

Transmission-Line Insulation.—Two widely different types of porcelain transmission-line insulators are in common use, viz., the pin type, generally used for voltages up to 66,000, and the suspension type for voltages from 66,000 to 220,000. Each suspension unit has a length of about five inches and, as ten or more units may be combined, the tendency of voltage to concentrate on the units nearest to the line is sometimes reduced by the use of grading shields. These shields, in addition to providing a comparatively uniform voltage distribution over the insulator, also tend to reduce damage from 'arcing' in the case of flashover across the insulators from lightning or other causes. Additional protection from lightning is sometimes provided by the use of overhead ground wires, i.e., by one or more wires placed above the current-carrying wires and connected to the ground at frequent intervals. Lightning arresters are also sometimes connected between the line and ground for the protection of the line and transformers.

The Merchandising of Power.

Three main types of service are provided by central electric stations, i.e., by organizations engaged in the sale of electricity. The first is the supplying of primary firm power, the highest type of service and commanding the highest price. This power is available to the consumer at uniform voltage, up to the amount of his contract, twenty-four hours per day. In general its cost varies from about \$10 per horse-power year to large users under long-term contracts and close to the point of generation to say \$50 per horse-power year to consumers of small blocks, on shorter contracts, and/or at greater transmission distances.

The second class of service is the supplying of primary interruptible power, i.e., power sold subject to certain limitations as to continuity of supply. Organizations selling electricity must install sufficient equipment to meet the maximum or peak demand of the firm-power customers. A market for power that can be produced in off-peak periods—times when the power customers are taking less than their maximum contract amounts—is found in the sale of primary interruptible power. Large industrial users, able to adjust their power requirements under special circumstances, purchase this power at considerable reductions from the cost of firm power.

The third class of service is the supplying of secondary or 'at will' power. The amount of such power that can be supplied at any time is indefinite and service is not guaranteed. Service can be discontinued at any time without notice to the customer. The price range for such service is quite wide, much of it being supplied at very low rates, in some cases as low as \$2 per horse-power year. The power is used where conditions will not permit the use of high-cost power. Much of it is used by the pulp and paper industry for steam generation. Steam cannot be produced by electricity in direct competition with coal except where surplus or off-peak power can be purchased at low rates, but in times of industrial depression, when much central-station equipment would be operating below capacity, a market is found for its output by selling it for steam generation at low rates. During 1938, 32 p.c. of the total output of central stations was used by the pulp and paper industry, almost half of which was secondary power for boilers.

Much of the continued growth in the consumption of central electric station power is due to the merchandising and educational campaigns of the electrical utility organizations. This is particularly the case in regard to domestic consumption.