

(Letter read.)

MR. S. P. FRANCHOT read the stenographer's report of the interview, and also the list of mining machinery filed in the Department of Customs by the Jencks Machine Company, Sherbrooke, and which, officially endorsed by the late Commissioner of Customs, Mr. Johnson, was used by the Government as a reference at ports of entry.

MR. L. A. KLEIN stated that he had at a recent period wanted a Block-hole drill and that he wrote to the Canadian Rand Drill Company for it. The company replied that very few of those drills were made, that they would have to get it for him from their house in New York, and that he would not be able to get it at such a satisfactory price as otherwise, as they would have to pay duty on it. Mr. Klein stated that he favored requesting the Government to allow mining machinery to come into Canada free of duty.

CAPT. R. C. ADAMS moved that: "Whereas the Dominion Government have stated that they are contemplating a revision of the tariff and that, looking to this end they have invited information upon the subject; and whereas the best interests of the Canadian Mining would be conserved by the removal of all duties upon mining machinery: Therefore be it resolved that the Dominion Government be respectfully requested to consider the practicability of granting this benefit."

MR. S. P. FRANCHOT seconded the motion, which was carried.

MR. HALSEY said: I may say in relation to Mr. Klein's remarks that the special drill he asked for is a little drill which we had never before been called upon to furnish. His application has been the only one of the kind in our experience; and I may say in point of fact made the only case which would have necessitated our importing machinery. One thing more. In the report of the interview with the Customs Department just read, the name of the Daw drill was mentioned as one of those wonderful machines. I have had full drawings and specifications of that drill made and I want to say distinctly that no man in Canada or any where else who has had a Rand or an Ingersoll in his mine would use a Daw; and that applies to many other kinds of imported machinery.

MR. B. T. A. BELL moved: That a special committee, representing the mineral operators of the province, consisting of Mr. L. A. Klein, Mr. John Blue, Mr. J. Hurley Smith, Mr. George A. Smith, Mr. S. P. Franchot and himself with an equal number of gentlemen representing the manufacturing interests of mining machinery in Canada be appointed to frame a statement of mining machinery not manufactured in Canada, and that the said statement be submitted to the various mining associations for approval before being finally submitted to the Department for official reference.

MR. JOHN PENHALE seconded the motion, which was carried.

The meeting then considered and adopted several important amendments to the Constitution and By-Laws and adjourned at one o'clock.

Afternoon Session.

The members re-assembled at half-past two o'clock, the club room being filled. Capt. R. C. Adams, Vice-President, who occupied the chair called for the first paper on the programme, entitled:

Mica Deposits in the County of Ottawa.

MR. F. CIRKEL (Templeton)—The mineral mica has assumed last year such considerable and economic importance that the attention of mining men and capitalists is directed at present very much to the mining of this mineral. Although the presence of the brown or so-called amber mica in the province of Quebec has been known for very many years, but little value was attached to it, the uses for the mineral and the market being exceedingly limited. Phosphate mines, worked formerly on a large scale, have yielded sometimes considerable quantities of mica, but the latter was thrown into the dump on account of its being considered as worthless. This brown or amber mica, a magnesia mica of the phlogopite species, occurs in scaly particles as an essential constituent of many eruptive and metamorphic rocks, such as gneiss, granite, porphyry, etc., and in this mode of occurrence it is of little geological and little commercial importance; but as an economic mineral, as a mineral of commercial value, as which it may come here in consideration, we have to refer to the deposits of mica, more nearly related to the limestone and pyroxene groups of the Laurentian system.

The principal areas where those phlogopite mica deposits are to be found in the province of Quebec, are confined to the Ottawa County and more especially to the districts of Wakefield, Templeton, and the Lievres. It occurs chiefly in the pyroxene rock which traverses in great masses the crystalline limestone, and forms crystals, aggregates of crystals, pockets or veins in great irregularity. Single crystals of very size, from a few inches up to two and three feet in diameter, are found imbedded and distributed irregularly over the whole rock; they are for the most part complete in their structure, afford occasionally limestones of two feet square, the sheets being free from wrinkles and crevices, and therefore of great economic value. Very often we see them associated together in aggregates, in pockets or deposits of highly irregular form and shape. In this form they are pocketed close together, cemented occasionally by crystalline limestone, penetrating and replacing each other and appear therefore in a much contorted and

twisted state. These pockets or aggregates are mostly in connection with each other by chains of small sized crystals and in the adjacent rock we find very often a large amount of crystals distributed. In following these chains many valuable discoveries of large mica masses have been made in considerable depth. The third kind of occurrence, and which is the most important from a mining point of view, is the veinlike occurrence. We hardly can say that the mica occurs in veins itself as it is for the most part an intimate connection of pockets and larger masses of mica crystals. These deposits resemble each other in many respects. Their general outline is approximately lenticular, as can be seen from surface indications and vertical sections in considerable depth. Veins of this class are found traversing all the strata, they are most frequently vertical in attitude and cut the bed in nearly every direction. They exhibit within certain limits great variations in their geological character not only in different deposits, but in different parts of the same deposits. While some consist of nearly pure mica crystals, others will be found to be characterized by an admixture of grains or small pockets of apatite, pyroxene, feldspar or carbonate of lime either alone or variously associated and sometimes in such quantities as to make up large portions of mica deposits. We observe occasionally a certain regularity in the veinlike deposits as far as the mica itself, the width and the horizontal extensions, but this fact is to be considered as seldom. On lot 15 in the 11th range of Templeton, there were on the surface two veinlike deposits, with small contorted crystals in a distance of about 10 feet, the walls being parallel, in width from two to four feet; the same were tested by a shaft and in a depth of 15 feet those two bodies came together, forming a single vein of eight feet wide and crossing the whole size of the shaft; this vein continued most regularly in the shaft and in about 25 feet a large phosphatic body was struck, the veins split up and the crystals being distributed over the whole body; the same were large sized and most regular in their structure, yielding a great amount of flat sheets. Mica crystals frequently line drusy cavities in fissures; they preserve in this mode their sharpness of outline, and are for the most part not contorted. Their regularity and frequently large dimensions serve to distinguish them from the crystals of the other mode of occurrence.

Taking all observations together, we must say that we have a great variety of occurrence of mica deposits. We find in one and the same belt very frequently all different modes, as single imbedded crystals, as aggregates and as pockets and veins and it is difficult to say which mode of occurrence is a characteristic feature for one or the other pyroxene belt. We see for instance in Lot 15, Range 8, Templeton, all kinds of deposits represented; we find in an open cut in a mountain ridge well defined single crystals, aggregates of crystals, veinlike deposits, some of them being of elliptical section. For the most part however we can say that the mica deposits occur as lenticular masses, frequently interrupted by the country rock.

On account of the great irregularity and the variation of occurrence, surface indications are not sufficient to give a judgment about the value of mica deposits, as many of them prove of superficial character; they have to be opened up and in considerable extent developed, especially in depth in order to gain a knowledge of their nature. In many cases we find that the soil contains a considerable amount of mica crystals, but there is no leading feature to determine with certainty that also the underlying rock likely contains mica deposits. This has been observed in several places especially on mountain slopes and is due to the weathering process in nature and action of water-streams, which in course of time excavate the superficial deposits and place laminae of crystals in lower levels. Further we notice that the mica appears in a much contorted and twisted state in a much shattered rock, sometimes in very large extent. Such deposits cannot be considered as worthless, as we know that all rocks are constantly undergoing decomposition and decay; in these cases sufficient development to the depth must be made in order to gain a knowledge of the conditions in the sound rock and we observe that deposits with contorted mineral on the surface have proved in many cases very valuable in lower levels.

As for the conditions of the deposits in the depth we have to refer here to the investigations made by different mines in the district of Wakefield. In the latter mica mines valuable deposits have been found in a depth of 150 till 250 feet, of the same nature as described above and these investigations have shown that in nearly all cases there is a leading connection between the lenticular and veinlike deposits. And with regard to the genesis of those deposits we can state that the nature of the latter in the depth must be the same as observed in higher levels.

Concerning the quality of the amber mica it has been stated by experts that it is well adapted for all purposes, which mica of foreign countries has been used for lithography; it has a yellowish color with pearly metallic lustre. Chemical analyses have shown that the darker mica contains more iron than the lighter colors, and it may be that this has an influence upon the uses of the darker species for electrical purposes. The regular, well defined, six sided crystals are for the most part obtained from cavities, while the crystals from aggregates or large sized pockets do not prove as valuable for commercial purposes, in being much contorted. The minerals of the pyroxene group, which sometimes occur in mica, in the form of plates of calcite or quartz, or flakes of plumbago. In one case a well defined crystal of apatite was found imbedded in a mica crystal, which had evidently crystallized around it.

On account of the irregular distribution of the deposits and the shattered and contorted condition of the mica itself it is evident that the bulk of rock and waste mica, necessary in order to obtain one ton of merchantable mica is great and with regard to the varied methods adopted in the different mines it is difficult to get reliable details, so as to make out the exact average cost of production of the several kinds of mica. As for the prices of cut mica in the run of mine, the figures obtained differ greatly; in one mine there were cut out 5,500 lbs. mica.

50 lbs., 4 x 6 inches and higher
125 lbs., 3 x 5 " "
1,500 lbs., 2 x 3 " "
or altogether about 30 per cent.

The Industrial Uses of Mica.

MR. B. T. A. BELL.—During the past three months, as most of you know, I have had my hands more than full, and I would therefore crave indulgence if the bald and unpretentious notes which I now submit fall far short of the requirements of a paper dealing with a subject of so much interest and importance. I have simply noted roughcast from such sources as were at hand, a few features of the mica industry which I have thought might be useful in supplementing the information gathered today by the other members. In doing so it may not be out of place, considering the importance of our market in the United States to glance briefly at the outset at the mica mining industry of that country.

Occurrence in United States.—The localities at which mica occurs in an available form are not numerous and its production has been confined to the States of North Carolina, New Hampshire, Virginia and South Dakota. It is also known to occur in Wyoming and Washington but no development has taken place.

Mica Mining in North Carolina.—In North Carolina the mineral has been mined since 1868. In the fall of 1867 "says Mr. W. B. Phillips" (Mineral Statistics, U.S.A., 1885). "General Clingman was told by a New York dealer in mica that a good quality was then so scarce that he had been obliged to pay as much as \$8.00 per pound for some small sheets. This induced the General to institute a search for good mica in North Carolina. He began work in the fall of 1867, or early in 1868, and from Cleveland county obtained several barrels of good mica which he sent to New York. A little work was done in Rutherford and Burke counties, but with no satisfactory results. Having an intimate knowledge of Mitchell and Vance counties, he decided to prospect there. In his own words "I selected as the best points for work the Ray mine, Vance county, the Silver mine, and Buchanan mines in Mitchell county. It was my singular good fortune to choose the very best of the three mines that have since been found most valuable." General Clingman then returned to New York and made an agreement with Messrs. Sloan & Mendon, of Liberty Street, to engage in the mica business together, and Mr. Mendon came out to North Carolina and visited the Ray mine. Not being much impressed with the outlook however, he returned home, and shortly afterwards, together with Mr. Sloan abandoned the enterprise. General Clingman carried on the work alone at the Silver mine, and got out several hundred pounds of mica. Being obliged to leave in order to attend to some more pressing business, he instructed his foreman to collect all the mica and store it away. This however was not done, and several large blocks were left on the ground. A stock driver passing that way with his wagon picked up one of these and carried it to Knoxville, Tenn. There it was seen by Mr. J. G. Heap, of the firm of Heap & Clapp, dealers in stoves and tinware, who at once recognized its value. Disposing of their business they went at once to Mitchell county and began mica mining. This was in 1869. For several years they conducted a very profitable business, realizing for some of the mica, as much as \$1 per lb. For some years the business was carried on quietly.

Mica Production in United States.—Prof. W. C. Kerr, (Min. Res. U.S.A., 1882), estimated that the production to the end of 1881 was 400,000 pounds valued at \$800,000. In 1887 it was estimated that the total value of the production in North Carolina from 1868 to 1887 amounted to 762,400 lbs. of a total value \$1,608,500. Since then the mica industry has declined. In 1884, it was estimated at \$232,000; in 1886 it had dropped to 6,700 lbs. of a value of \$7,000. The average depth of the mines is quoted by Prof. W. C. Kerr, at 75 feet, only two, the Clarissa, 3 1/2 miles east of Bakersville, Mitchell county, and the Flat Rock in the same neighborhood having attained a depth of between 300 or 400 feet. Nearly all are worked by shafts, vertical or underlie. Steam power until very recently being used very sparingly, most of the hoisting being done by horse-power.

A better idea of the retrospective nature of the mica industry in the United States may be gathered by a comparison of the United States Census Statistics. In 1880 there were in that country 78 mica mines, 71 of these being in North Carolina; of these 78, 22 were worked, 17 of them in North Carolina. The invested capital was \$337,900, \$6,900 being in North Carolina; total number of hands employed 272, in North Carolina 177; total paid in wages \$65,500; total production \$1,669 lbs., valued at \$127,825; North Carolina producing 42,669 pounds valued at \$17,575.

In 1880 only a small number of mines were operated, and few of these were worked steadily. Of a total product of 49,500 pounds of cut mica, valued at \$50,000, and 196 short tons of scrap, valued at \$2,450, one mine