THE SINGLE PHASE RAILWAY MOTOR.

It may be of interest to you to learn something of the operation of the single phase motors which we are using at the St. Clair Tunnel; I will, therefore, endeavor, in a few words, to make this plain.

It is our experience with the direct current series motor that if the direction of current in both armature and field be changed, the armature will continue to revolve in the same direction; so, too, with alternating current in the motor and with the armature and field in series, the direction of rotation will not change with reversals of the alternating current and the armature will revolve just as it does with direct current.

So far as the production of mechanical energy is concerned, the action of the motor is practically the same whether direct or alternating current is used, in fact alternating current, as such, is not essential to the operation of these single phase motors; they have been developed so that they operate satisfactorily in spite of certain difficulties inherent in the alternating current, so that they have the proper speed characteristics for railway work.

The direct current series motor may be considered a special case of the more general alternating current motor, for, while the alternating current motor makes an equally successful direct current motor, the reverse is not true. The changes in voltage, load, etc., have corresponding effect on speed and torque in the alternating current motor as similar changes in the direct current motor; the practical operation of the two motors is therefore the same. The alternating current motor is started by lowering the voltage through the medium of auto-transformers and the motors are reversed by inter-changing either the field or armature connections as in the ordinary railway motor.

While, in general, the alternating current series motor works on the same principles as the corresponding direct current motor, several things happen inside of the former by reason of the varying magnetic field produced by the alternating current, that are not found in the direct current motor. The characteristics of the alternating current motor are:

(1) An e.m.f. generated in the armature winding by the alternating magnetic field, in addition to the e.m.f. generated by the rotation of the armature.

(2) A local current generated in the armature coils, short circuited by the brushes due to this e.m.f.

(3) An iron loss occurring in the entire magnetic circuit, due to the alternating magnetic field.