A sequence whose adjacent terms always make the given algebraic expression a square number

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$$\frac{1-36z+23z^2}{1-38z+38z^2-z^3}=\sum_{i=0}^{\infty}a_iz^i \tag{1}$$

$$3+\frac{a_i^3+a_{i+1}^3}{\frac{1}{a_i}+\frac{1}{a_{i+1}}}=(6a_ia_{i+1}-6-a_i-a_{i+1})^2 \tag{2}$$