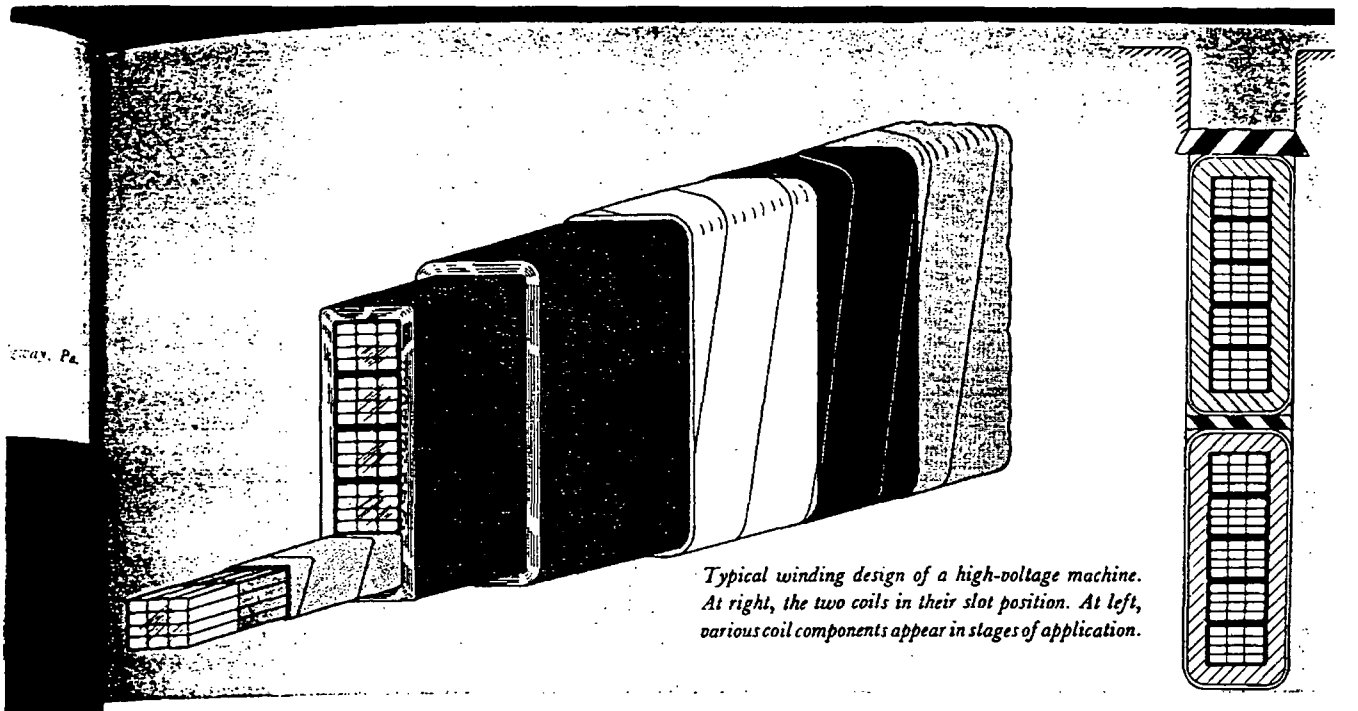

Typical winding design of a high-voltage machine. At right, the two coils in their slot position. At left, various coil components appear in stages of application.

to be overcome. Some made an about-face and applied mica tape along with vacuum and pressure impregnation with an asphalt, emphasizing the importance of not only the selection of material, but also the proper processing. An asphalt that is good enough to fill the fibers of cotton or asbestos in the internal part of a coil (as was done early in this century) may not be, and usually is not, suitable for application to the main high-voltage insulation. This improper selection of a suitable impregnant has caused some manufacturers considerable difficulty and field expense, because it has been proved that straight asphalts, so called, are not adequate and have not sufficient flexibility for the type of operation encountered.

In high-voltage coils, we have a number of turns, or conductors. Any piece of copper is known as a conductor, but in the design engineer's "lingo," a conductor and a turn are synonymous. A conductor consisting of a number of parallel wires or strands combined is a turn.

About the year 1940 the transition from "rags to riches" really began to unfold with the advent of glass as an insulating material. Flexible glass, which is taken for granted today, was a boon to the insulation designer. The use of glass-insulated strands within conductors not only gave better thermal insulation, but also a better space factor. It gave the designer a chance to pack more kilowatts into a given machine. As applied in the high-voltage machines this glass is only good as a spacer. It only replaces cotton thermally and has no superior dielectric strength, so that mica must be placed on the turns. Even today there is no better high-voltage insulation than mica.

After placing mica on the turns, the next step is to prepare the coil so that it is ready for application of the main high-voltage insulation. That preparation consists of molding the coil by treating it with a synthetic resin which polymerizes—that is, turns from a liquid to a solid, and does not soften upon any subsequent heating. It has made a chemical change such as you find with concrete. The coil, once molded to a predetermined size, is ready for the main insulation. Because of the shape of the coils, this molding is only accomplished in the slot portion and slightly beyond, in what is known as the straight portions of the coil. The same sort of treatment is impossible on the end-turns because of their shape.

At this point the coils have been prepared for the main mica insulation. This insulation is in the form of continuous layers and is known as Black Bond mica tape, a special

Turbo-generator stator coils are here being molded to size by heat and pressure.

PAC