

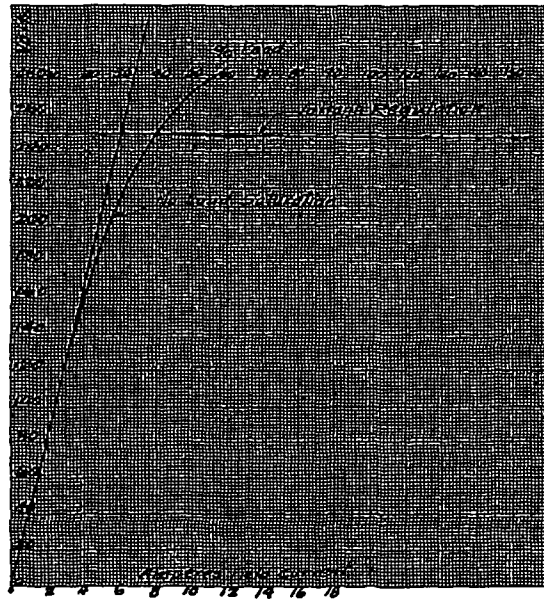


Fig. 5—Voltage regulation curve on an Elliott 1000-hp., 250-volt, 600-r.p.m. compensated generator.

maintaining constant under all speeds as long as the motor armature and field currents remain constant. In mill work it is frequently desirable to speed up the motor beyond its full-field, full-voltage condition. The generator can no longer be depended upon to give this higher motor speed, but by weakening the field of the motor it is easily accomplished. It is quite customary to raise the motor speed as much as 200% in this way. At these increased speeds, the normal capacity of the motor remains at constant horse-power output, inasmuch as the decreasing field and increasing speed balance each other to keep the output constant and the horse power unchanged.

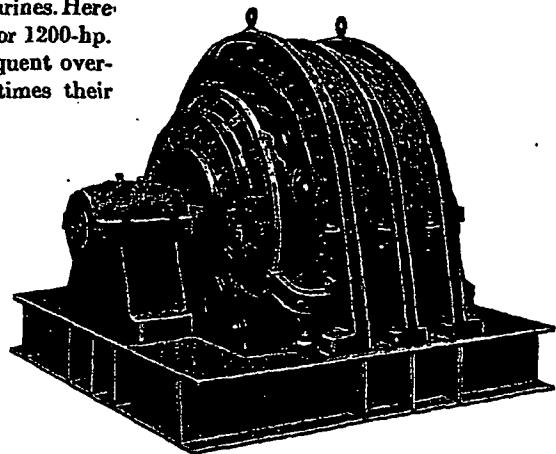
While it is possible to obtain a 3 to 1 speed range on a non-compensated type of motor, such a machine is likely to commutate very badly under heavy overloads with weak fields. Where loads of this kind are to be carried, and

generally where field weakening of the motor is combined with a Ward-Leonard reversing system, it is certainly advisable to use a compensated motor.

The adaptability of the compensated machine is well illustrated by its use for main driving motors on submarines. Here motors of 1000- or 1200-hp. rating carry frequent overloads of three times their normal rating with fields weakened to less than one-third full magnetic strength, for a period of half an hour at a time. Such a load is enormously more difficult to handle than considerably heavier loads for

short periods. This type of motor has been unusually successful in handling these extremely heavy overloads in submarine practice.

As a further explanation, or example, of the ability of the compensated machine to handle severe loads with weak fields,—many years ago a considerable number of storage battery regulating boosters of this type were built and in nearly every case the short peak overload required was enormously high. In one case, the load consisted of unbalanced ore unloaders and the booster furnished for this work was rated at 1800 amperes with a guaranteed peak overload of 9600 amperes for 5 minutes. This machine was tested in the shops of the builders with overloads of 10,000 amperes for periods as long as 10 minutes with successful commutation. The machine had an unusually long life for this class of service, and when inspected after 18 years of use the commutator was as perfect as when first built, and had every appearance of never having been turned or even sandpapered. It is characteristic of storage battery boosters that



Elliott 1000-hp., 600-volt, 800- to 600-r.p.m. compensated direct-current motor for rolling mill drive.