

**THE CHAIRMAN**—Mr. Peterson's motion is as follows "Resolved that section (b) be not now considered, but that the same be referred to a committee to report at once whether any limitations are desirable to said clause, and if so, what."

The motion passed and the following gentlemen were appointed the committee: Messrs Pearson, Dick, Archibald, Gilpin and Willis.

The committee withdrew to draw up a report.

Paragraph 3, comprising sections 3 and 4 was then passed.

**THE CHAIRMAN**—The next paragraph relates to ordinary members and is as follows: "Any gentleman interested in the Canadian mining industry who may not be a member of the societies in the federation is eligible for election as an ordinary member."

Ordinary members shall be elected by council and will pay an annual subscription of ten dollars."

**MR. STUART**—I should decidedly object to that clause. Any member should be required to obtain his membership through one or the other of the existing societies. I move that it be struck out.

**MR. WYLDE**—I second the motion.

**MR. MORROW**—There might be mining men in New Brunswick who would like to obtain the Journal, and it might not be convenient for them to join either one of the societies.

**MR. WYLDE**—They are eligible to ours now, and it would not cost them more, and they would get greater privileges.

The motion was then put and passed.

**THE CHAIRMAN**—Paragraph 5 is as follows: "The affairs and business of the Institute shall be managed and controlled by a Council consisting of the Presidents of the societies in the Federation and one member to be elected annually by each society. The Council shall elect a Chairman and a Secretary-Treasurer each year."

**MR. POOLE**—I move that the different societies have one representative for every forty of its members in addition to the President of the society.

**MR. FERGIE**—I second the motion.

**MR. GULF**—I fail to see why we should care whether they have the control or not. If the object is merely to publish the reports in combined form, we need not care whether they have four thousand members.

**THE CHAIRMAN**—As a matter of fact the Society is not committed yet to federation. We say we are willing to federate if the scheme commends itself to us in its details. In connection with representation, the Ontario society is not on the same par with Quebec. The members of the Ontario society only pay two dollars per year. Mr. Klein proposes, therefore, that the representation be based on so much annual subscription. On the basis of per capita representation they would have two members and a half. On the basis of money representation they would only have one member.

**MR. POOLE**—The vote could be to some extent controlled by providing that all members having votes respecting the constitution and by-laws should pay an equal fee.

**THE CHAIRMAN**—Mr. Chas. Archibald the chairman of the committee appointed to revise sub-section (b) of the second paragraph, presents the following report:

"Your committee having considered the construction of clause (b) beg to report that the same be adopted with the following proviso added thereto, viz—"Provided that nothing in this clause shall be construed as conferring jurisdiction of power to act with reference to any matter or thing affecting the said mineral industries or any of them unless thereto requested by a majority of the members of one or more of the societies associated in such federation."

The report was on motion adopted.

**THE CHAIRMAN**—(reading paragraph 5 section 6.) There is a motion to amend that so that it will read—"The Presidents and one member for every forty members of each society."

**MR. POOLE**—It was found necessary when the federation was made in England that there should be some uniform lines in order to put members on an equal footing, and the fees were made identical. Ontario should raise the membership fee to \$10.00.

**MR. WILLIS**—How would it be if there were ninety or one hundred members. Would there be one representative for the members over the eighty?

**THE CHAIRMAN**—I would suggest this view might be met by altering the amendment to "every forty members and fraction thereof."

**MR. AUSTEN**—The thought has struck me when I heard Mr. Poole suggesting that the Ontario society should be asked to raise their fees to \$10.00 that they could say to us "We find that two dollars is full and sufficient to pay all the bills we propose to contract". I don't know whether it is correct for one society to ask another to raise its fee to \$10.00 because it finds a \$10.00 fee to be just sufficient. I would suggest that the President and one from each society be the Council and do whatever little business is to be done, then the Nova Scotia Society would have equal representation with any other. I think the paragraph reads fairly at present.

**MR. WILLIS**—I will incorporate my motion with that of Mr. Poole.

**THE CHAIRMAN**—The following is the amendment proposed by Mr. Poole, seconded by Mr. Fergie "and one member for every forty full members of each federated society and fraction thereof."

"The qualification for full membership as specified above shall be an annual fee of ten dollars."

"Nothing in this clause shall prevent the various Societies from having other classes of members paying other rates or fees." This amendment passed.

**THE CHAIRMAN**—The next paragraph reads "The Council shall elect a Chairman and a Secretary-Treasurer each year."

**MR. WILLIS**—I beg to move the following in amendment:—

That the Council elect a Chairman each year, and that the office of Secretary-Treasurer shall be an honorary one, and that this officer shall be elected by the individual votes of the members of each of the Societies in the Federation. This was seconded by Mr. Hayward and carried.

**MR. POOLE**—I move that the following words in Section 8 "shall be appointed by, and his salary if any, shall be determined by the Council" be struck out, and the rest of the clause retained.

This was seconded by Mr. Andrews and passed.

Sections 9 and 10 were then, on motion, passed.

**THE CHAIRMAN**—Section 11 reads as follows: "The accounts of the Treasurer and the financial statement for the year shall be audited by two members of the Institute. The auditors shall be elected at the Annual General Meeting."

**MR. STUART**—I would suggest that the auditors be one from each Society.

**THE CHAIRMAN**—I take it that the accounts shall be audited at the annual general meeting, and the auditors would be elected then.

The clause passed.

**THE CHAIRMAN**—The next section, 12, provides for an annual subscription not to exceed \$150.00.

**MR. POOLE**—I don't like the last part. If the papers are illustrated they could not be got out for that. I prefer a per capita tax. I move that that clause be amended to read "not to exceed \$3.00 per capita" in lieu of \$150.00.

This motion was seconded by Mr. Stuart and passed.

Section 13 was struck out as the subject matter was embraced in a previous amendment.

**THE CHAIRMAN**—The next section provides for the Annual General Meeting to be held each year in the month of July at such time and place as the Council may determine.

The clause passed.

Paragraph 8, respecting publications was then read.

**MR. POOLE**—I would not allow the Council the privilege of distributing free copies. I would allow a certain number also to the authors.

**MR. DICK**—There is no provision for exchanges. I move that one copy be allowed to each member, twenty to the authors, and that the balance be sold by the Council.

This motion was seconded by Mr. Austen and passed.

**MR. MATHESON**—In regard to exchanges I move that the following be incorporated with the 15th section—"That copies of the Transactions sent for exchange shall be accompanied with a request for a copy of such exchange for each Society in the Federation." Seconded by Mr. Fergie, and passed.

Section 16 was also approved.

**THE CHAIRMAN**—The last section reads:—"The Council may accept communications from persons who are not members of the Institute and allow them to be published." We may desire to have papers from members of the Geological Survey, or from members of McGill and other Universities. It is simply a permissive clause. The clause passed.

**MR. POOLE**—I move that the scheme as amended be forwarded by the Secretary to the two other Societies as the basis upon which the Mining Society of Nova Scotia will enter the federation.

**MR. WILSON**—I second the motion. Passed.

#### COMMITTEE ON MINING LEGISLATION.

**MR. B. C. WILSON**—seconded by Mr. Willis moved the following:—

"Resolved that the President is hereby empowered to nominate a committee of five members of this Society to take into consideration legislation affecting the mining industry of this province and to secure such modifications and changes therein as may be desirable in the best interests of such industry." Passed.

The Chairman thereupon nominated the following committee:—Messrs. Poole, Drysdale, Stuart, Pearson and B. C. Wilson.

(To be Continued.)

#### Gold Milling—The Vibration of Stamp-Stems.\*

Philip Argall, Denver, Col. (communication to the Secretary): Dr Raymond claims (*Trans.* xliii., 560), that my statement (p. 559) regarding the crystallization of iron "is beyond question incorrect." He says: "It is not even settled that vibration will crystallize iron under any conditions." While admitting that authorities differ on the possibility of cold crystallization of iron, I believe it is a settled and undisputed fact that vibration in the presence of heat will crystallize iron. Bloxam and Huntington say: (1) "Vibration assists in converting fibrous material (iron) back into a crystalline state when heated, a lower temperature sufficing than in the absence of vibration." Mr. A. F. Hill, (2) summing up a very exhaustive review upon the crystallization of iron and steel, pronounces against crystallization, but only at temperature below 900° F. Mr. Howe, (3) discussing the breakage of a 20 foot porter bar with a crystalline fracture, suggests that it was attributable to heat, jointly with the jar. We see, then, that vibration of heated iron bars will induce crystallization, and consequent change of structure.

Referring to my statement, I wish to point out, that I was discussing the vibration of stamps and should have said, "vibration under all such conditions," etc. That is, vibration attended with sharp blows, such as a stamp-stem is subjected to, will crystallize iron; yet I believe that intense vibration under any condition will eventually crystallize iron. It is only a function of time, a very long time, perhaps, when the vibration is unaccompanied by shocks or blows.

I am not aware that any law of modern physics, or of the molecular theory of matter, would be violated by the assumed rearrangement of molecules in a viscous solid, such as iron, at ordinary temperatures. We must admit that the molecules are in motion, and that any force capable of increasing the amplitude of their vibrations may induce a change of structure. What is electrolysis but the direction, by means of an electric current, of the movement of molecules in the electrolyte to form new bodies? We have seen that vibration of hot iron bars induces crystallization at temperatures far below plasticity; so that it can be understood, that at ordinary temperatures, where the molecular motion is comparatively slow, the vibration must either be intense or long continued, in order to cause crystallization. Dr. Barus (4) has shown that "the chemical equilibrium of a solid changes with each change of strain." Osmond (5) claims that strain more or less completely converts cold metals from one definite molecular condition to another. Warburg and Ewing (5) have proved that hysteresis is not only associated with mechanical stress but may also be induced by magnetic stress, while the experiments of Rowland and Bell (5) prove that magnetic iron is more electronegative than unmagnetic iron. From which Barus infers that this phenomenon is to be interpreted as directly evidencing "a chemical difference between magnetic and unmagnetic iron."

It has also been proven by Dr. Barus (6) that, "even at temperatures slightly above mean atmospheric, the molecular configuration of glass-hard steel is always in a state of incipient change." He says:

"During the last three years I have been making experiments on the secular annealing of cold hard steel. The results are very striking, and show that mean atmospheric temperature acting on freshly quenched steel for a period of years produces a diminution of hardness nearly equal to that of 100° C. acting for a period of hours. I examined some twenty rods, the specific resistance of which, within thirty-seven months, has fallen from 46.5 to 42.5 in the case of thin rods (diameter 0.08 c.m.) and from 43.7 to 35.4 in the case of thicker rods (diameter 0.13 c.m.)."

It is true that these quotations do not support a crystallization theory for iron but they do prove that the molecular structure of iron can and does change under different physical conditions and at atmospheric temperatures. This conceded, the possibility of cold crystallization of iron becomes apparent, the "current fable" and the "myth" to the contrary notwithstanding.

Apart from the abstract theory, however, we have practical experience on the one hand and two sets of theorists on the other, from which conclusions may be drawn.

The cold crystallization of iron is a subject that has long been agitated and never satisfactorily settled. It is true, some eminent authorities have at various times settled the matter to their own satisfaction, but good, fibrous iron will continue to break with

\* A continuation of the discussion arising in connection with Mr. Rickard's paper on "The Limitations of the Cold Stamp-Mill," *Trans. American Institute of Mining Engineers, Bridgeport meeting, October, 1894.*