Word calculus in the fundamental group of the Menger curve

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The fundamental group of the Menger universal curve is uncountable and not free, although all of its finitely generated subgroups are free. It contains an isomorphic copy of the fundamental group of every one-dimensional separable metric space and an isomorphic copy of the fundamental group of every planar Peano continuum. We give an explicit and systematic combinatorial description of the fundamental group of the Menger universal curve and its generalized Cayley graph in terms of word sequences. The word calculus, which requires only two letters and their inverses, is based on Pasynkov's partial topological product representation and can be expressed in terms of a variation on the classical puzzle known as the Towers of Hanoi.