

(12) **United States Patent**
Smith

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(54) **CONFIGURATION MODEL CONSISTENCY CHECKING USING FLEXIBLE RULE SPACE SUBSETS**

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(51) **Int. Cl.**
G06F 17/00 (2006.01)
B06N 5/02 (2006.01)

(52) **U.S. Cl.** **706/47; 706/45; 706/46**

(58) **Field of Classification Search** **706/45, 706/46, 47; 717/105; 707/100**

(56) **References Cited**

OTHER PUBLICATIONS

Polat, Faruk, et al., UVT: A Unification-Based Tool for knowledge Base Verification, Validation and Verification of Knowledge-Based Systems, Jun. 1993, IEEE Computer Society Press, pp. 69-75.*

* cited by examiner

Primary Examiner—Joseph P Hirl

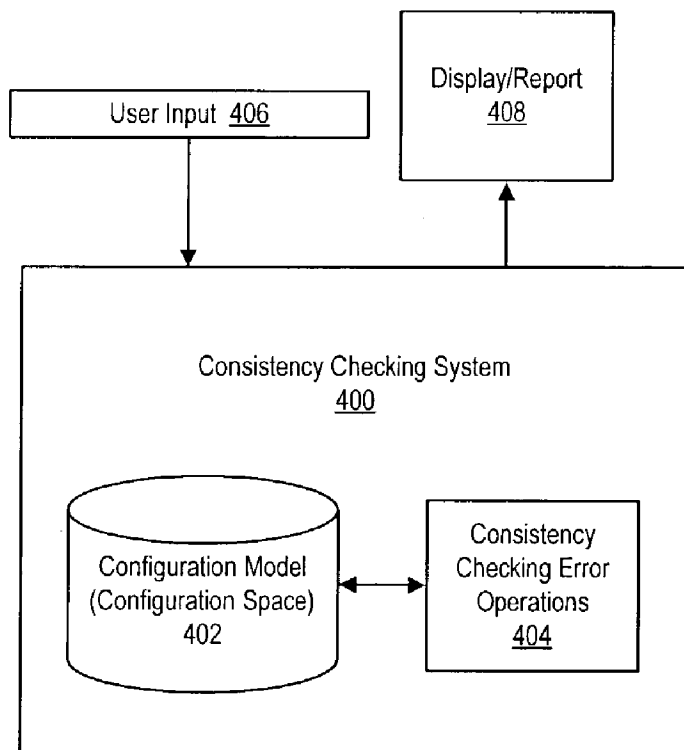
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(57) **ABSTRACT**

Inconsistencies between configuration rules represent a significant concern when modeling a product using configuration rules. The consistency checking system approaches a configuration model from the perspective of a sets of features and families. The configuration space of a model represents the entire set of all combinations of selections within a configuration model. The consistency checking system operates on subsets of the configuration space by consolidating data within the configuration space into minimized subsets that represent a portion of the configuration space where a particular consistency error can occur. Thus, the contents of each subset vary depending upon which consistency error is being checked, and consistency checking is performed on reduced subsets determined on an error by error basis rather than on the configuration space as a whole.

See application file for complete search history.

5 Claims, 26 Drawing Sheets



RULES		
Feature	Optionality	Constraint
F1	S	A1, B1, C1, D1, E1
F1	O	A1, B1, C1, D1, E2
F2	M	A1, B1, C1, D1, E1
F2	O	A1, B1, C1, D1, E3
F2	O	A1, B1, C1, D2, E1
F2	O	A1, B1, C1, D2, E2
F3	O	A1, B1, C1, D2, E1
F3	O	A1, B1, C1, D2, E2
F4	O	A1, B1, C1, D2, E1
F4	O	A1, B1, C1, D2, E2
·	·	·
·	·	·
·	·	·

Figure 1 (prior art)

	A1	A1	A1	A1	A1	
	B1	B1	B1	B1	B1	
	C1	C1	C1	C1	C1	· · ·
	D1	D1	D1	D2	D1	
	E1	E2	E3	E1	E2	
F1	S	O				
F2	M		O	O	O	
F3				O	O	
F4				O	O	

Figure 2A (prior art)

	A1	A1	A1	A1	A1	
	B1	B1	B1	B1	B1	
	C1	C1	C1	C1	C1	· · ·
	D1	D1	D1	D2	D2	
	E1	E2	E3	E1	E2	
F1	S	O				
F2	M		O	O	O	
F3				O	O	
F4				O	O	

Figure 2B (prior art)

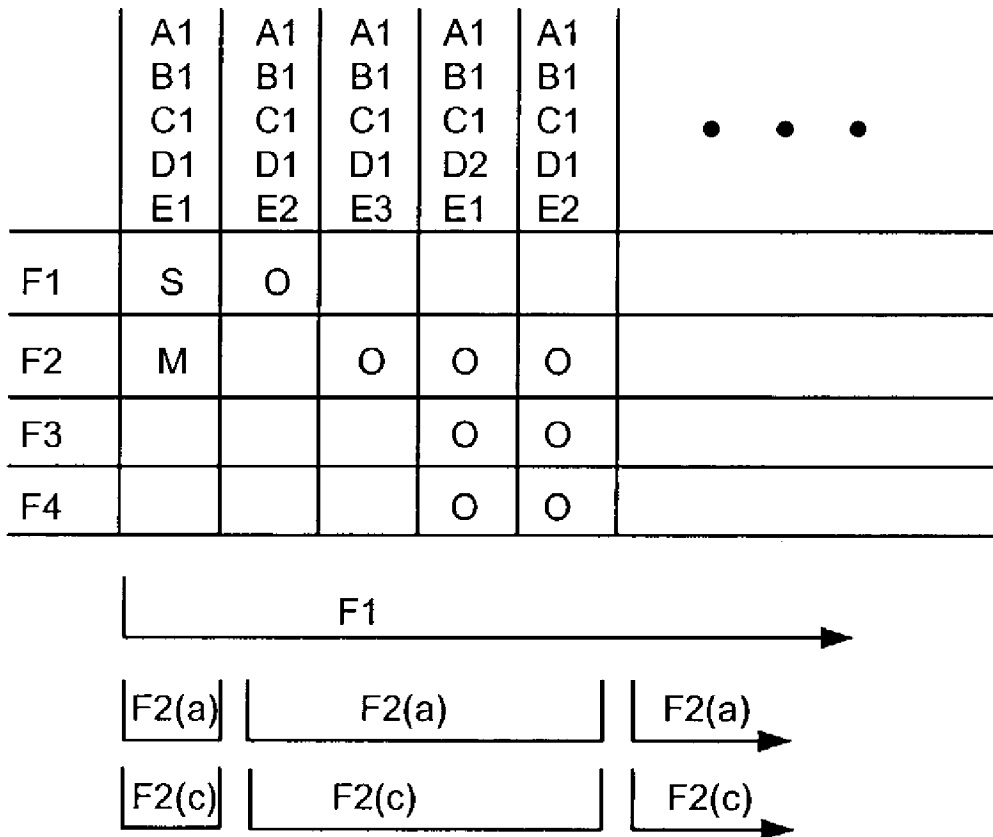


Figure 3

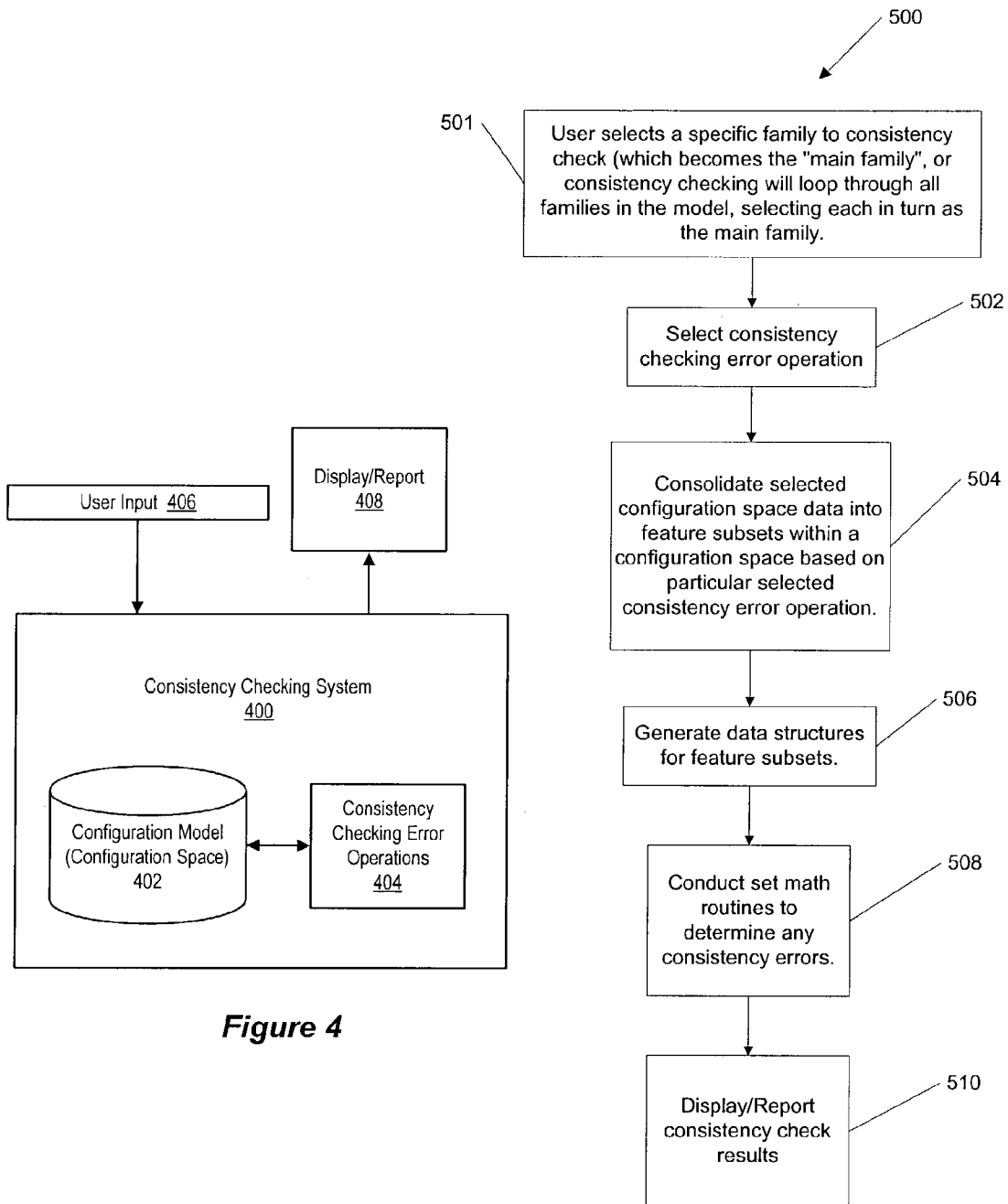


Figure 4

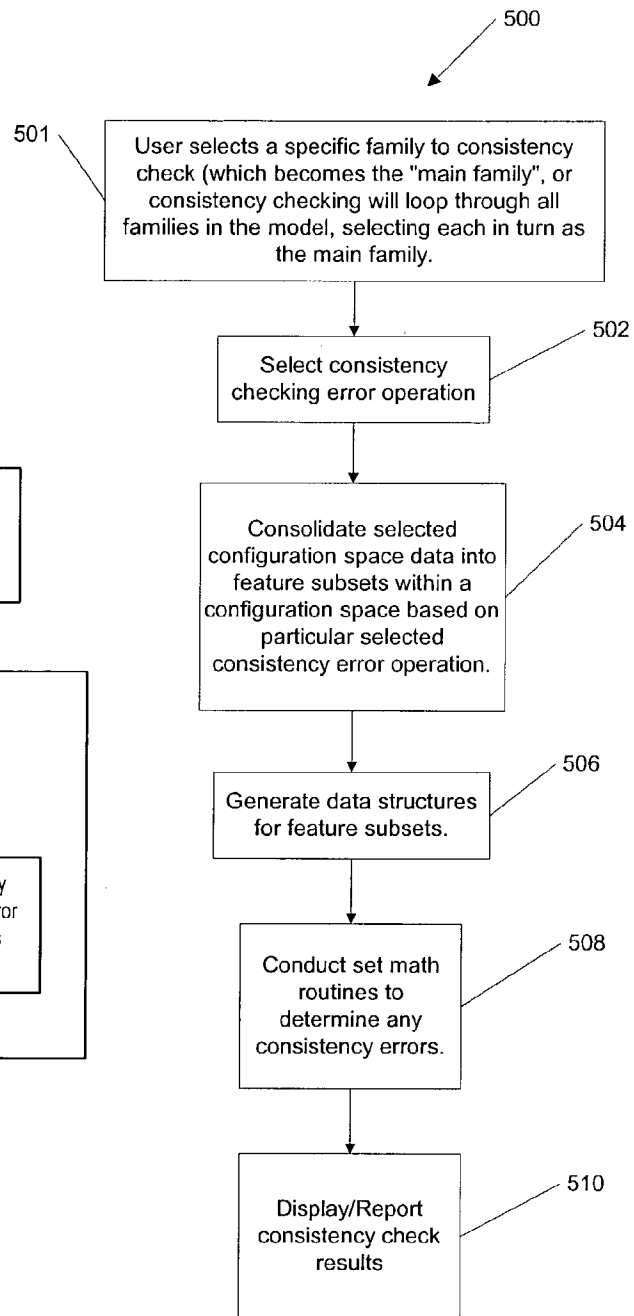


Figure 5

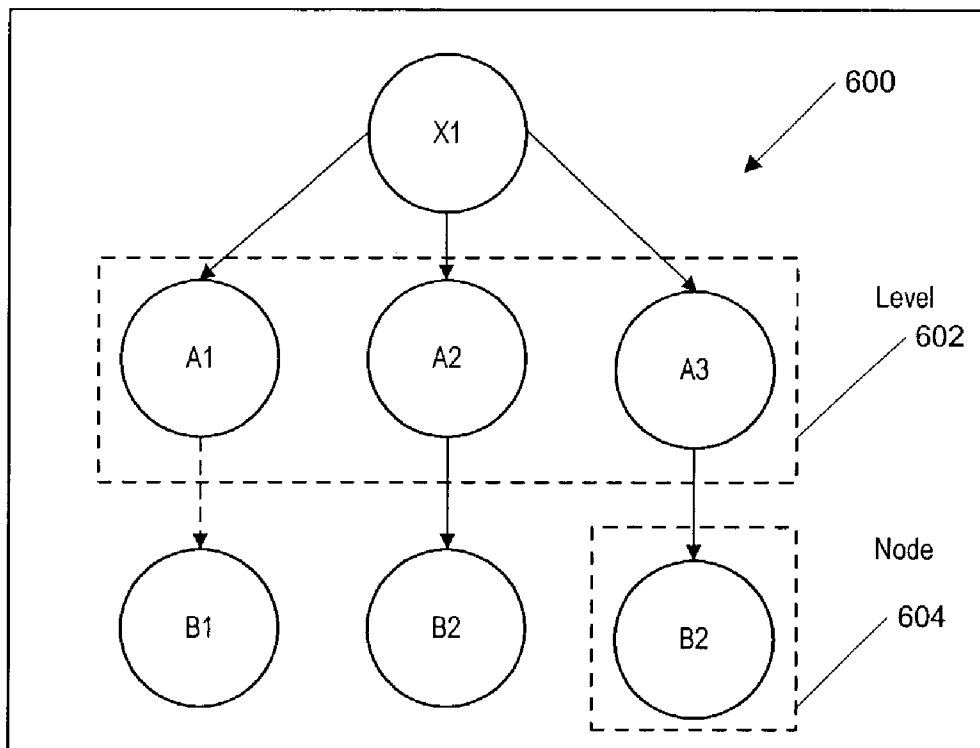


Figure 6A

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