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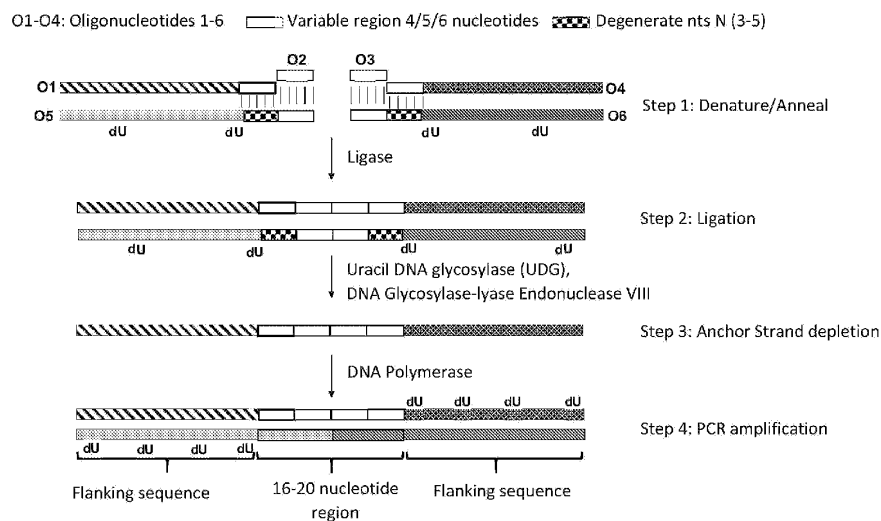
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Figure 1A



(57) **Abstract:** The invention provides methods of synthesizing a product DNA molecule having a desired and/or defined sequence. The methods involve annealing at least one long oligonucleotide and at least one short oligonucleotide to at least one anchor strand having a sequence at least partially complementary to the at least one long and at least one short oligonucleotide. After annealing, at least one long oligonucleotide bound to an anchor strand abuts at least one short oligonucleotide bound to the same anchor strand. The anchor strand has one or more non-standard nucleotides, and optionally one or more degenerate nucleotides. The method involves ligating the abutting at least one long oligonucleotide and at least one short oligonucleotide to form a dsDNA molecule. The invention also provides methods of synthesizing DNA molecules by assembling oligonucleotide members of a library that contains less than 20,000 members that can be assembled into all possible DNA sequences.

[Continued on next page]

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