THE USE OF CONTINUED FRACTIONS IN THE DESIGN OF ELECTRICAL NETWORKS*

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1. *Introduction.* The literature on the subject of electrical circuit theory deals very largely with one type of problem: "Given an electrical system and the driving force which is imposed upon it, to find how it responds."

The converse problem, namely "Given a known driving force and the response which it is desired to produce, to find a system which will so respond," is much less frequently dealt with in the literature. It is this problem with which the present paper is to deal.†

About the electrical side of the problem we need only say that, whatever the language in which the engineer may phrase his requirements, they can always be satisfied provided we can produce one or more networks of preassigned *impedances*. It is, then, no serious restriction upon the prac-

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† Those who are interested in following the earlier literature will find the following references helpful. They will also give some idea of the technical problems to which the theory is applicable.

Fry, U. S. Patent #1,570,215, 1926, filed June 1921.

Zobel, *Theory and design of uniform and composite electric wave filters*, Bell System Technical Journal, vol. 2 (1923), p. 1.

Bartlett, *A note on the theory of artificial telephone and transmission lines*, Philosophical Magazine, vol. 48 (1924), p. 859.

Bartlett, *Properties of the generalized artificial line*, Philosophical Magazine, vol. 1 (1926), p. 553.

Cauer, *Die Verwirklichung von Wechselstromwiderständen vorgeschriebener Frequenzabhängigkeit*, Archiv für Elektrotechnik, vol. 17 (1926), pp. 355–388.

Bartlett, British Patent #290,701, 1928, filed January 1927.

Mead, *Phase distortion and phase distortion correction*, Bell System Technical Journal, vol. 7 (1928), p. 195.

Zobel, *Distortion correction in electrical networks with constant resistance recurrent networks*, Bell System Technical Journal, vol. 7 (1928), p. 438.