Mill Of The Future...

Continued from Page Seventeen

number of minerals and possibly the fundamentals in various industries.

EFFECT ON ECONOMICS AND SOURCES OF RAW MATERIALS

A number of industries that it will affect in various respects are as follows.

ALUMINUM INDUSTRY

The combined magnetic and flotation process will probably have two major effects on the aluminum industry as a whole. Although the natural minerals of aluminum form the largest part of the earth's crust, the aluminum industry is limited to but few sources. The reason for this is that the major host rock material affecting the final purity of the aluminum metal produced is silica. For this reason, and the limitations of the currently used process, the silica in the raw ore as mined for processing is limited to approximately 8%. This limitation means that extremely high grade deposits are necessary and are found at the present time in major quantities only in Jamaica, British Guyana, Australia and West Africa. Minor deposits exist in France and Greece. Data already available strongly indicates that effective separation of the silica from the alumina is now practical and economically possible. This, in effect, will mean that the aluminum companies can use the much lower grade deposits which are available on this continent.

A second and equally important factor is in changing of the present processing of the aluminum ores. The single most expensive step in the processing of the present aluminum ores is the leaching process prior to refining of the aluminum ore to remove the silica. All of the major aluminum companies have been working on processes for direct reduction of the ore to aluminum metal eliminating this costly step. One of the major stumbling blocks to economic success has been the high silica impurity, even at the limitation of 8%. With the removal of what I would expect to be in excess of 95% of the silica from the original ore, there is an excellent possibility that direct reduction will be a success and a major economic factor in reducing the current cost of producing aluminum metal.

CEMENT INDUSTRY

At the present time, the location of a cement plant has been pretty well dictated by the location of high grade limestone deposits. The reason for this is the question of balancing the freight rates of the raw material versus the freight rates of the finished product to the user market. As it takes approximately 1½ tons of raw material to produce one ton of cement, the tendency has been to locate the cement plant at the source of raw material.

The major impurity in the raw material is silica and the limiting factor of working a deposit for cement is a maximum of 15% silica in the deposit. With the new combination of the concentration processes, near perfect separation of the limestone from the silica will be possible. This will result in the movement of cement plants to appreciably lower grade deposits close to the market.

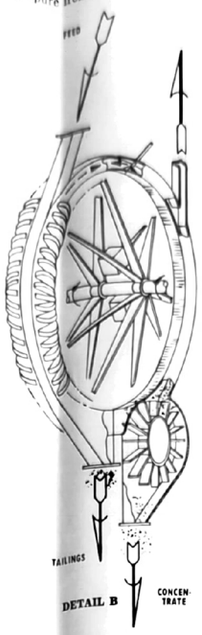
In addition, with the normal variance of limestone to silica ratio in currently worked deposits the quality of the cement has been most difficult to control and results in variations in cement quality from practically all cement plants. By having the tools to separate initially the two minerals and then re-blend them in the exact proportions for optimum cement manufacture, the producer will be able to manufacture a more consistent high quality cement than has been heretofore possible.

Probably the second major development in this field will be the elimination of the long kiln and massive grinding circuits that now characterize the final stages of cement production. The kilns will probably be replaced by small vertical furnaces and the final cement product forced out of the furnaces through nozzles to produce the cement at a given controlled size optimum for the maximum quality.

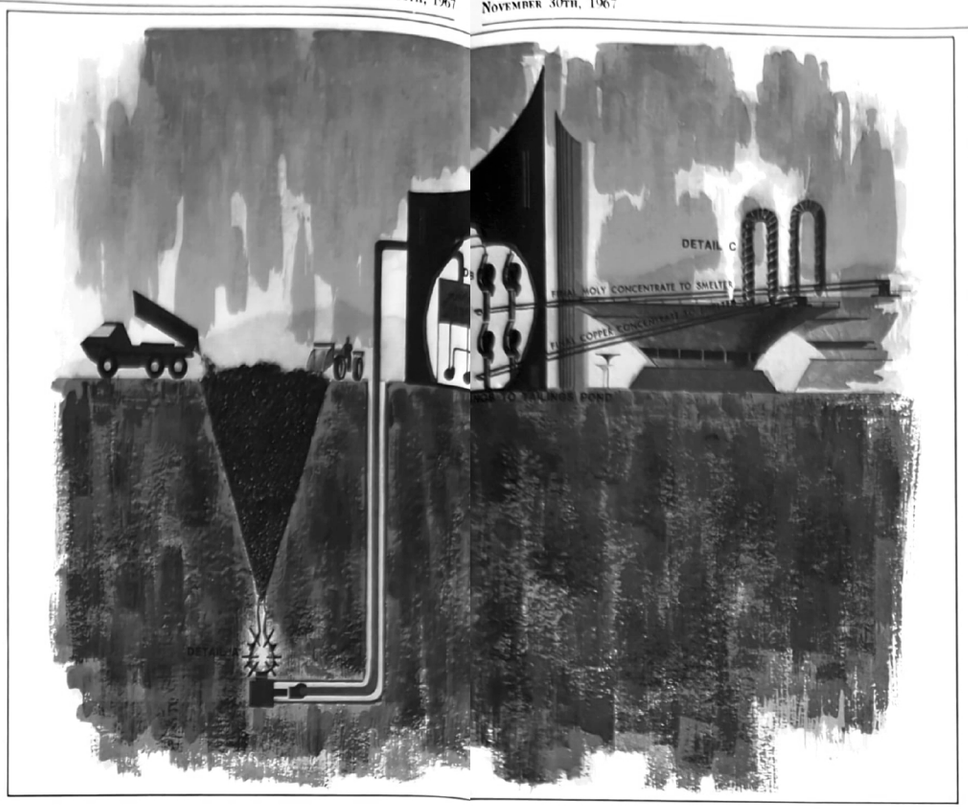
STEEL INDUSTRY

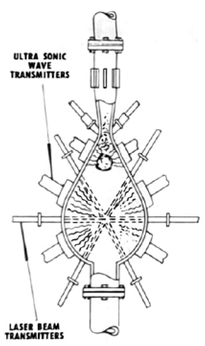
On the North American continent the major part of the iron ore produced is either from magnetic iron or iron in a coarsely crystalline state that can be concentrated by gravity concentration. In excess of 75% of the continent's reserves are in finely disseminated iron minerals, primarily hematite and goethite. Due to the fine crystallization of these minerals it has heretofore been economically impossible to recover the iron units from the various deposits.

With the development of the new processes, as these minerals form not only the bulk of the potential reserves but also tend to be higher in grade than existing mined deposits, the cost of production will be appreciably lower and the final product will be higher in grade, with both factors lowering the current cost of steel. The major part of these deposits occur in the Mesabi Iron Range and the Head of the Lakes, Port Arthur-Fort William area. Within the next decade the concentration of iron ore development will take place in these areas. In addition, both the cost of power and fuel will be cheaper and will probably result in a change-over from current pellet production to direct reduction, with a product that will be in excess of 95% pure iron. Further, the produc-



MAGNETIC CONCENTRATING UNIT





DETAIL A
COMBINED CRUSHING & GRINDING ULTRA SONIC LASER BEAM COMMINUTION UNIT

...As Big As Your Office

tion of iron concentrates carrying less than one-half of 1% in silica will also result in the first major large scale movement from iron concentrates to direct steel production.

URANIUM INDUSTRY

The combination of processes in the uranium industry will have a major impact in the reduction of costs over current conventional circuits. Flotation results to date have not only indicated an overall increase in recovery from the 93% level up to 99%, but have also indicated major reductions in operating costs. The overall benefits are already indicated at a minimum of $1.50 per original ton of ore mined.

These developments will further result in the economic operation of appreciably lower grade deposits than were heretofore considered possible.

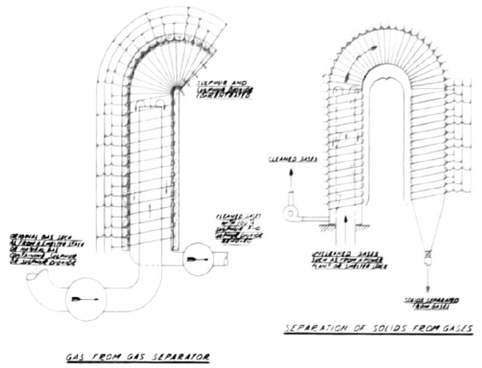
The overall impact of these developments will probably have the greatest effect on the uranium industry in South Africa, placing this country in the position of being the single largest economic potential producer of uranium.

MANGANESE ORES

Manganese is a basic mineral in the steel industry and also has a number of other minor uses in the chemical industry. Approximately 90% of the requirements of the steel industry in the United States and Canada are imported from foreign countries, the major supplier at the present time being South Africa.

There are major low grade manganese deposits in New Brunswick, Vermont, Arkansas and Nevada. Probably the largest tonnage of potential reserves is in the province of New Brunswick. These reserves are indicated to be in excess of 200 million tons.

The combination of the data from the new processes to date indicate that these low grade ores can now be economically treated. In the analysis of the mining and treatment costs on the New Brunswick ores, the cost of producing manganese from these deposits would be approximately one-half of the laid down cost of the South African manganese ores that are now imported. In addition, as the South African manganese ores are naturally mined they vary to a great extent in chemical composition. With the new processes applied to the New Brunswick manganese ores the product produced would be at a consistent chemical analysis which, in itself, would form a premium product over currently imported ores.



DETAIL C

COPPER ORES

On the North American continent there are comparatively large tonnages of low grade copper ores wherein the copper minerals are in a complex mineralogical form and cannot be economically recovered by any present known process. These deposits contain an estimated minimum of a half billion tons of potential ore. From the data to date, using the combination of the new processes, there is an excellent indication that these deposits will be economically workable and in operation within the next few years.

METALLIC OXIDES

There is a group of important raw materials which, with currently known processing means, have a comparatively low percentage of recovery from the original deposits. The major minerals in this category are tin, tungsten, niobium, tantalum and beryllium. The recovery of these minerals is in the range of 55-70%. With the development of the new processes these recoveries will be increased to the range of 92-97% at probably lower operating costs than those of currently used circuits. These developments will probably have a major effect on complex deposits that occur in Canada and also in making available to industry increasing amounts of the various metals that are now in comparatively short supply.

PROSPECTING

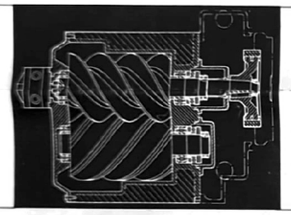
The development of the Laser Beam is probably one of the single most important new tools that will be applied to prospecting. Within the next decade the mining executive will be able to sit in his office in Toronto and completely control the prospecting of an area. An aeroplane will be used with automatic controls and will probably resemble a flying Christmas tree. It will be equipped with a large number of Laser Beams with each Laser Beam having a corresponding light receiver. As the plane is directed over a specific area, each beam will analyze at least one mineral either in the soil or where there is no overburden, in the country rock itself. The light receiver from the individual mineral will automatically record the percentage of the mineral and its exact location. All of the minerals sought after will be thus automatically recorded and fed to a computer. The computer itself will delineate the area of mineralization and thus the ground to be staked.

Probably the largest practical application of Ultra-Sonic Waves will be in their determining the location and horizontal delineation of blind orebodies. Their use will be as both a surface and an underground tool. In using the ultra-sonic wave as a prospecting tool, the ultra-sonic transmitter will create a wave of specific characteristics. As this wave passes through various types of formation, each formation will show specific characteristics in its changes to the wave, thus it will be able to record the type of formation and the change of formation at the exact depth. With such concrete data we will be able to determine the exact depth and horizontal delineation of a specific orebody which may occur several thousand feet below the surface of the testing point.

Similarly from underground we will be able to pick up the vertical extent of an orebody and its distance from the testing point.

Effective Air/Effective Team

NOW 98% AVAILABILITY Joy Ram Track Drill+Joy RPS 600 Compressor

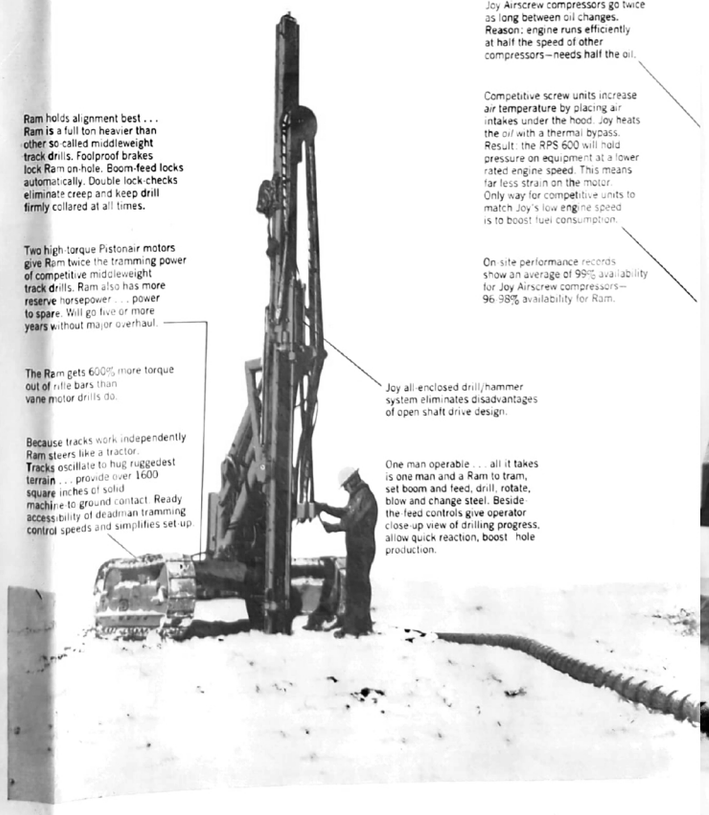


Exclusive direct drive on Joy RPS 600 Portable Airscrew Compressor gives you "Effective Air" . . . maximum output at minimum cost/minimum maintenance. Here's why:

- ☐ fewer parts
- ☐ less maintenance
- ☐ highest reliability
- ☐ greater efficiency
- ☐ longer life

JOY

Joy Manufacturing Company (Canada) Limited, Galt, Ontario.



PYRAMID MINING CO. LTD.
(N. P. L.)

EXAMINING
DEVELOPING
&
FINANCING
MINING
PROPERTIES

SUITE 600 - 890 WEST PENDER STREET
VANCOUVER 1, B.C.

LAKEFIELD RESEARCH
of
CANADA LIMITED

Ore Testing and Mineral Processing Investigations
Ores and Industrial Minerals
Flotation Reagent Evaluation

Custom Analysis and Assaying.

Mineralogical and Petrographic Investigations.

Metallurgical Research: grinding, gravity concentration, magnetic separations, flotation, cyanidation, filtration, roasting, leaching.

Pilot Plant: bulk sampling, autogenous and conventional grinding, flotation, magnetic separation, on a continuous tonnage basis.

Flowsheet Development: from bench scale through pilot plant.
Metallurgical Design Data: in collaboration with engineering consultants.

Laboratories and Pilot Plant: Lakefield, Ontario
Phone 652-3341