Proposed problem to Octogon 2024

Let $a_k \geq a_{k+1} > 0,\ k = 1, 2 \ldots.$ *Prove that if* $\sum_{k=1}^{\infty} a_k$ *diverges the series* $\sum_{k=1}^{\infty} (\sum_{j=k}^{2k} \frac{a_j}{a_{j+1}})^{-1}$ *also diverges*