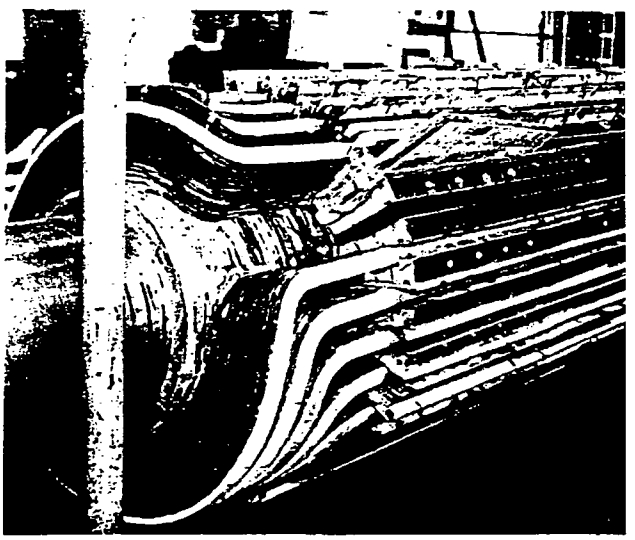
It has been overworked and overblamed. Inadequate materials, improper assembly, and lack of quality control are most often the real offenders. If one goes back to the days of "rags" and opens up any of those 30-year-old coils, he may find that they were literally eaten up with internal corona; but they have been running 30 years. This tell-tale corona was evidenced by unwinding the insulation until you could see white deposits. Still that machine gave a good account of itself for a long time. It is that kind of dependability that is built into these machines. Corona is negligible on the newer type of windings where the presence of air is excluded, as in hydrogen-cooled synchronous condensers or generators.

On spongy types of insulation that are tightly sealed by varnish treatment there may be slight internal corona, but it is limited because sealing excludes oxygen which allows corona to create the acid condition resulting from the presence of corona in air. This, of course, applies to air-cooled machines. Corona makes its appearance usually as a gray-white powder on the surface of the windings. It was first noticed in the slot sections; and back in the days of fibrous and organic materials, the secondary effects of corona—its combination with moisture to form the damaging nitrous or nitric acid—would actually deteriorate in a very short time the linen covering on coils, the varnishes that were used to coat them, as well as the cording which was used to lash in the end windings to give them a support against short-circuit stresses.

Again, the "rich" part of the team came into the foreground with the introduction of glass. Neoprene-treated glass cord is a must in modern windings because it is unaffected by any of the elements to which a winding is subjected. We say neoprene-treated—some people use other treatments—but neoprene treatment has been found to insulate the glass fibers from each other sufficiently well so that there is no abrasion; glass is still glass. The degree of abrasion is dependent upon the size of the filaments from which the glass product is made. Some corona may appear in the end windings, and the amount of corona-eliminating materials built onto the surface of the stator coil depends upon design features of the particular manufacturer. We say this because proper spacing of end winding parts is more essential than protective coatings. The corona stress is highly cumulative right at the edge of the iron, and diminishes progressively the first several inches beyond the end of the stack to a point where it is hardly noticeable and is usually a surface condition. So far, modern insulation has not been attacked to the point of failure through mica. You can get concentrated bombardment on a test set-up where a mica flake will be pitted, but modern in-

Turbo-generator rotor in process of winding; the mica slot insulation is being installed. Coils are of edge-wound copper strap, top sections reinforced for better mechanical and electrical qualities.



Photograph reproduced below shows the wound stator of a 40,000-kva, 13,800-volt hydrogen-cooled synchronous condenser.

