## September 7, 1911.

little washing. After allowing the liquid to drain away, the filter with adherent  $CoCO_3$  is placed upon several folds of bibulous paper and very gently pressed. This operation partially dries it. The filter is rolled in such a manner as to enclose the precipitate, and placed in an absorption tube filled with mercury and suspended over a mercury trough. The paper is passed up the tube from below, care being taken to keep the introduction of air at a minimum. 2 or 3 c.c. of Hcl. are passed up the tube by means of a curved pipette. In contact with the  $CaCO_3$  the H.Cl. will liberate the  $CO_3$ . After some hours the amount of gas may be read in c.c. and corrected for temperature and barometric pressure.

The determination of ammonia has been given in detail in this journal of June 29, page 893. The total solids are determined by evaporating 100 c.c. on a water bath.

## TASK WORK ON CONSTRUCTION.

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The ultimate aim of scientific management is construction work, says Sanford B. Thompson, in the introduction of task work or some similar method of laying out the work so that man will be paid in proportion to the amount of work he accomplishes.

Piece work consists in paying a man a certain price for the performance of a given job. Differential piece rates are arranged so that a man who does an extra large day's labor receives pay not only, for the total number of pieces, but is given a larger rate per piece.

In task work the time which a man ought to take to do a job when working hard and to the best advantage is fixed in advance, and if he accomplishes the work in a fixed time he receives a bonus.

Suppose, for example, it has been found from time study and a condition of the unit times that a carpenter, allowing, say, 30 per cent. for unavoidable delays and necessary rent, should make by working hard, a section of form in 9.5 minutes, If he accomplishes the work in this time or less, he should be given for the period, say, 35 per cent. more pay than if he were working simply by the day. It his day rate is \$0.50 per hour, his regular pay for 91/2 minutes would be 7.9c.. Adding 35 per cent would give him a price per form of 10.7c., provided he made an acceptable lot of forms in the specified time. In case he failed to make them within the time, he would receive his ordinary day's pay. If he completed 10 sections in 80 minutes instead of 95 minutes he would be paid his 35 per cent. bonus on the full 95 minutes, and would at once begin on the next task so that he would receive even higher than the figured rate, and he would have an incentive to work as fast as possible. If any of the forms were imperfect he would receive a smaller rate or else he would be required to repair them in his own time.

For satisfactory task work exact knowledge is necessary of the time required to do each branch of the work and scientific methods must be employed in fixing the tasks.

Great care must be used in setting a rate to be sure that the men can accomplish the work in the given time. If they fail to earn their bonus, they immediately become discouraged. On the other hand, if the time given is longer than necessary, the men will earn more than was planned for them and will probably start soldiering so as to prevent their employer from knowing that a wrong task has been set. Accurate fixing of tasks and rates by experienced men is absolutely essential to success.

## MINERAL PRODUCTION OF BRITISH COLUMBIA.

The aggregate value of all mining in British Columbia at the end of 1910 amounted to \$374,197,650, which shows an increase in ten years of \$222,042,442, or about 146 per cent. over that at the close of 1900 (\$152,155,208). Comparing 1905 (248,663,176) with 1900, the increase in five years was \$96,507,968, or about 63.5 per cent., while the five-year period, 1905-1910, gave an increase of \$125,534,474, or nearly 51 per cent., the aggregates at the end of 1905 and 1910, respectively, having been as shown above.

The quantity of lode gold during 1910 was the largest produced in any year by 12,119 ozs., the largest previous production having been in 1908, 255,582 ozs., as against 267,701 ozs. for 1910.

The net production of coal, 2,777,495 tons, for 1910, shows also a comparatively large increase of 793,579 long tons. Other materials—that is, non-metallic minerals, practically all for building purposes, are credited with a 25 per cent. increase. It is most likely these have been underestimated in quite recent years until 1910, for there has been a steadily enlarging use of materials in building and road and footpath construction in the larger cities of the coast district during several years, and this is continuing in larger degree than in the past.

Mr. William Fleet Robertson, the provincial mineralogist in commenting on the subject, says: "The value of mineral products in Tritish Columbia for the year 1910 amounts to \$26,377,066, which is considerably greater than that of any previous year. The tonnage of ore mined in the lode mines during the year was 2,216,428 tons, an increase over that of the preceding year of 158,715 tons, or 7.7 per cent., and it might also be stated that this is the largest tonnage for any year since the commencement of lode mining in British Columbia.

"This year for the first time in many years, the Coast district has the honor of first place on the list, followed in order of importance by the Boundary and East Kootenay districts, while West Kootenay, for many years the greatest producer of mineral in the province, is relegated to fourth place. The Coast and East Kootenay districts owe considerable percentage of their output to the coal mines situated within their limits, whereas in the other districts the production is almost entirely from metal mining. The total tonnage of ore was produced by the several districts in the following proportions: Boundary, 76.75 per cent; Rossland (Trail Creek division), 11.35 per cent.; Fort Steele Division (East Kootenay), 5.22 per cent.; Coast, 1.90 per cent.; others, 4.7 per cent."

Mr. E. Jacobs, of Victoria, B.C., says: "An analysis of British Columbia's mining activity during 1910 shows that there were 713 tons of ore mined a year for each man employed about the mines. In this respect, however, the districts vary very materially, since, in the Slocan, the figures show 148 tons mined to the man in a year; in Nelson district 142 tons; in Trail Creek 385 tons, and in the Boundary 1,472 tons mined to the man employed."

But copper mining is equally lucrative in this province, as will be seen from the following table, furnished by the British Columbia Copper Company, which in June alone produced \$16,676 pounds of copper, against 407,040 pounds for the same month of the year previous. For the six months ended June 30, 1911, the company produced 5,144,365 pounds of copper, as compared with 2,978,227 pounds in the corresponding period of last year.

Production in detail for six months of 1911 and 1910 follows: