Metallic compound gratings are studied in this work by means of an analytical equivalent circuit approach in order to obtain its transmission and reflection properties when illuminated by a TM-polarized plane wave. A compound grating consists of the periodic repetition of a finite number of slits carved out of a thick metal slab (reflection grating) or connecting two separated open regions through groups of slits in the metal slab (transmission grating). The equivalent circuit is rigorously obtained starting from a simplified version of the integral equation for the electric field at the slits apertures. That equivalent circuit involves transmission-line sections that account for the fundamental and lowest order diffracted modes (which does give the “dynamical” nature to the present equivalent circuit), and lumped components to model the effect of all the higher order diffracted modes. All the relevant and complex features of the spectra can be satisfactorily explained in terms of the topology and characteristics of the equivalent circuit. In contrast with some previously reported circuit models, all the dynamical and quasi-static circuit elements are analytically and explicitly obtained in terms of the geometric and electrical parameters of the grating. The accuracy of the approximate circuit model is very good over a very wide band, as it is demonstrated by comparison with full-wave data computed with commercial electromagnetic solvers.