satisfactory motor that can be produced when constant speed is required. Its efficiency is the highest—quite as high as that of direct current motors of equal capacity—while the regulation is perfect. So long as the generator, with which such motor is connected, runs at a uniform speed, the motor must run at a proportional speed, dependent on the ratio of the poles to the alternations, every impulse of the generator advancing the armature of the motor one pole, which can not change its speed any more than if it were mechanically geared to the generator, unless it is overloaded to a point where it is impossible to carry the load, which point is usually about fifty per cent. in excess of the normal capacity of the motor. This is accomplished without the introduction of any lag or power factor, the load being practically non-inductive—like a load of incandescent lamps—provided the proper excitation is maintained. Furthermore, by overexcitation, the synchronous motor may be made to perform the office of a condenser and compensate for lag or inductive load; this can be carried so far as to introduce a negative lag or lead, at the same time raising the electro-motive force of the line.

The drawback to the single-phase synchronous motor, heretofore, has been that it could not be started without some other source of power, and would not carry its load up to speed. This is entirely overcome in the motors here alluded to, which start up under load, and can be specially wound to give much greater torque in starting than in running in synchronism.

This brings us back to the two simple, well-known principles before referred to, which are combined in this motor—the principle of the ordinary alternating-current synchronous motor with that of the direct-current motor or generator. The armature has two distinct windings—one, a distributed winding connected to a commutator, similar to that of a direct-current motor or dynamo, which in this motor is used for starting and afterwards for exciting the fields; the other winding is of the shuttle type, wound so as to concentrate distinct and regularly alternating poles in the armature, and perform the regular work of rotating the motor armature, advancing it from one pole to the next, with each impulse of the generator.

An ordinary double-throw switch on top of the motor is used in starting, there being no resistence or other complicated device, as the self-induction of the windings is sufficient to choke back any abnormal flow of current. In starting, the switch handle is depressed so that the lead wires which conduct the alternating current from the transformer are connected through the switch blades to the contacts which lead the current first to one of the commutator brushes, thence through the distributed armature windings, and out through the opposite brushes to a coarse wire winding on the field poles, and back again to the switch contacts and binding posts, these connections being identical with those of a direct-current series motor. As soon as the current is turned on the motor commences to rotate at a constantly accelerating speed until synchronism is reached, which is indicated by the lighting of a lamp located on the switch at a dull red. This is the signal for the reversal of the double-throw switch, which then changes the connections so that the leads from the transformer are cut off from the commutator, and connected to the collector rings and concentrated armature windings, while at the same instant the commutator brushes are