Palindromic graphs are a class of graphs inspired by the concept of palindromes in words and sequences. A graph $G$ on $n$ vertices is a \textit{palindromic graph} if it has a vertex-labeling bijection $f : V(G) \rightarrow \{1, 2, \ldots, n\}$ with the property that $uv \in E(G)$ if and only if there is an edge $xy \in E(G)$ such that $f(x) = n - f(u) + 1$ and $f(y) = n - f(v) + 1$. This concept was introduced by Robert Beeler who presented sufficient conditions on $G$ and $H$ that guarantee that the Cartesian product $G \Box H$ is palindromic. We prove that these sufficient conditions are also necessary. (Received September 25, 2018)