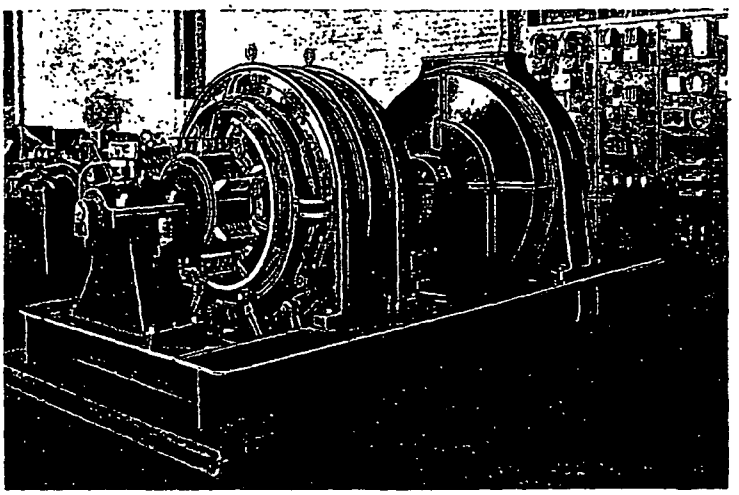

Elliott 500-kw.-a., 480- to 960-r.p.m. inverted motor-generator set supplying power to 87 induction motors for run-out table on a continuous mill. The direct-current end of the unit is a compensated motor.

Compensated Motors and Generators

PAPER PRESENTED BEFORE THE CONVENTION OF THE ASSOCIATION OF IRON AND STEEL ELECTRICAL ENGINEERS IN PITTSBURGH, PA., JUNE 22, 1932

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THE PAST FEW YEARS have witnessed an increasing use of direct-current motors and generators in the steel industry. Reversing and continuous mills are producing a considerable variety of products with speeds and refinements that were considered impossible a few years ago. This greater speed of production and variety of refined products have made it desirable to employ electric drives having considerable flexibility. At the same time, close voltage regulation in generators and close speed regulation in motors are needed. Direct-current motors of the adjustable-speed type have often been selected to insure the necessary flexibility and refinements in speed adjustments in connection with modern high-speed mills. The compensated generator and motor have been very important factors in these developments. This fact, as indicating the general trend, makes it worth while to consider in some detail the characteristics and application of compensated machines.

The direct-current compensated type of machine is wound with a special winding in the pole faces. The method employed is to slot the pole faces and to place a winding about the commutating pole as a center, with a part of the winding distributed in the pole faces. The extra winding necessary to produce a commutating flux is concentrated on the commutating poles located midway between the main poles. This winding is connected in series with the armature winding. In the construction of a machine, the compensating winding is placed as near to the armature winding as possible and arranged in such a manner that they carry load current in opposite directions.

The function of a compensating winding is twofold:

First, to create a commutating field which will vary in exact proportion to the armature current. This variation produces the correct condition for sparkless commutation at all loads.

Second, to prevent the magnetic field produced by the armature conductors when carrying current from distorting and cross-magnetizing on the main shunt field, which action has an important influence upon the performance characteristics of a machine.