CORRESPONDENCE

CENTRIFUGAL COMPRESSORS

To the Editor of The Canadian Mining Journal:—

Sir,—In the issue of Oct. 15th, there appears an article under the head of "Centrifugal Compressors." In the latter part of this article, a comparison is made between centrifugal and reciprocating compressors; but the case of the latter has not been fully presented. In the case of low pressure compressors, or the low pressure cylinder of a multi-stage compressor, where the pressure is about 25 lbs. per sq. in. gauge, and assuming that the machine is of correct design and workmanship for the work it has to do, the clearance will be between 2 and 5 per cent., giving a volumetric efficiency, due to clearance, of from 95 to 98 per cent.

At the end of the stroke the clearance space is filled with air at the compression pressure. This pressure must decrease to atmospheric pressure before any fresh air can be drawn into the cylinder. The expanding air, by its pressure on the piston, returns the power that was used in compressing it; but by preventing the entrance of air from the outside during the interval of expansion it causes a decrease of capacity.

The statement that some designers have attempted to increase the volumetric efficiency, by increasing the velocity of the air at intake, is correct, and it is the regular practice among some of the German manufacturers of gas engines and blowing engines. The air cylinders have Corliss valves, and the air is taken in through a duct or pipe of some length. The air in this pipe undergoes changes in velocity influenced by the variable velocity of the air piston at various points of the stroke. The piston starts with zero velocity, attains maximum velocity at midstroke, and again has zero velocity at the end of the stroke. In the beginning of the suction stroke, there is a tendency to accelerate the column of air moving in the suction pipe, which tends to produce a drop of the pressure below that of the atmosphere during the early portion of the stroke. At some point near midstroke of the compressor the velocity in the suction pipe has attained its maximum, after which a retardation takes place. When the piston has reached the end of the suction stroke, and has stopped, the column of air is still moving, the result being that the pressure of the air in the cylinder rises above that of the atmosphere. If the suction valve can be closed at the moment when this attains its maximum pressure the cylinder will be filled with air at a higher pressure than that of the atmosphere, and thus be enabled to deliver more air than that due to the difference of the piston displacement and the expanded air in the clearance spaces. In other words the volumetric efficiency will be 100 per cent. or higher.

This extra air is not obtained without a corresponding use of power and the cost per cubic foot of air, compressed and delivered from free air at atmospheric pressure and temperature, will be practically the same, whether the compressor has a volumetric efficiency of 95 or of 100 per cent.

A compressor that is designed and built for the economical operation in the particular work it has to do, will hold up its original efficiency during its lifetime with no greater—often less—cost for upkeep than the engine to which it is attached.

There can, however, be no comparison between the above and what may be called the commercial type of compressor, which must be designed and manufactured cheaply, in order to sell at the low price at which they are offered. Each type of compressor has its own field. A guarantee of the capacity in cubic feet of free air at atmospheric pressure and temperature of any compressor at a given speed, should also include the steam consumption for every 100 cu. ft. of free air, that is compressed and delivered, under the specified conditions.

This gives a definite basis for a comparison of the claims made by the different builders of compressors, in terms of actual cost of operation, which is much more satisfactory to the intending purchaser than a lot of indefinite and bewildering statements regarding "efficiency." A comparison of the horsepower required for the adiabatic compression of a certain quantity of air with the indicated horse power of the steam end of the compressor when compressing the stated quantity of air will show the total, or over all "efficiency" of the compression. In a compressor driven by an electric motor the power imparted to the motor can be compared to the power required for adiabatic compression of the given amount of air, to show the over-all "efficiency."

Yours, etc.,

Hamilton, Ont., Nov. 26, 1914. A. WILLCOCKS.

ORIGIN OF THE ROCKY MOUNTAINS.

On the evening of November 3, at Nelson, British Columbia, Mr. Stuart J, Schofield, of the Geological Survey of Canada, gave an address before the local University Club and others interested, on the subject of the Origin of the Rocky mountains. The Nelson "Daily News" published a brief synopsis of the address, as follows:

"Mr. Schofield began by placing on the blackboard an outline of the geological timetable from the pre-Cambrian down to recent times and referred the several divisions of the great Cordillera to this as he proceeded with his address.

"The pre-Cambrian nucleus of the mountain system of the Province was, he said, a rolling body of land near the Columbia valley. Bordering this to the east was a shallow sea stretching far across the region now occupied by Eastern British Columbia and the plains. In this sea the sediments from the ancient land were laid down. Long afterwards in Jurassic times the sediments of this sea were elevated in great folds to form the Selkirk and Purcell mountains. The shore line of the great shallow sea then lay near the great trench now occupied by the Kootenay and Columbia rivers. Still again erosion of these great ranges provided further sediments, which in Cretaceous times were crushed and folded upward to produce the Rocky mountains.

"The upfolding of a mountain chain gives rise to streams that destroy it. The ancient rivers met the shore at right angles, while the folds rose slowly across them; so slowly that in many cases the streams were able to maintain their channels. Such is the nature of the Crowsnest pass. New stream valleys lie between the upfolds, as in the case of the great trench of East Kootenay.

"The finishing touches to the mountain scenery have, he said, been given by ice. Glaciers have produced at the head of the streams countless little basins or cirques occupied by small tarns and bordered by sharp ridges. These are among the features of greatest beauty and charm, the richest reward of the tourist and mountaineer."