Book Reviews

Aluminum Paint and Powder. Junius D. Edwards and Robert I. Wray. Reinhold, New York, ed. 3, 1955. viii + 219 pp. Illus. $4.50.

The reader of this 219-page book by two men who have been the leaders in the development and increasing use of aluminum paint expects a clear, authoritative, and complete discussion of the subject, and he is not disappointed by this book. Well printed and copiously illustrated, the book gives a picture of the production and properties of aluminum powder and the formulation, properties, and uses of aluminum paint that is more complete than that available anywhere else. Other uses of aluminum powder and other varieties of the powder than those used in paint are also covered.

A discussion of methods of production is followed by a description of methods of testing the powder in the laboratory, the grading system used by Alcoa for the powder, and the uses of the different grades. Important precautions that should be observed in handling and storing the powder are mentioned.

The chapter on the composition of aluminum paint discusses the selection of the pigment grade and the formulation of the vehicle from the standpoint of the intended use of the paint. The kauri reduction test for the toughness of the vehicle is described and its importance is pointed out. Different types of varnish, lacquer, and synthetic resin vehicles are discussed and examples of their composition are given.

A chapter on aluminum paint in the protection of metals describes and illustrates various practical large-scale and laboratory tests of aluminum paint on steel. The importance of pigment concentration, vehicle viscosity, and composition are discussed and illustrated, as well as the preparation, priming, and painting of steel surfaces. The painting of aluminum, magnesium, and zinc, as well as special paint finishes such as the polychrome finishes used on automobiles, is also discussed.

Another chapter discusses the reflectance of aluminum paint, including that for ultraviolet and infrared radiation. The importance of the high visibility of aluminum paint on bridges and its high reflectivity for heat radiation on oil tanks is emphasized. The use of a properly formulated aluminum paint on the steel parts of furnaces to reduce thermal radiation and protect the metal is described and illustrated. The practical value of the opacity or "hiding power" of aluminum paint, its thermal and electric conductivity, and its resistance to penetration by water vapor are discussed. Figures are given for the effect on permeability of exposure to light and atmospheric influences for from 3 to 24 months for a variety of aluminum paints and other paints. Figures are also given that show the effect of such exposure on the tensile strength of the paint film, and the effect of hydrogen sulfide on the standard light-colored paints is discussed at an appropriate point.

The use of aluminum paint as a primer in the protection of wood is important, although it is not noticed as often as its use in the protection of steel. Tests at the Forest Products Laboratory and Aluminum Research Laboratories that show the ability of the aluminum primer to protect wood from the penetration of moisture and consequently to prevent warping and cracking of the wood are described and illustrated. Differences in the effects with different kinds of wood are noted. Proper vehicles for painting on wood are discussed and the advantages of "back painting" of lumber are pointed out.

The last chapter discusses the use of aluminum powder in other arts such as printing, coating of paper, plastics, powder metallurgy, and aeration of concrete. Practical experience and results in these fields are discussed. Pyrotechnic uses of aluminum powder—including its use as an additive to TNT in military explosives—are considered. The use of the powder in caulking compounds and cements, mold washes, the treatment of silicosis, and aeration of soap are also described.

It will be clear to the reader that aluminum powder has made great strides since World War I, when its application with "banana oil" lacquer to the decoration of radiators was about its only commercial use.

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Machine Translation of Languages. Fourteen essays. William N. Locke and A. Donald Booth, Eds. Massachusetts Institute of Technology, Cambridge, Mass.; Wiley, New York; Chapman and Hall, London, 1955. xii + 243 pp. $6.

Large-scale computers can now perform exceedingly complex operations, mathematical and logical. They can be programmed to process vast amounts of data. Their "memories," in the form of punched cards or magnetic tapes, for example, can be tremendous. If languages consisted only of vocabulary and grammar—with one-to-one correspondences in meaning between the words of one language and those of another, and with the grammars of each formalizable as sets of logical rules—then an automatic dictionary would be a matter of input-output equipment, large enough memory capacity, and means for memory searching (all these exist in computers already), and machine translation would be possible when the automatic dictionary is augmented by a logical computer programmed to transform from one set of rules to another.

The 14 essays and historical introduction of this book trace the developments in and grapple with the problems of this field in its manifold aspects, engineering and linguistic. In a sense, some are concerned with bridging the gap between the problem of translation between natural languages and the afore-mentioned problem, the soluble one of translating between two completely formalized languages. The first essay (Weaver) is historically significant not only as the first presentation, apparently, of the general problem but also because of the leads for further research disclosed therein. The next (Richens and Booth) deals with some actual methods of mechanical translation, and specimens thereof, illustrating how problems such as stripping off endings to get at the root or how the wider problem of getting to the semantic units of the communication can be approached.

The third essay (Oettinger) summarizes a thesis on the design of an automatic Russian-English technical dictionary. An experiment with monolingual volunteers showed with high probability that a scientist armed therewith could not only extract information clearly enough for his own purposes but could also communicate it to others. The next (Harper) goes into the syntax, morphology, and vocabulary of Russian, a specific mechanical translation procedure, and an example of its application. The eighth (Dostert) describes the Georgetown-I.B.M. experiment in which actual machine translation from Russian to English was done. The fifth essay (Bull, Africa, and Teich-