

Interesting Phases in
Manufacture of
D & W Fuses

PRACTICALLY everyone uses the same ingredients in the making of bread, yet one is forced to admit that the final results obtained by various individuals vary widely. The manufacture of enclosed fuses could by no stretch of the imagination come under the head of domestic science, yet the parallel between the two is by no means a remote one. All makers of enclosed fuses, on certain capacities, use fibre tubes, metal caps, zinc links, filling material and various other elements in the manufacture of their goods, but when one compares the finished products one finds them quite unlike in appearance and operation.

By describing in a general way some of the methods used by the D & W Fuse Company, of Providence, R. I., in the manufacture of enclosed fuses it is hoped that the reader may gain a basis of comparison, together with a better appreciation of just what "D & W" stands for in the matter of quality.

Standing out most prominently as an essential part of an enclosed fuse is the link, or fusible portion. Upon this element rests the important duty of accurately opening the circuit without rupture of the enclosing tube. To effect exactness in the operation of the link, thousands of experiments have been made to ascertain the proper distribution of metal as well as its exact shape and thickness. An error of ten thousandths of an inch on fuses of some capacities would result in an inaccuracy of rating. To reduce to a minimum errors of this kind the commercial zinc sheets out of which the links are stamped are rerolled by an expert, thereby insuring precision of measurements and uniformity of product.

Of the several varieties of links employed in the manufacture of "D & W" fuses, two or three are particularly interesting and deserve special mention. In the National Code line, up to and including 15 amperes, the so-called air



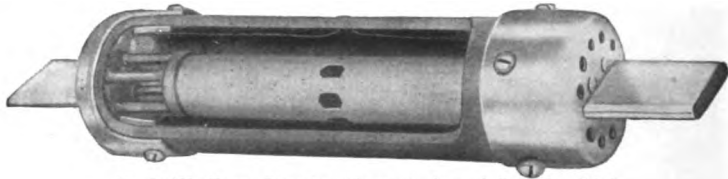
Manufacturing Plant of the D & W Fuse Company, Providence, R. I.

drum construction is used. By preserving an air space around the center of the link, by means of a capsule, the heat conducted through this confined air is slow. The temperature of that portion of the link naturally rises very rapidly and bears a definite relation to the current value, rendering the blowing point of any given overload practically constant, whether the fuse is blown cold or after running at its full load temperature.

In fuses of larger capacities, where greater quantities of metal are needed

material must be tamped to an exact degree of tightness, otherwise the accuracy of the fuse is impaired to some extent. Great care is, therefore, exercised that each "D & W" fuse is loaded uniformly.

During the process of construction each fuse is subjected to numerous tests of a mechanical, as well as of an electrical nature. To insure perfect alignment and exact dimensions the fuse is gauged during the various steps in its making, as well as a final rigid inspection of the finished article. To further reduce to a minimum the chance of an



D & W Fuse, Showing Construction of Cylinder Link

to carry the current, the links are either sub-divided into many strips or formed into cylinders. By this means greater radiating surface is secured which reduces the amount of heat generated, and rapidly dissipates the metal vapor formed in blowing.

These ingenious methods to secure accuracy would, however, go for naught if the union of the link and its proper terminal were imperfectly made. As a positive safeguard against this difficulty arising, the connection is strongly riveted as well as soldered.

The powder used as a filling material around the link is important, since it must be loaded into the shell in a certain way as well as possess certain marked characteristics. It is of utmost consequence that the powder shall not attack or corrode the link in any manner, since that would reduce its carrying capacity. Furthermore, it must be practically free from moisture when loaded into the fuse case, and in addition it must absorb no dampness while the fuse is in service. Should any moisture be present at the time of blowing, the intense heat of the arc would convert it into steam and thereby develop a dangerous pressure inside the fuse case.

Odd as it may seem the filling ma-

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The rugged, pleasing appearance of "D & W" fuses is the result of careful, intelligent assembling of the grade parts. The fibre tubes are heavy and are carefully selected as to quality and appearance. All metal pieces are strong and generous in weight. Machine screws, ample both in number and size, are employed to secure the caps to the tube and finally by use of templets and jigs all these are assembled into a product as near uniform and perfect as is possible to make.

"D & W" fuses have met with such success that it is little wonder that the growth of the company has been remarkable. The plant at its beginning, in 1896, consisted of a working force of one boy beside the inventor, with an output of one or two dozen fuses per day. The entire plant then consisted of 320 sq. ft. Now the factories include about 100,000 sq. ft. of space, with 350 to 400 employees, who turn out many thousand fuses daily.