conditions make the account a large and important one In ordinary mines the timbering necessary is charged directly to the stope account, or, (in development) to the shaft, level or heading requiring it; its cost price is the first cost, plus the cutting and preparation, plus the labor of putting it in place, etc., etc.

(9.) Transport may be a separate account under the head of Surface Expense as will also be—

(10.) Sorting, and

(11.) Crushing, in the case of mines selling their product or sending it to public sampling works. The labor involved in making stock piles of ore, for which a higher than a market price is sought, may be charged to separate account or included in 9. Transport should also include whatever labor is expended in loading ore wagons or cars.

(12.) Milling, in the case of gold ores or concentrating propositions, is but a copy of the cost account.

If, as is customary with English companies, there is a Salaries, or office account, it presents no difficulty.

There remain two other points to which I desire to call attention before closing, the first of these is what I might call "Management Cost per Ton" in which all salaries paid both at the Mine office and at Home office, including directors, auditors, and consulting engineer's fees and percentages, are divided by the unit of product. Such a cost item is most instructive to shareholders, but rarely desired by boards of directors.

The other point is a "Shift" record, in which one arrives at the production per single shift, or per man at work. The production of any one day, week or month is divided by the total number of single shifts in that period, including in this shift all the office staff and non-productive labor as well as the productive.

Finally let me draw your attention to a subject which is perhaps not germain to this paper, but which involves a cardinal point in the subject of Costs, and that is the ratio between Producers and Consumers, as I have been in the habit of designating them for many years.

Classify as Producers only that labor which is *directly* producing material from which revenue or income is derived, such as the men stoping or developing; classify as Consumers all others who simply handle the valuable material produced without increasing its amount, such as nippers, trammers, and all surface men. The smaller the proportion of consumers the more profitable the mine, the larger this proportion gets the less the profit becomes.

Machine Mining at Lethbridge, N.W.T.

BY W. D. L. HARDIE.*

The Galt coal-field is situated in Alberta, Canada, about 800 miles west of Winnipeg, 110 miles west of Dunmore on the Canadian Pacific Railway, and 66 miles north of the international boundary-line (49 degrees north latitude) between the Dominion of Canada and the United States of America. It is reached by a branch line of the

*Paper read before the Mining Institute of Scotland.