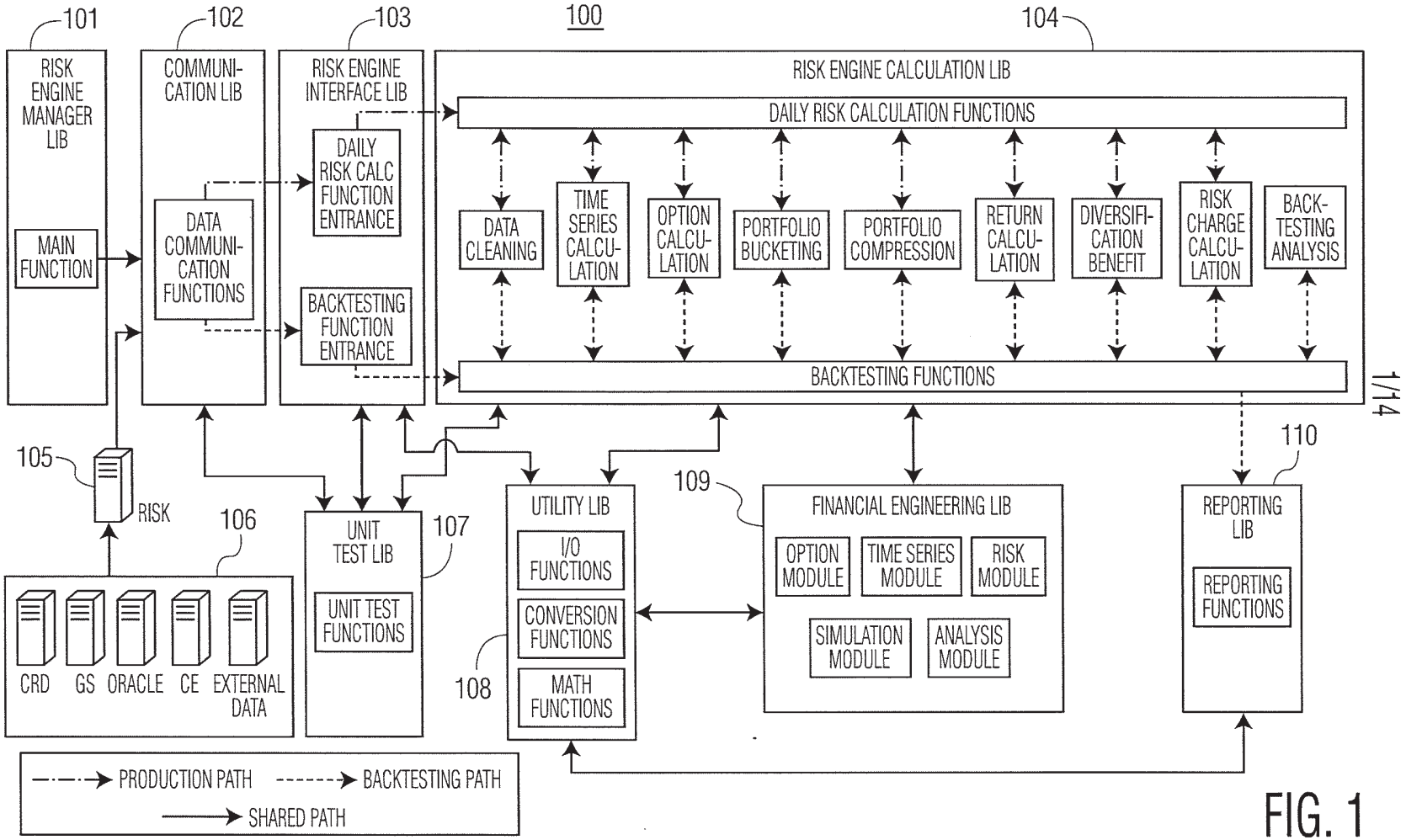

101
102
103
100
104
RISK ENGINE MANAGER LIB
MAIN FUNCTION
COMMUNI-CATION LIB
DATA COMMUNI-CATION FUNCTIONS
RISK ENGINE INTERFACE LIB
DAILY RISK CALC FUNCTION ENTRANCE
BACKTESTING FUNCTION ENTRANCE
RISK ENGINE CALCULATION LIB
DAILY RISK CALCULATION FUNCTIONS
DATA CLEANING
TIME SERIES CALCU-LATION
OPTION CALCU-LATION
PORTFOLIO BUCKETING
PORTFOLIO COMPRESSION
RETURN CALCU-LATION
DIVERSIFI-CATION BENEFIT
RISK CHARGE CALCU-LATION
BACK-TESTING ANALYSIS
BACKTESTING FUNCTIONS
1/14
105
RISK
106
CRD
GS
ORACLE
CE
EXTERNAL DATA
UNIT TEST LIB
UNIT TEST FUNCTIONS
107
UTILITY LIB
I/O FUNCTIONS
CONVERSION FUNCTIONS
MATH FUNCTIONS
108
109
FINANCIAL ENGINEERING LIB
OPTION MODULE
TIME SERIES MODULE
RISK MODULE
SIMULATION MODULE
ANALYSIS MODULE
110
REPORTING LIB
REPORTING FUNCTIONS
PRODUCTION PATH
BACKTESTING PATH
SHARED PATH

FIG. 1

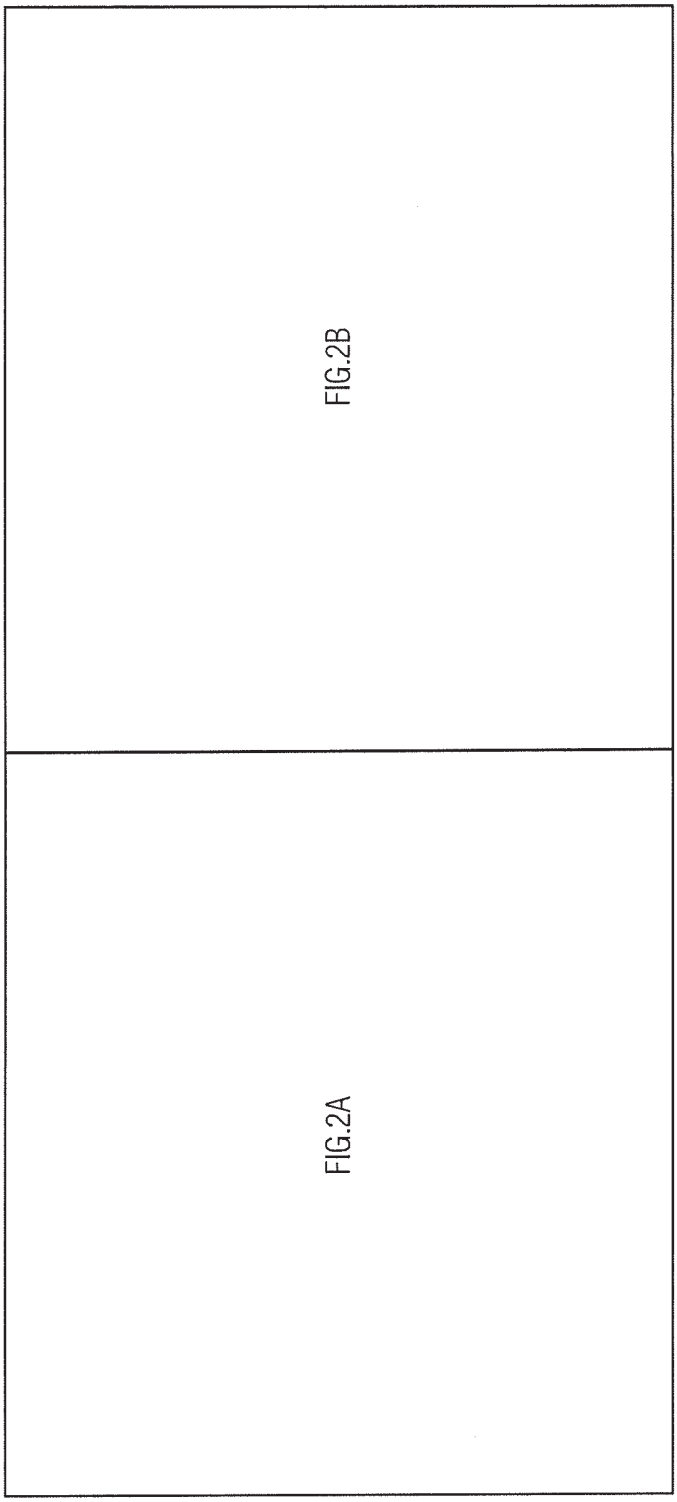


FIG. 2

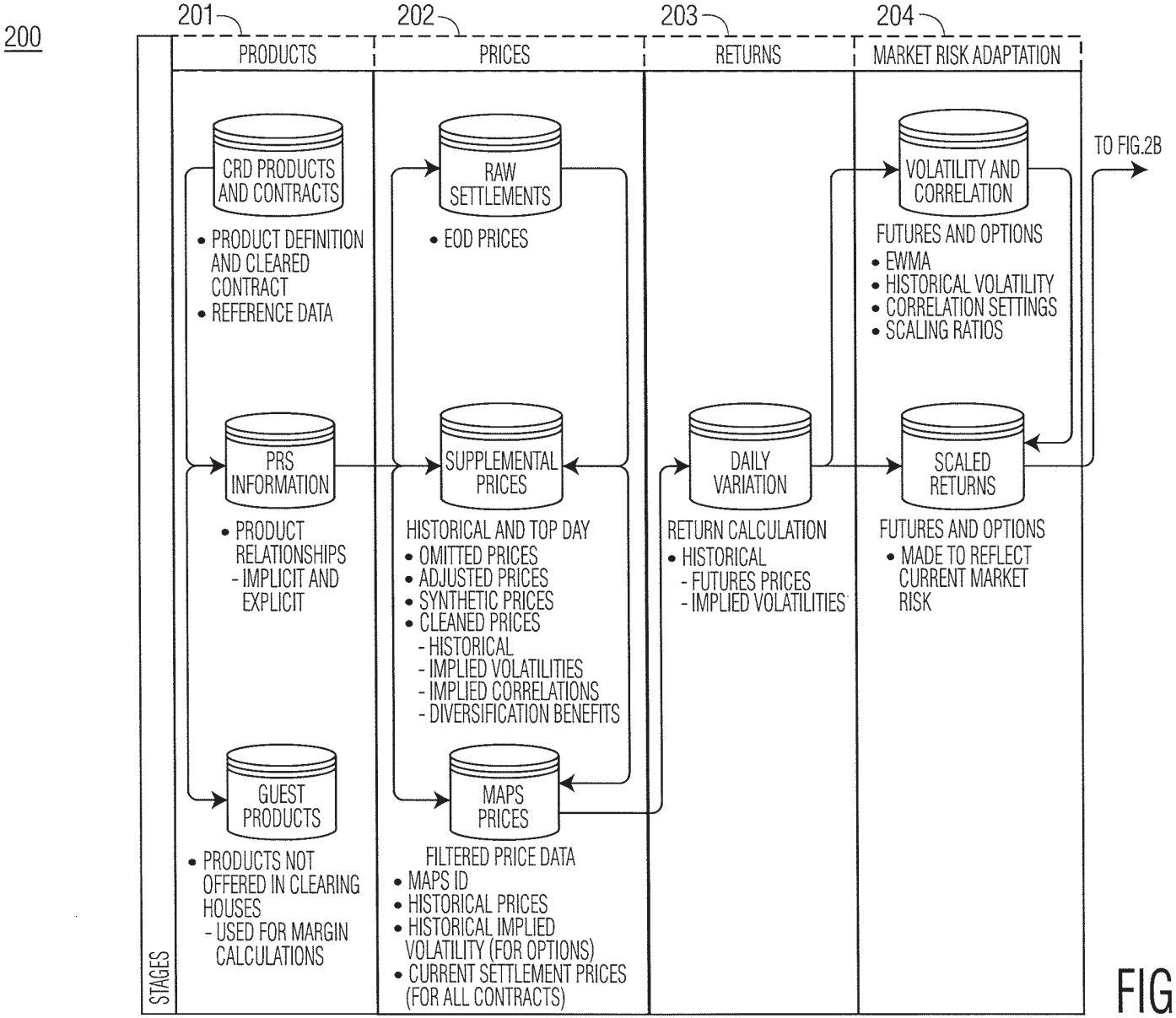

200
201
202
203
204
PRODUCTS
PRICES
RETURNS
MARKET RISK ADAPTATION
STAGES
CRD PRODUCTS AND CONTRACTS
• PRODUCT DEFINITION AND CLEARED CONTRACT
• REFERENCE DATA
RAW SETTLEMENTS
• EOD PRICES
VOLATILITY AND CORRELATION
FUTURES AND OPTIONS
• EWMA
• HISTORICAL VOLATILITY
• CORRELATION SETTINGS
• SCALING RATIOS
TO FIG.2B
PRS INFORMATION
• PRODUCT RELATIONSHIPS
- IMPLICIT AND EXPLICIT
SUPPLEMENTAL PRICES
HISTORICAL AND TOP DAY
• OMITTED PRICES
• ADJUSTED PRICES
• SYNTHETIC PRICES
• CLEANED PRICES
- HISTORICAL
- IMPLIED VOLATILITIES
- IMPLIED CORRELATIONS
- DIVERSIFICATION BENEFITS
DAILY VARIATION
RETURN CALCULATION
• HISTORICAL
- FUTURES PRICES
- IMPLIED VOLATILITIES
SCALED RETURNS
FUTURES AND OPTIONS
• MADE TO REFLECT CURRENT MARKET RISK
GUEST PRODUCTS
• PRODUCTS NOT OFFERED IN CLEARING HOUSES
- USED FOR MARGIN CALCULATIONS
MAPS PRICES
FILTERED PRICE DATA
• MAPS ID
• HISTORICAL PRICES
• HISTORICAL IMPLIED VOLATILITY (FOR OPTIONS)
• CURRENT SETTLEMENT PRICES (FOR ALL CONTRACTS)

FIG. 2A

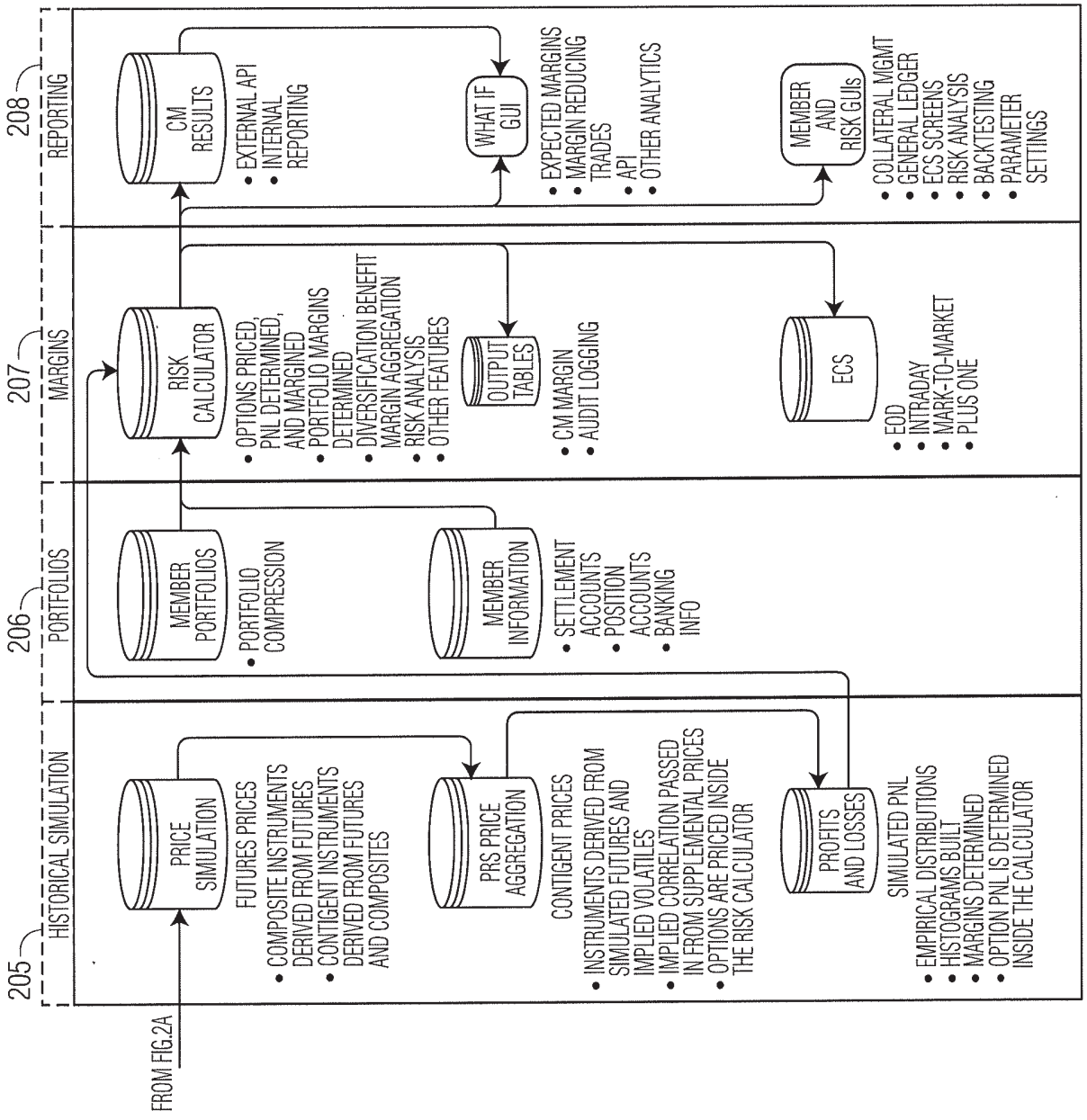

205
HISTORICAL SIMULATION
206
PORTFOLIOS
207
MARGINS
208
REPORTING
FROM FIG.2A
PRICE SIMULATION
FUTURES PRICES
• COMPOSITE INSTRUMENTS DERIVED FROM FUTURES
• CONTIGENT INSTRUMENTS DERIVED FROM FUTURES AND COMPOSITES
PRS PRICE AGGREGATION
CONTIGENT PRICES
• INSTRUMENTS DERIVED FROM SIMULATED FUTURES AND IMPLIED VOLATILES
• IMPLIED CORRELATION PASSED IN FROM SUPPLEMENTAL PRICES
• OPTIONS ARE PRICED INSIDE THE RISK CALCULATOR
PROFITS AND LOSSES
SIMULATED PNL
• EMPIRICAL DISTRIBUTIONS
• HISTOGRAMS BUILT
• MARGINS DETERMINED
• OPTION PNL IS DETERMINED INSIDE THE CALCULATOR
MEMBER PORTFOLIOS
• PORTFOLIO COMPRESSION
MEMBER INFORMATION
• SETTLEMENT ACCOUNTS
• POSITION ACCOUNTS
• BANKING INFO
RISK CALCULATOR
• OPTIONS PRICED, PNL DETERMINED, AND MARGINED
• PORTFOLIO MARGINS DETERMINED
• DIVERSIFICATION BENEFIT
• MARGIN AGGREGATION
• RISK ANALYSIS
• OTHER FEATURES
OUTPUT TABLES
• CM MARGIN
• AUDIT LOGGING
ECS
• EOD
• INTRADAY
• MARK-TO-MARKET
• PLUS ONE
CM RESULTS
• EXTERNAL API
• INTERNAL REPORTING
WHAT IF GUI
• EXPECTED MARGINS
• MARGIN REDUCING TRADES
• API
• OTHER ANALYTICS
MEMBER AND RISK GUIs
• COLLATERAL MGMT
• GENERAL LEDGER
• ECS SCREENS
• RISK ANALYSIS
• BACKTESTING
• PARAMETER SETTINGS

FIG. 2B

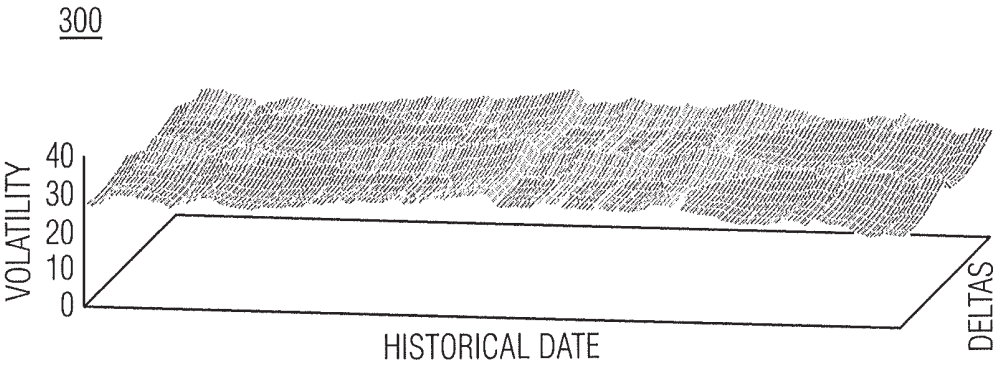

300
VOLATILITY
40
30
20
10
0
HISTORICAL DATE
DELTAS

FIG. 3

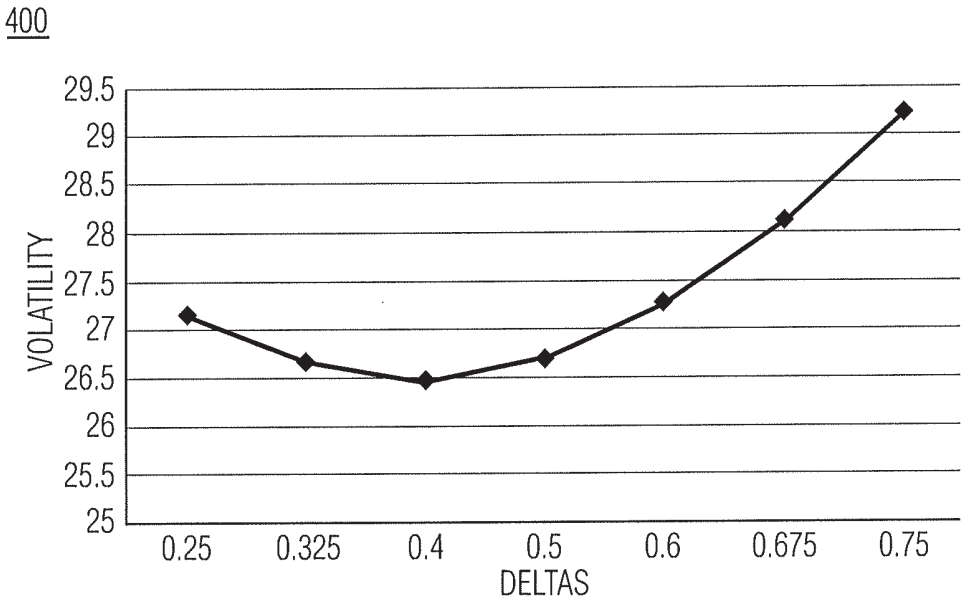

400
VOLATILITY
29.5
29
28.5
28
27.5
27
26.5
26
25.5
25
0.25
0.325
0.4
0.5
0.6
0.675
0.75
DELTAS

FIG. 4

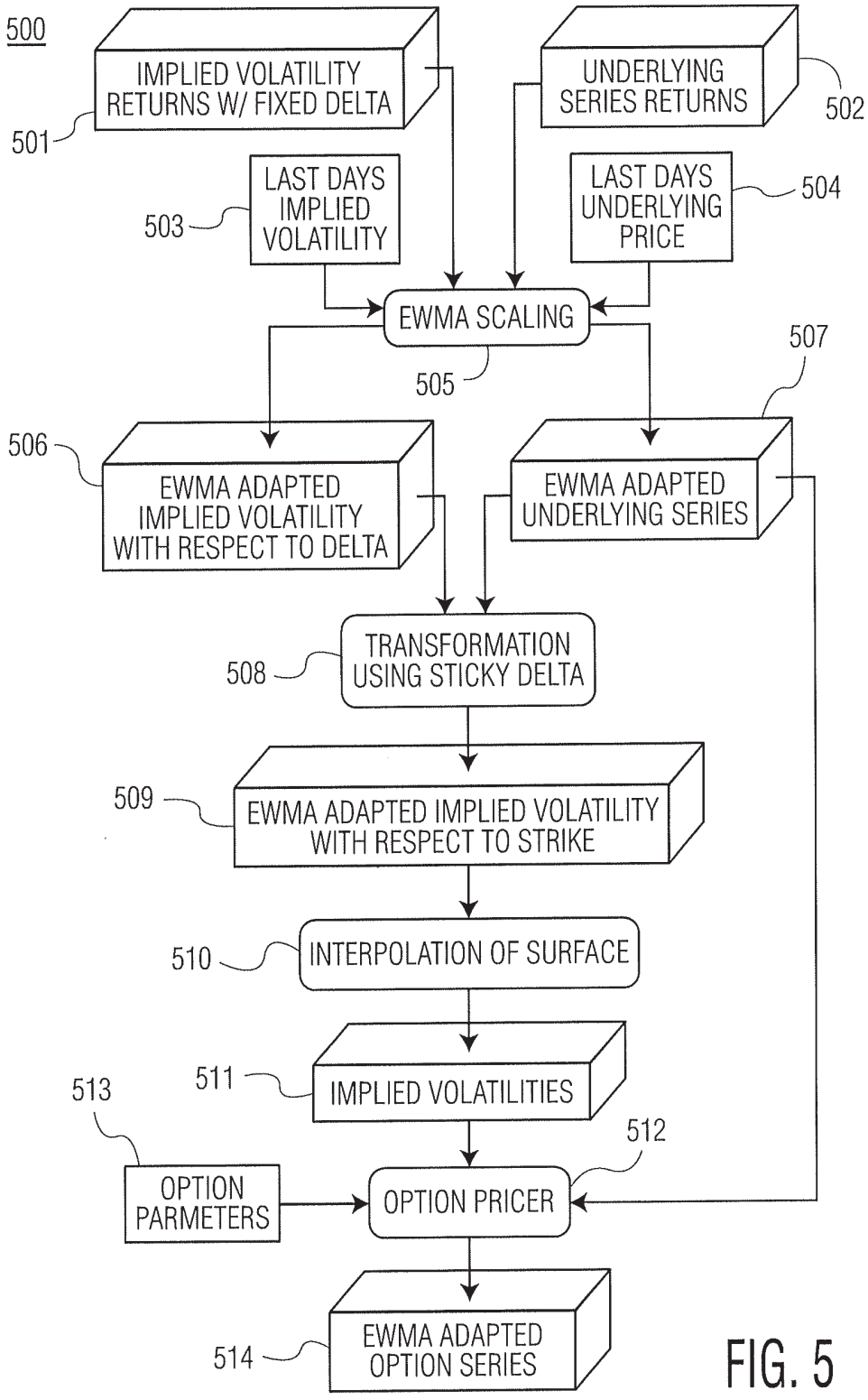

500
IMPLIED VOLATILITY RETURNS W/ FIXED DELTA
501
UNDERLYING SERIES RETURNS
502
LAST DAYS IMPLIED VOLATILITY
503
LAST DAYS UNDERLYING PRICE
504
EWMA SCALING
505
507
506
EWMA ADAPTED IMPLIED VOLATILITY WITH RESPECT TO DELTA
EWMA ADAPTED UNDERLYING SERIES
TRANSFORMATION USING STICKY DELTA
508
EWMA ADAPTED IMPLIED VOLATILITY WITH RESPECT TO STRIKE
509
INTERPOLATION OF SURFACE
510
IMPLIED VOLATILITIES
511
513
512
OPTION PARMETERS
OPTION PRICER
EWMA ADAPTED OPTION SERIES
514

FIG. 5

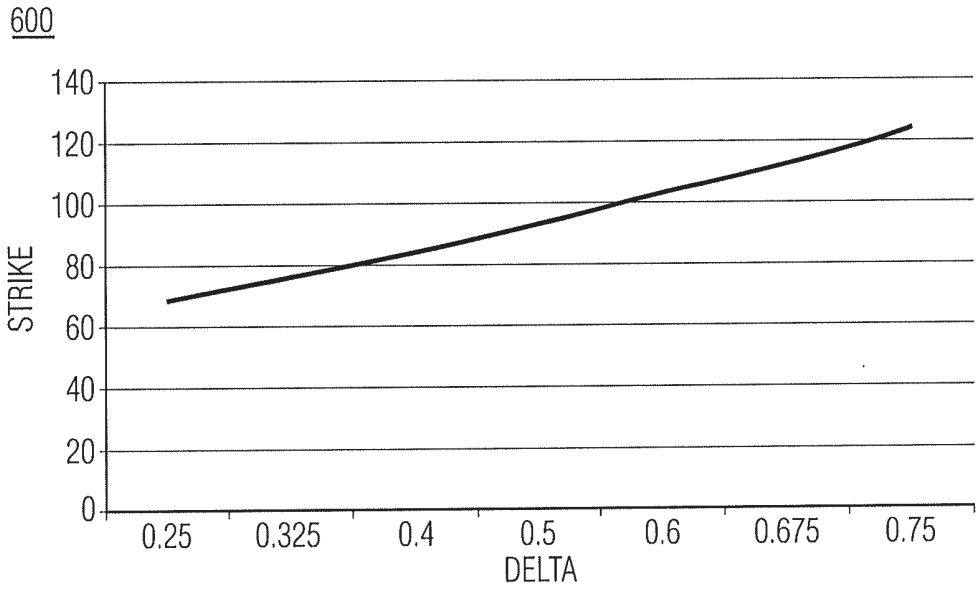

600
140
120
100
80
60
40
20
0
STRIKE
0.25
0.325
0.4
0.5
0.6
0.675
0.75
DELTA

FIG. 6

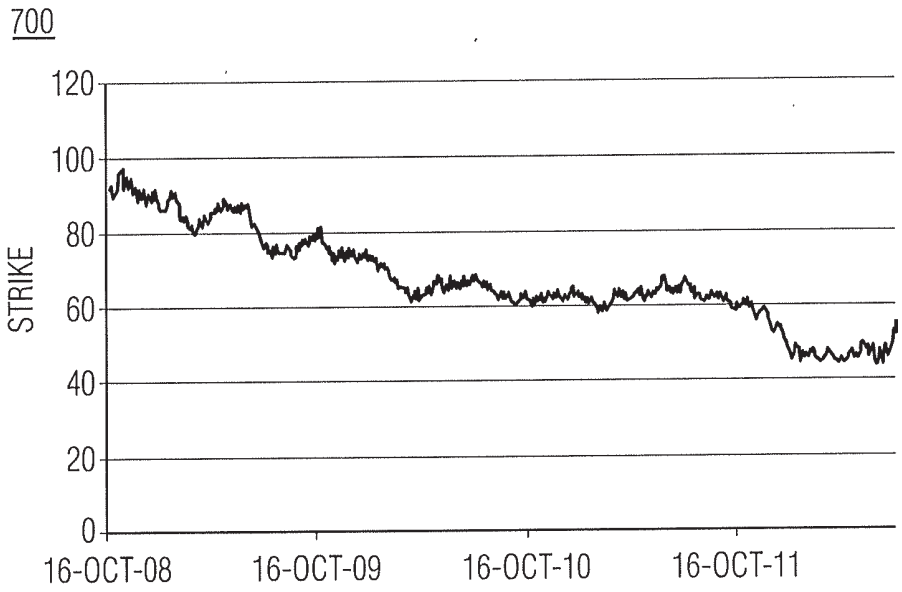

700
120
100
80
60
40
20
0
STRIKE
16-OCT-08
16-OCT-09
16-OCT-10
16-OCT-11

FIG. 7

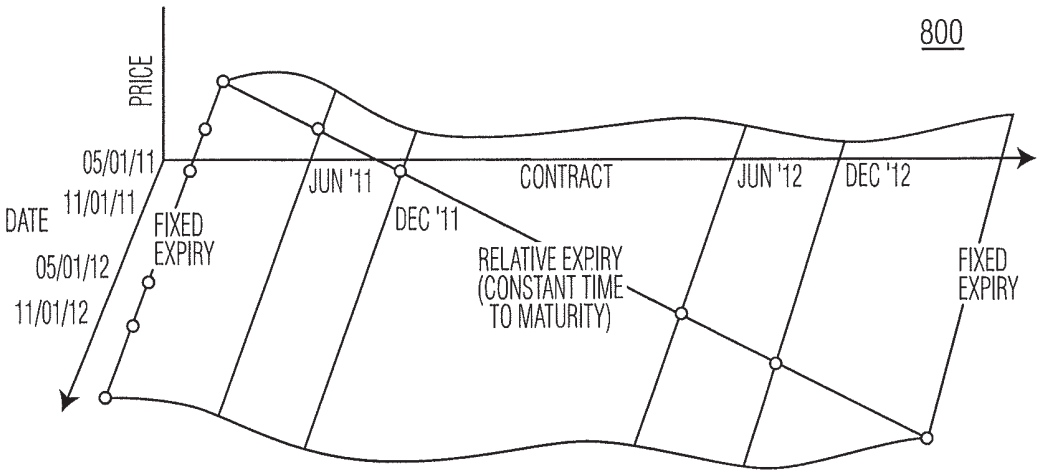

800
PRICE
05/01/11
11/01/11
DATE
05/01/12
11/01/12
FIXED EXPIRY
JUN '11
DEC '11
CONTRACT
JUN '12
DEC '12
RELATIVE EXPIRY (CONSTANT TIME TO MATURITY)
FIXED EXPIRY

FIG. 8

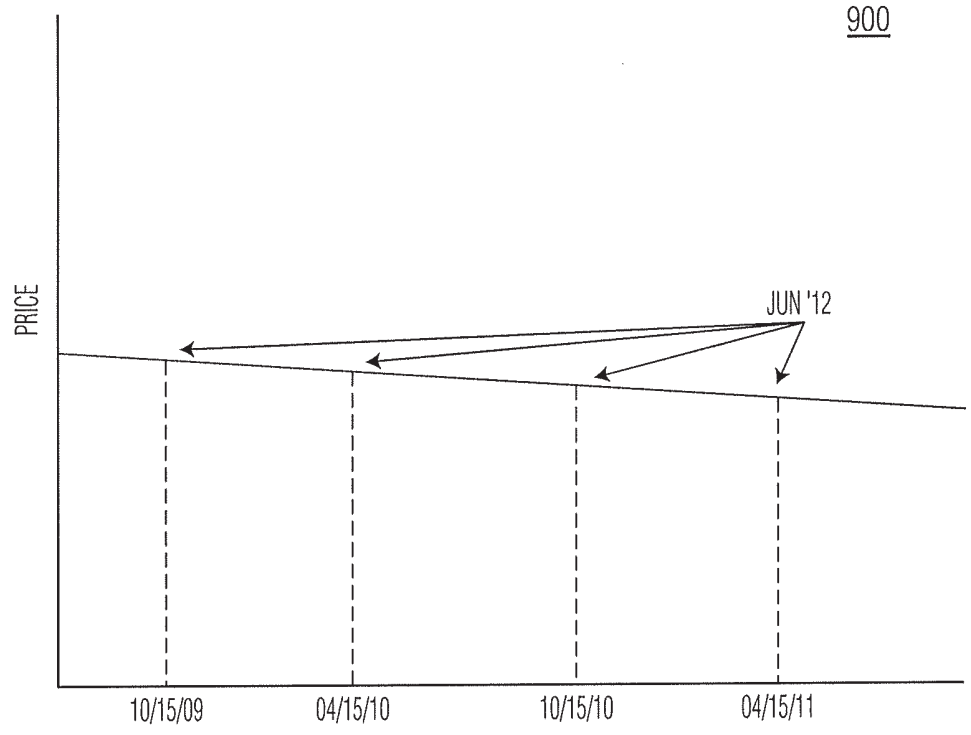

900
PRICE
JUN '12
10/15/09
04/15/10
10/15/10
04/15/11

FIG. 9

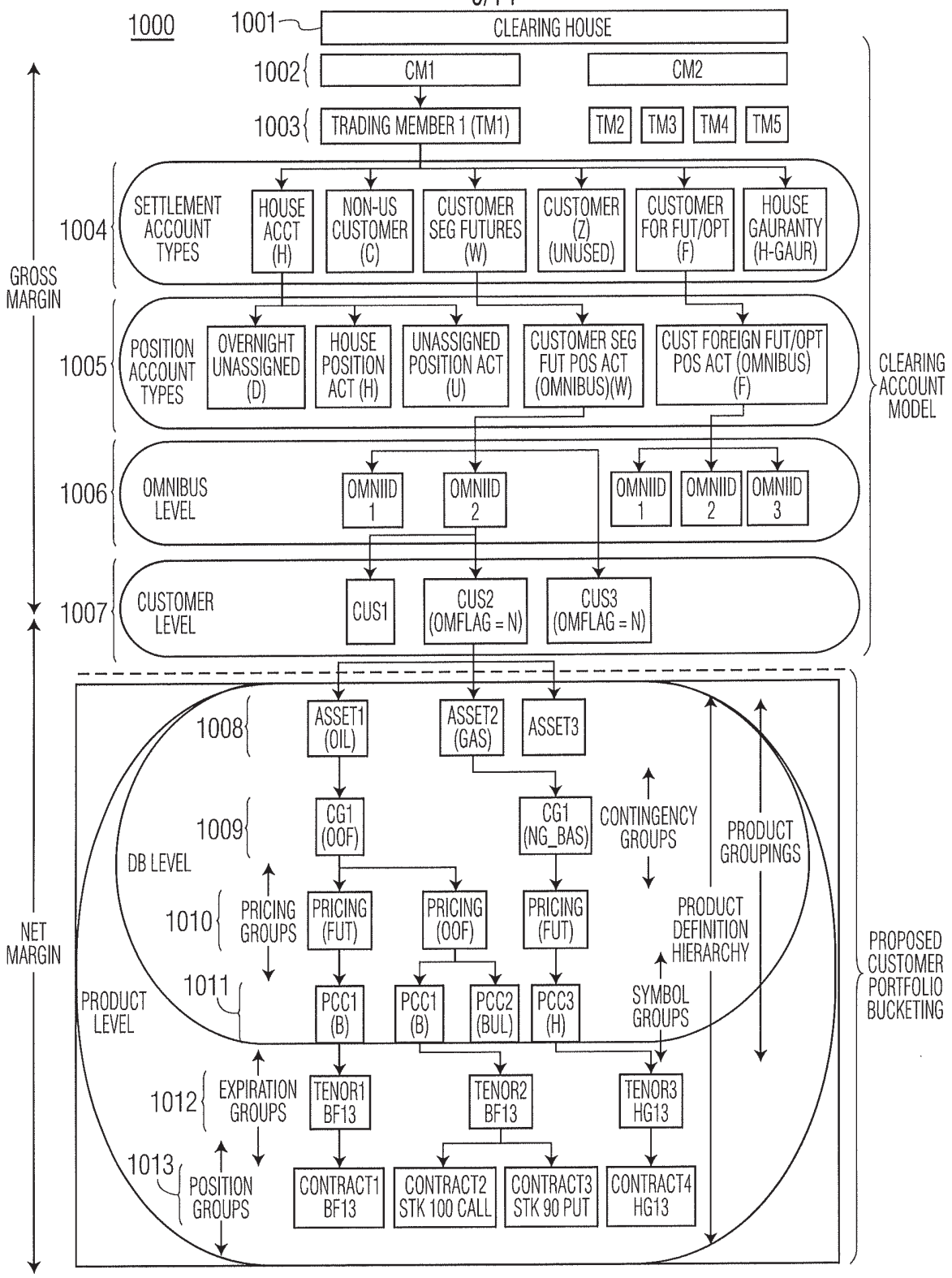

1000
1001
CLEARING HOUSE
1002
CM1
CM2
1003
TRADING MEMBER 1 (TM1)
TM2
TM3
TM4
TM5
1004
SETTLEMENT ACCOUNT TYPES
HOUSE ACCT (H)
NON-US CUSTOMER (C)
CUSTOMER SEG FUTURES (W)
CUSTOMER (Z) (UNUSED)
CUSTOMER FOR FUT/OPT (F)
HOUSE GAURANTY (H-GAUR)
1005
POSITION ACCOUNT TYPES
OVERNIGHT UNASSIGNED (D)
HOUSE POSITION ACT (H)
UNASSIGNED POSITION ACT (U)
CUSTOMER SEG FUT POS ACT (OMNIBUS)(W)
CUST FOREIGN FUT/OPT POS ACT (OMNIBUS) (F)
1006
OMNIBUS LEVEL
OMNIID 1
OMNIID 2
OMNIID 1
OMNIID 2
OMNIID 3
1007
CUSTOMER LEVEL
CUS1
CUS2 (OMFLAG = N)
CUS3 (OMFLAG = N)
GROSS MARGIN
CLEARING ACCOUNT MODEL
NET MARGIN
PROPOSED CUSTOMER PORTFOLIO BUCKETING
1008
ASSET1 (OIL)
ASSET2 (GAS)
ASSET3
1009
DB LEVEL
CG1 (OOF)
CG1 (NG_BAS)
CONTINGENCY GROUPS
PRODUCT GROUPINGS
1010
PRICING GROUPS
PRICING (FUT)
PRICING (OOF)
PRICING (FUT)
PRODUCT DEFINITION HIERARCHY
1011
PRODUCT LEVEL
PCC1 (B)
PCC1 (B)
PCC2 (BUL)
PCC3 (H)
SYMBOL GROUPS
1012
EXPIRATION GROUPS
TENOR1 BF13
TENOR2 BF13
TENOR3 HG13
1013
POSITION GROUPS
CONTRACT1 BF13
CONTRACT2 STK 100 CALL
CONTRACT3 STK 90 PUT
CONTRACT4 HG13

FIG. 10

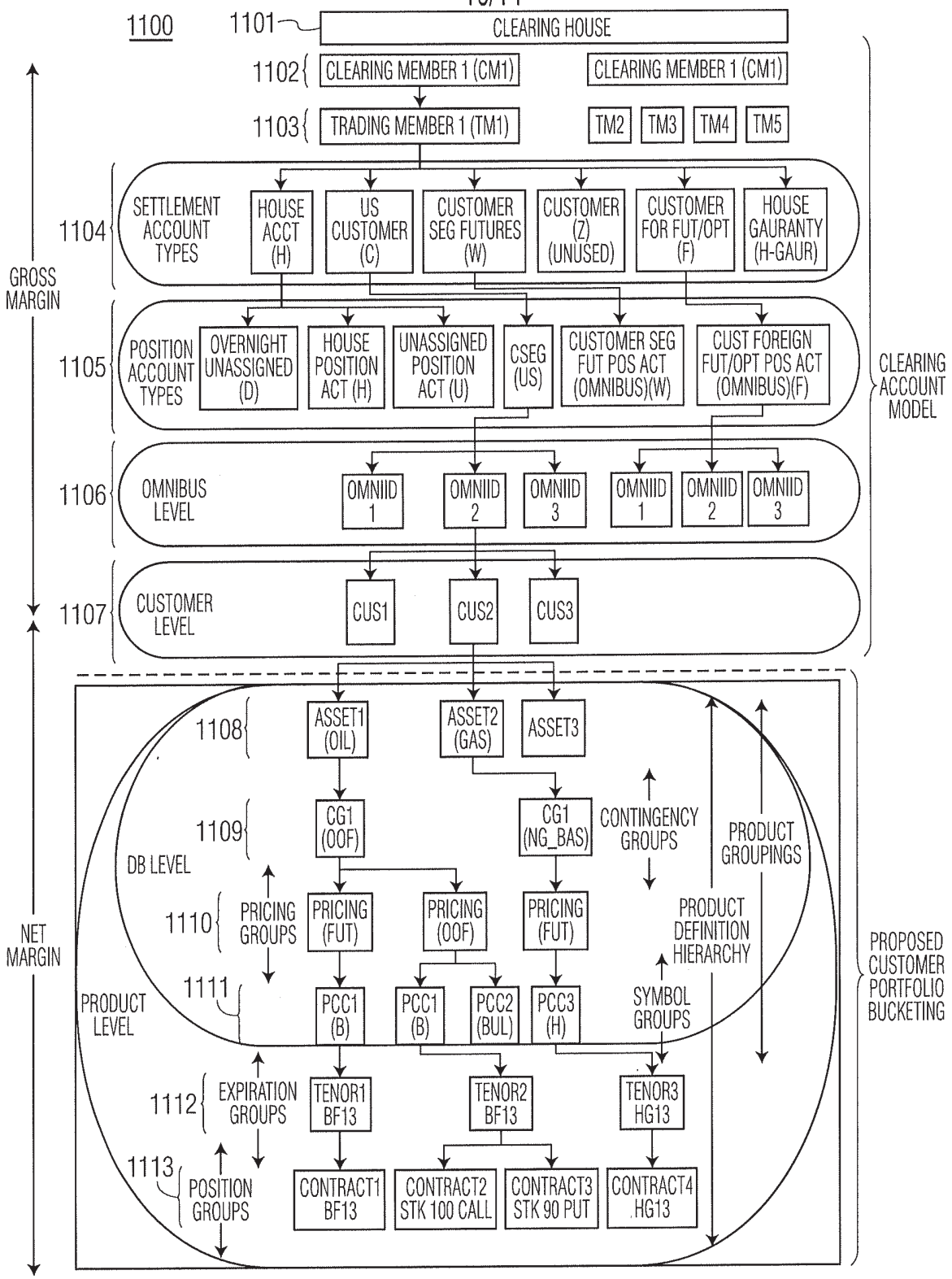

1100
1101
CLEARING HOUSE
1102
CLEARING MEMBER 1 (CM1)
CLEARING MEMBER 1 (CM1)
1103
TRADING MEMBER 1 (TM1)
TM2
TM3
TM4
TM5
1104
SETTLEMENT ACCOUNT TYPES
HOUSE ACCT (H)
US CUSTOMER (C)
CUSTOMER SEG FUTURES (W)
CUSTOMER (Z) (UNUSED)
CUSTOMER FOR FUT/OPT (F)
HOUSE GAURANTY (H-GAUR)
1105
POSITION ACCOUNT TYPES
OVERNIGHT UNASSIGNED (D)
HOUSE POSITION ACT (H)
UNASSIGNED POSITION ACT (U)
CSEG (US)
CUSTOMER SEG FUT POS ACT (OMNIBUS)(W)
CUST FOREIGN FUT/OPT POS ACT (OMNIBUS)(F)
1106
OMNIBUS LEVEL
OMNIID 1
OMNIID 2
OMNIID 3
OMNIID 1
OMNIID 2
OMNIID 3
1107
CUSTOMER LEVEL
CUS1
CUS2
CUS3
GROSS MARGIN
CLEARING ACCOUNT MODEL
NET MARGIN
PROPOSED CUSTOMER PORTFOLIO BUCKETING
1108
ASSET1 (OIL)
ASSET2 (GAS)
ASSET3
1109
DB LEVEL
CG1 (OOF)
CG1 (NG_BAS)
CONTINGENCY GROUPS
PRODUCT GROUPINGS
1110
PRICING GROUPS
PRICING (FUT)
PRICING (OOF)
PRICING (FUT)
PRODUCT DEFINITION HIERARCHY
1111
PRODUCT LEVEL
PCC1 (B)
PCC1 (B)
PCC2 (BUL)
PCC3 (H)
SYMBOL GROUPS
1112
EXPIRATION GROUPS
TENOR1 BF13
TENOR2 BF13
TENOR3 HG13
1113
POSITION GROUPS
CONTRACT1 BF13
CONTRACT2 STK 100 CALL
CONTRACT3 STK 90 PUT
CONTRACT4 HG13

FIG. 11

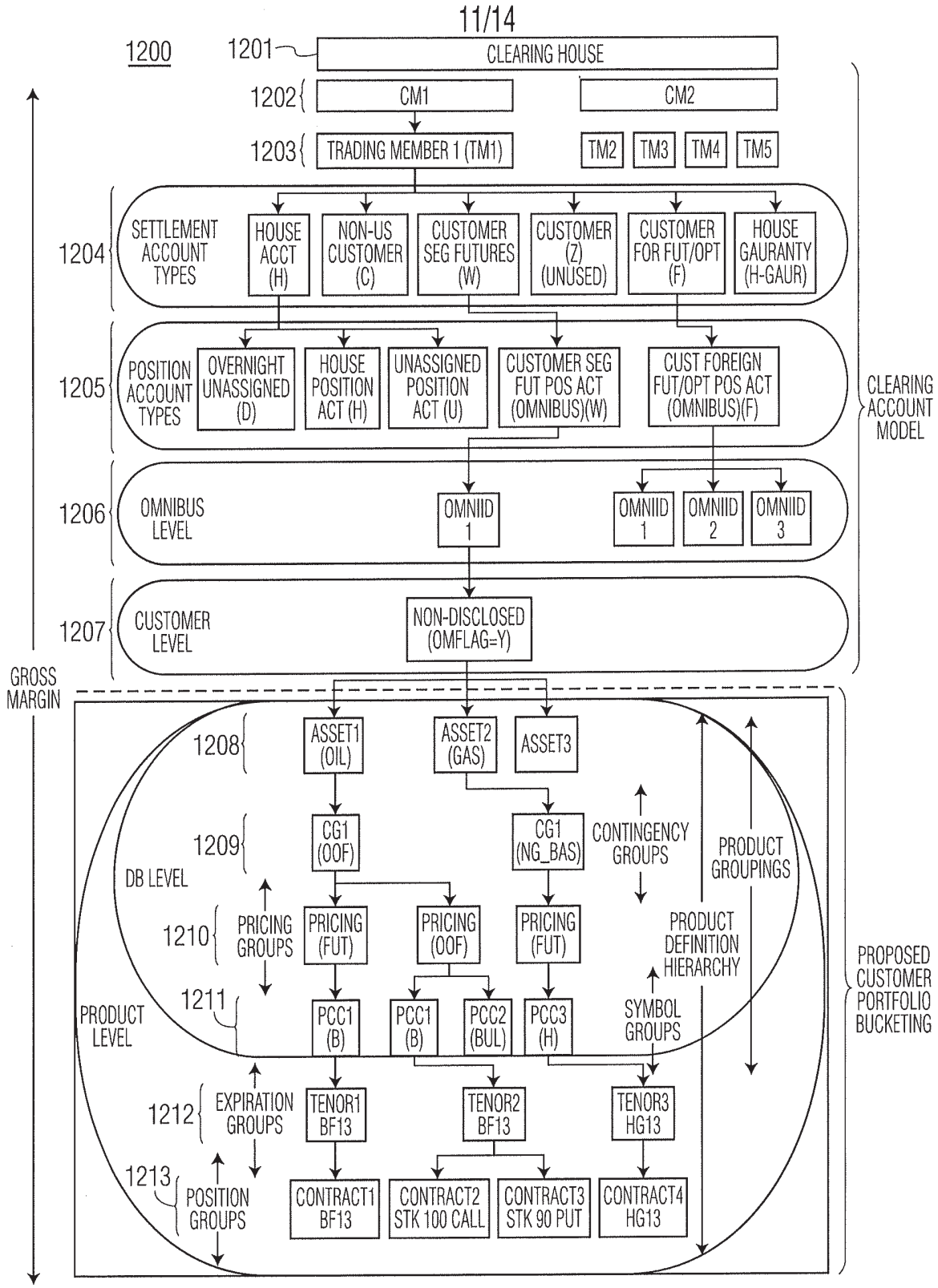

1200
1201
CLEARING HOUSE
1202
CM1
CM2
1203
TRADING MEMBER 1 (TM1)
TM2
TM3
TM4
TM5
1204
SETTLEMENT ACCOUNT TYPES
HOUSE ACCT (H)
NON-US CUSTOMER (C)
CUSTOMER SEG FUTURES (W)
CUSTOMER (Z) (UNUSED)
CUSTOMER FOR FUT/OPT (F)
HOUSE GAURANTY (H-GAUR)
1205
POSITION ACCOUNT TYPES
OVERNIGHT UNASSIGNED (D)
HOUSE POSITION ACT (H)
UNASSIGNED POSITION ACT (U)
CUSTOMER SEG FUT POS ACT (OMNIBUS)(W)
CUST FOREIGN FUT/OPT POS ACT (OMNIBUS)(F)
CLEARING ACCOUNT MODEL
1206
OMNIBUS LEVEL
OMNIID 1
OMNIID 1
OMNIID 2
OMNIID 3
1207
CUSTOMER LEVEL
NON-DISCLOSED (OMFLAG=Y)
GROSS MARGIN
1208
ASSET1 (OIL)
ASSET2 (GAS)
ASSET3
1209
DB LEVEL
CG1 (OOF)
CG1 (NG_BAS)
CONTINGENCY GROUPS
PRODUCT GROUPINGS
1210
PRICING GROUPS
PRICING (FUT)
PRICING (OOF)
PRICING (FUT)
PRODUCT DEFINITION HIERARCHY
1211
PRODUCT LEVEL
PCC1 (B)
PCC1 (B)
PCC2 (BUL)
PCC3 (H)
SYMBOL GROUPS
1212
EXPIRATION GROUPS
TENOR1 BF13
TENOR2 BF13
TENOR3 HG13
1213
POSITION GROUPS
CONTRACT1 BF13
CONTRACT2 STK 100 CALL
CONTRACT3 STK 90 PUT
CONTRACT4 HG13
PROPOSED CUSTOMER PORTFOLIO BUCKETING

FIG. 12

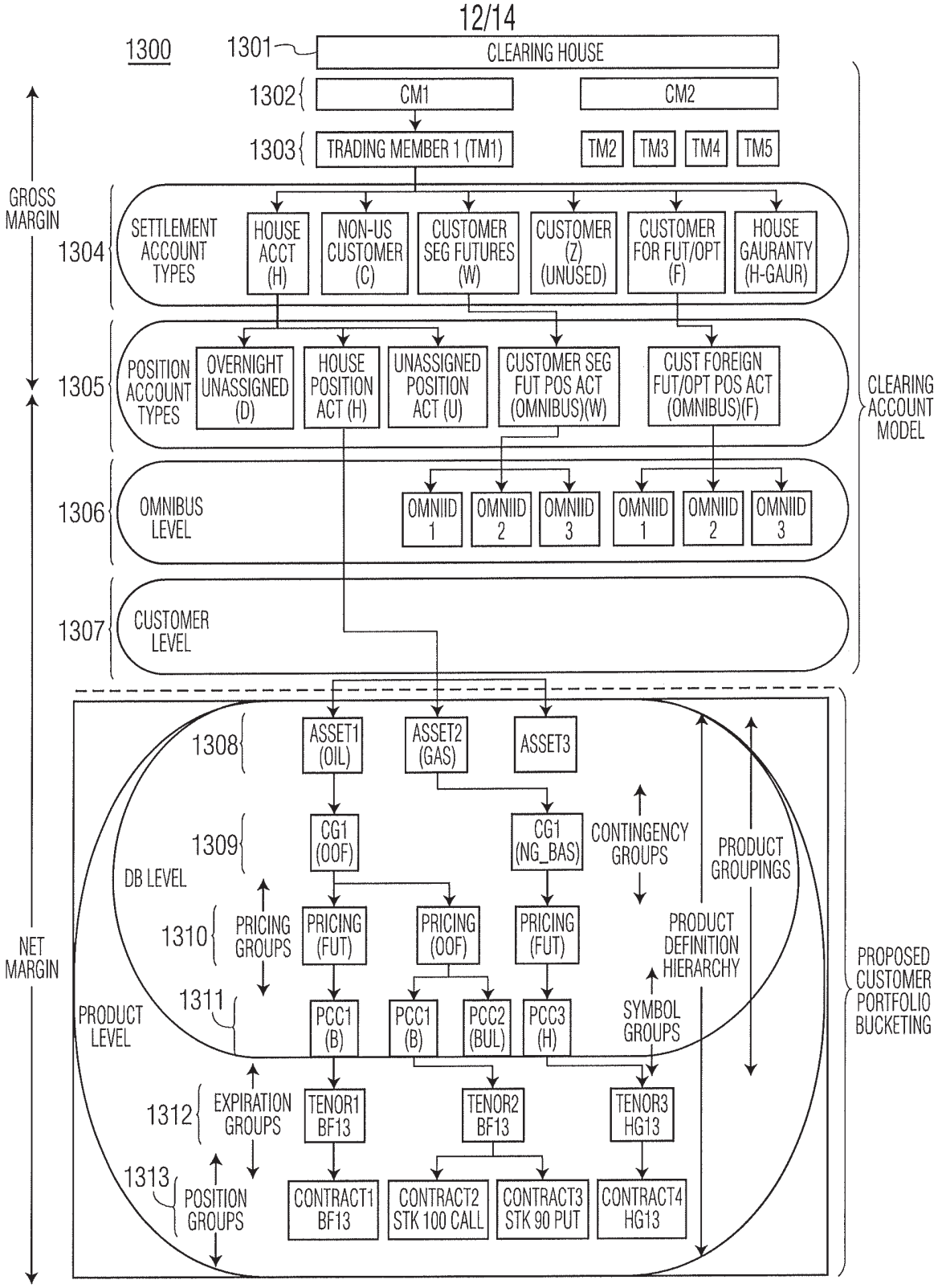

1300
1301
CLEARING HOUSE
1302
CM1
CM2
1303
TRADING MEMBER 1 (TM1)
TM2
TM3
TM4
TM5
GROSS MARGIN
1304
SETTLEMENT ACCOUNT TYPES
HOUSE ACCT (H)
NON-US CUSTOMER (C)
CUSTOMER SEG FUTURES (W)
CUSTOMER (Z) (UNUSED)
CUSTOMER FOR FUT/OPT (F)
HOUSE GAURANTY (H-GAUR)
1305
POSITION ACCOUNT TYPES
OVERNIGHT UNASSIGNED (D)
HOUSE POSITION ACT (H)
UNASSIGNED POSITION ACT (U)
CUSTOMER SEG FUT POS ACT (OMNIBUS)(W)
CUST FOREIGN FUT/OPT POS ACT (OMNIBUS)(F)
CLEARING ACCOUNT MODEL
1306
OMNIBUS LEVEL
OMNIID 1
OMNIID 2
OMNIID 3
OMNIID 1
OMNIID 2
OMNIID 3
1307
CUSTOMER LEVEL
NET MARGIN
1308
ASSET1 (OIL)
ASSET2 (GAS)
ASSET3
1309
DB LEVEL
CG1 (OOF)
CG1 (NG_BAS)
CONTINGENCY GROUPS
PRODUCT GROUPINGS
1310
PRICING GROUPS
PRICING (FUT)
PRICING (OOF)
PRICING (FUT)
PRODUCT DEFINITION HIERARCHY
1311
PRODUCT LEVEL
PCC1 (B)
PCC1 (B)
PCC2 (BUL)
PCC3 (H)
SYMBOL GROUPS
1312
EXPIRATION GROUPS
TENOR1 BF13
TENOR2 BF13
TENOR3 HG13
1313
POSITION GROUPS
CONTRACT1 BF13
CONTRACT2 STK 100 CALL
CONTRACT3 STK 90 PUT
CONTRACT4 HG13
PROPOSED CUSTOMER PORTFOLIO BUCKETING

FIG. 13

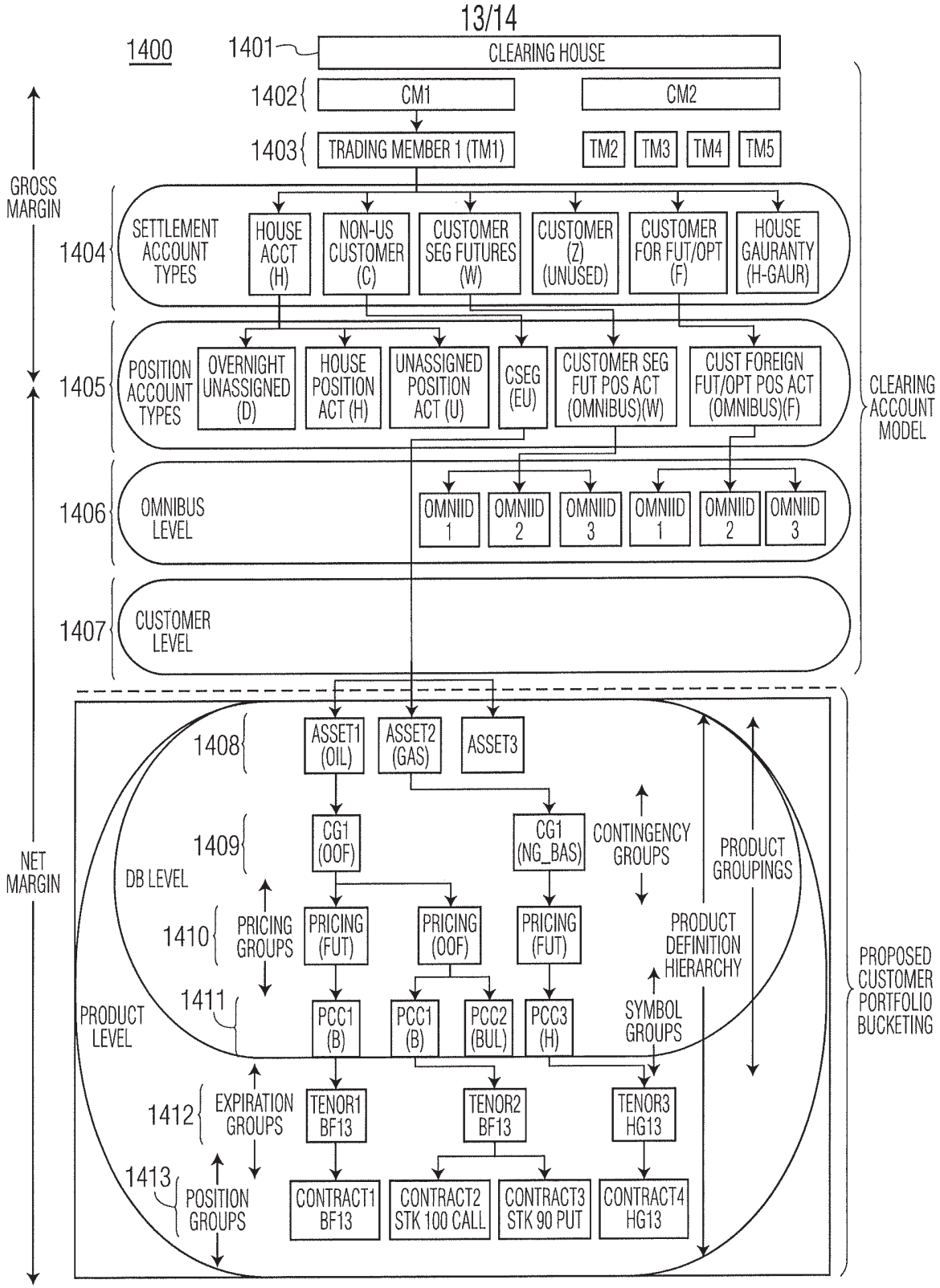

1400
1401
CLEARING HOUSE
1402
CM1
CM2
1403
TRADING MEMBER 1 (TM1)
TM2
TM3
TM4
TM5
GROSS MARGIN
1404
SETTLEMENT ACCOUNT TYPES
HOUSE ACCT (H)
NON-US CUSTOMER (C)
CUSTOMER SEG FUTURES (W)
CUSTOMER (Z) (UNUSED)
CUSTOMER FOR FUT/OPT (F)
HOUSE GAURANTY (H-GAUR)
1405
POSITION ACCOUNT TYPES
OVERNIGHT UNASSIGNED (D)
HOUSE POSITION ACT (H)
UNASSIGNED POSITION ACT (U)
CSEG (EU)
CUSTOMER SEG FUT POS ACT (OMNIBUS)(W)
CUST FOREIGN FUT/OPT POS ACT (OMNIBUS)(F)
CLEARING ACCOUNT MODEL
1406
OMNIBUS LEVEL
OMNIID 1
OMNIID 2
OMNIID 3
OMNIID 1
OMNIID 2
OMNIID 3
1407
CUSTOMER LEVEL
NET MARGIN
1408
ASSET1 (OIL)
ASSET2 (GAS)
ASSET3
1409
DB LEVEL
CG1 (OOF)
CG1 (NG_BAS)
CONTINGENCY GROUPS
PRODUCT GROUPINGS
1410
PRICING GROUPS
PRICING (FUT)
PRICING (OOF)
PRICING (FUT)
PRODUCT DEFINITION HIERARCHY
1411
PRODUCT LEVEL
PCC1 (B)
PCC1 (B)
PCC2 (BUL)
PCC3 (H)
SYMBOL GROUPS
1412
EXPIRATION GROUPS
TENOR1 BF13
TENOR2 BF13
TENOR3 HG13
1413
POSITION GROUPS
CONTRACT1 BF13
CONTRACT2 STK 100 CALL
CONTRACT3 STK 90 PUT
CONTRACT4 HG13
PROPOSED CUSTOMER PORTFOLIO BUCKETING

FIG. 14

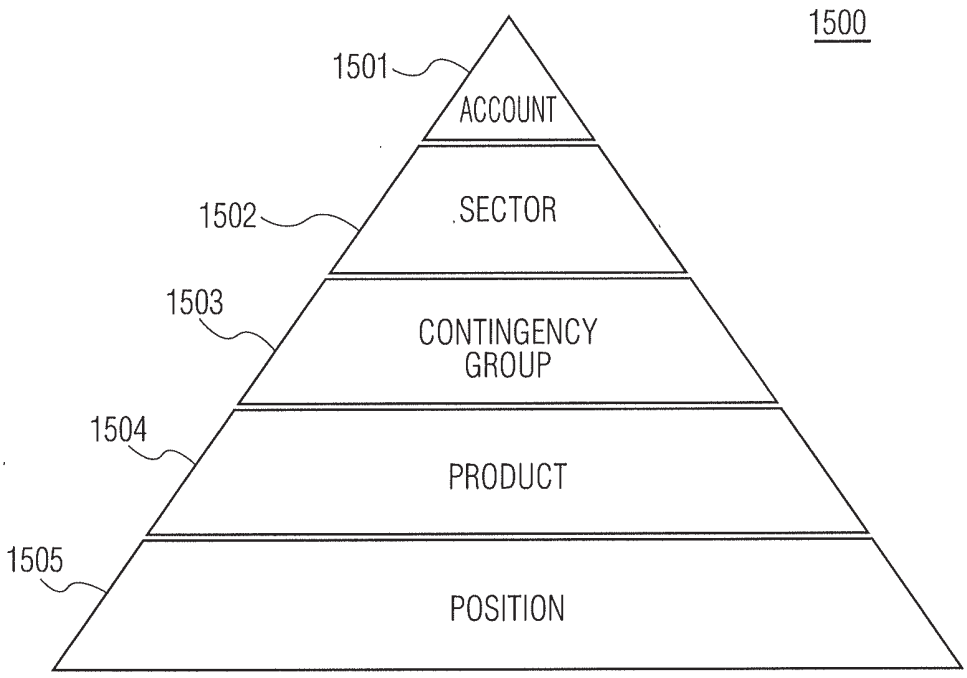

1500
1501
ACCOUNT
1502
SECTOR
1503
CONTINGENCY GROUP
1504
PRODUCT
1505
POSITION

FIG. 15