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CENTRAL DIST. OF CALIF.
LOS ANGELES

BY _____

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and UNILOC USA, INC.

UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

UNILOC LUXEMBOURG S.A., and UNILOC USA, INC. Plaintiffs, vs. eCLINICALWORKS, LLC Defendant.	Case No. CV 13-03244 JFW (VBKx) **COMPLAINT FOR PATENT INFRINGEMENT**

McKool Smith Hennigan, P.C.
Los Angeles, California

FILE COPY

For its Complaint against eCLINICALWORKS, LLC, Plaintiffs Uniloc Luxembourg S.A. and Uniloc USA, Inc. ("Plaintiff" or "Uniloc"), allege as follows:

THE PARTIES

1. Plaintiff Uniloc Luxembourg S.A. is a Luxembourg corporation, having a principal place of business at 75, Bd Grande Duchesse Charlotte, L-1331 Luxembourg. Plaintiff Uniloc Luxembourg S.A. is the owner, by assignment, of all right, title and interest to U.S. Patent No. 5,682,526.

2. Plaintiff Uniloc USA, Inc., is a corporation duly organized and existing under the laws of the State of Texas, with its principal place of business at 7160 Dallas Parkway, Suite 380, Plano, Texas 75024. Plaintiff Uniloc USA is the exclusive licensee of U.S. Patent No. 5,682,526.

3. Defendant eClinicalWorks, LLC ("eClinicalWorks" or "Defendant") is a Limited Liability Company duly organized and existing under the laws of the State of Massachusetts, with its principal place of business at 110 Turnpike Rd, Westborough, MA 01581-2864. Defendant eClinicalWorks's registered agent for service of process in California is CT Corporation System, 818 W 7th St, Los Angeles, CA 90017-3407.

NATURE OF THE ACTION

4. In this civil action, Plaintiff seeks damages against Defendant for acts of patent infringement in violation of the Patent Act of the United States, 35 U.S.C. §§ 1 *et seq*.

JURISDICTION AND VENUE

5. This Court has subject matter jurisdiction of such federal question claims pursuant to 28 U.S.C. §§ 1331 and 1338(a).

6. Venue is proper under 28 U.S.C. §§ 1391(c) and 1400(b), in that the acts and transactions complained of herein were conceived, carried out, made effective, or had effect within the State of California and within this district, among other places. On information and belief, Defendant conducts business activities in this judicial district including regularly doing or soliciting business, engaging in conduct and/or

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los angeles, california

deriving substantial revenue from goods and services provided to consumers in the State of California and in this district.

7. On information and belief, this Court has personal jurisdiction over Defendant. Defendant conducts continuous and systematic business in California and in this district by offering to sell and/or selling infringing electronic health records system in this State and in this district.

FACTS COMMON TO EACH CLAIM FOR RELIEF

8. Plaintiff is the owner by assignment of the entire right, title, and interest, including the right to enforce U.S. Patent Number 5,682,526, entitled "Method and System For Flexibly Organizing, Recording, and Displaying Medical Patient Care Information Using Fields In a Flowsheet" ("the '526 patent"). A true and correct copy of the '526 patent is attached as Exhibit A and incorporated herein by reference.

9. The inventors of the '526 patent are Timothy L. Smokoff, Tom Marlin, and Herbert J. Uhrig. The application resulting in the '526 patent was filed on July 20, 1995, and the patent issued on October 28, 1997. The inventors originally assigned the application resulting in the '526 patent to SpaceLabs Medical, Inc., an early pioneer in the electronic heath record field.

10. The '526 Patent is directed to methods for flexibly organizing, recording, and displaying medical patient care information. The invention discloses a software system that enables users to customize a patient information hierarchy. The patient information hierarchy defines and organizes the information that may be stored about each patient, as well as patient data flowsheets, which define views in which the patient data may be entered and viewed.

11. The claims of the '526 Patent recite a method of designing a patient information hierarchy, which has parameters and values. Certain parameters are linked to each other and to values. When a user creates a new parameter (New Parameter) and specifies a possible value for the new parameter (New Value), the user may also link that New Value to other parameters (Other Parameter). Therefore,

when the New Parameter and New Value are selected and/or displayed, the Other Parameter, to which the New Value is linked, is also pulled up and displayed. This ensures that a patient management system will efficiently and accurately alert or remind a health care provider of an important variable, condition or issue (Other Parameter) when a separate variable, condition or issue (New Parameter/New Value) is selected.

12. In July 2010, the Office of the National Coordinator (ONC) of the U.S. Department of Health and Human Services (HHS) issued a Final Rule to qualify EHR technology for the American Recovery and Reinvestment Act (ARRA). Rules governing ONC certification are available in 45 C.F.R. Part 170. ONC has approved certain organizations as an Authorized Testing and Certification Body ("ATCB"). ONC-ATCB certification is a program that tests complete EHR systems or EHR modules against the Final Rule issued by the ONC. Vendors who wish to deliver a ONC-ATCB certified solution to a healthcare provider must use software that conforms to all certification criteria adopted at 45 CFR Part 170, Part C and must program that software accordingly.

13. The Certification Commission for Health Information Technology (CCHIT) is an independent, 501(c)(3) nonprofit organization with the public mission of accelerating the adoption of robust, interoperable health information technology. The Commission has been certifying electronic health record technology since 2006 and is approved by the ONC as an Authorized Testing and Certification Body (ONC-ATCB).

14. The ONC-ATCB certification criteria and implementation specifications require an EHR system to conform to predefined operative standards, in order to meet certain functional objectives, such as the ability to readily exchange information between parties, insure accurate identification of drug-drug interactions, enable electronic prescribing and order entry, calculate and submit clinical quality measures, and support clinical decisions.

15. To achieve those functional objectives, in particular electronically exchanging data with other systems, a certified EHR system must organize patient data into a plurality of structured documents, which are generally defined by a Continuity of Care Document ("CCD") or Continuity of Care Record ("CCR"). The CCD and CCR are defined as acceptable content exchange standards for the purposes of electronically exchanging a patient summary record in 45 C.F.R. Section 170.205. One or more these structured documents ("Hierarchy Documents") comprise the patient information hierarchy.

16. One example of a Hierarchy Document is a CCR described in ASTM E2369. According to ASTM E2369, Section A2.5.3, "the core patient-specific data contained within the CCR is within the Body of the CCR Document…<body> is comprised of sections, which contain the discrete data objects that make up the core elements and content of the CCR." The <Body> data objects include Payer, Advance Directives, Support, Functional Status, Problems, Family History, Social History, Alerts, Medications, Medical Equipment, Immunizations, Vital Signs, Results, Procedures, Encounters, Plan of Care, and Health Care Provider, among other objects. An example data object (parameter) is shown below:

Example 21 – Data Object <Description>

```
<Description>
 <ObjectAttribute>
  <Attribute>Diagnosis</Attribute>
   <AttributeValue>
    <Value>Myocardial Infarction</Value>
    <Code>
     <Value>22298006</Value>
     <CodingSystem>SNOMED CT</CodingSystem>
     <Version>20050131</Version>
    </Code>
   </AttributeValue>
</ObjectAttribute>
<ObjectAttribute>
  <Attribute>Acuity</Attribute>
   <AttributeValue>
    <Value>Acute</Value>
    <Code>
    <Value>53737009</Value>
    <CodingSystem>SNOMED CT</CodingSystem>
    <Version>20050131</Version>
   </Code>
  </AttributeValue>
</ObjectAttribute>
<ObjectAttribute>
 <Attribute>Site</Attribute>
  <AttributeValue>
   <Value>Anterioseptal</Value>
```

17. As shown above, part of the CCR is a parameter, Diagnosis, which has a value "Myocardial Infarction". The structure of the data object (parameter) allows the data object and associated value (myocardial infarction) to be linked to other data objects (i.e. medications, plan of care, etc.).

18. In one example, this link is effectuated through the "InternalCCRLink". The InternalCCRLink is the mechanism used to link one CCR data object (Diagnosis) to another data object (Medications). The claims of the '526 patent do not require any particular form of linking. Thus, while the use of an InternalCCRLink satisfies the linking requirements in the '526 patent, other forms of linking satisfy the claims of the '526 patent as well.

19. To pass certain ONC-ATCB certification tests, namely tests for drug-drug interactions and clinical support decisions, EHR software must implement rules that operate by linking possible result values for certain parameters (i.e. within one data object) to other parameters (*i.e.* within another data object) in the patient hierarchy. Accordingly, certified EHR software and systems must use a patient information hierarchy (Hierarchy Document), which contains a plurality of parameters (data objects) including a linked-from parameter (*e.g.* Diagnosis) having a linked-from possible result value (*e.g.*, Myocardial Infarction) that is linked to one or more linked-to parameters (*e.g.*, Medications, Plan of care, etc.).

20. The linking functionality required to obtain ONC-ATCB certification is described and claimed in the '526 Patent. Depending on whether the certified software uses a CCD or CCR, the linking functionality may be done in underlying software or in the user interface. Additionally, the linked parameters may define rules or alerts.

21. To obtain ONC-ATCB certification, an EHR provider's software and system must satisfy all other limitations of the independent claims in the '526 patent. In other words, EHR software and systems cannot receive ONC-ATCB certification under the published rules without also infringing one or more claims of the '526 patent.

22. Uniloc has investigated eClinicalWorks eClinicalWorks EMR software, beginning with version 8.0.47, and has determined that such software, including all later versions of the software ("eClinicalWorks EMR software") practices one or more of the claims of the '526 patent.

FIRST CLAIM FOR RELIEF FOR DIRECT INFRINGEMENT OF U.S. PATENT NO. 5,682,526

23. Plaintiff incorporates herein by reference the allegations set forth in paragraphs 1-22 of this Complaint as though fully set forth herein.

24. Defendant eClinicalWorks has directly infringed and continues to directly infringe the '526 patent by making, using, selling, and/or offering for sale its eClinicalWorks EMR software, which embodies and/or otherwise practices one or more of the claims of the '526 patent.

25. eClinicalWorks has received certification from HHS that at least its eClinicalWorks EMR software System is ONC compliant.

26. The eClinicalWorks EMR software directly infringes one or more claims of the '526 patent because, among other things, it contains categories of patient information for logically organizing patient information in the form of a patient information hierarchy. Relationships between the patient information, or parameters, within eClinicalWorks EMR software are well-defined and the parameters have result values may be programmed to link to other parameters.

27. eClinicalWorks also infringes the '526 Patent because eClinicalWorks EMR software, among other things, creates alerts and reminders. eClinicalWorks EMR software creates parameters and values (new parameters/new values) such that the specifying of patient's data would trigger health reminders (other parameters) that alert providers and staff to other tests, medical screenings, and procedures.

28. The eClinicalWorks EMR software complies with the requirement for a patient information hierarchy. To comply, when a vendor or healthcare provider inputs information, the eClinicalWorks EMR software receives an instruction to create a new parameter, i.e. data object, within the patient hierarchy. In response, the eClinicalWorks EMR software creates that new parameter (data object) within the patient hierarchy.

29. The eClinicalWorks EMR software has passed test procedures established for various sections of 45 CFR Section 170, including Section 170.304(e) (Clinical Decision Support) and 170.302(a) (drug-drug, drug-allergy, formulary checks), among other tests for both ambulatory and inpatient software.

30. The eClinicalWorks EMR software is capable of being configured such as drug-drug interaction notifications or clinical support decisions, can be effectuated. When a possible result value (e.g., a disease state) is placed into the eClinicalWorks EMR software with a parameter (*e.g.*, a diagnosis), the eClinicalWorks EMR software associates that new value or values with the parameter.

31. To support certain features within the certification standard, such as alerts/notifications as required by the testing procedures of Section 170.304(e) (Clinical Decision Support) and 170.302(a), the eClinicalWorks EMR software includes a link between a parameter/value with another data object within the patient hierarchy using the link mechanism.

32. In response, the eClinicalWorks EMR software links the parameter/value (e.g., a Diagnosis/Myocardial Infarction) to the indicated parameters (e.g., Medications, Plan of Care, etc.). By doing so, an alert or notification is effectuated such that when the new parameter (e.g., a Diagnosis) is displayed for a particular patient that has the indicated value (e.g., Myocardial Infarction), the linked-to parameters (e.g., Medications, Plan of Care, etc.) are also displayed. The same data object/value pairing, linking, and alert function is also used for notifying users of drug-drug interactions, allergy-drug interactions, or clinical support decisions. While the claims of the '526 patent recite a linking ability, the claims do not require that any particular parameter of value be linked.

33. As a direct and proximate result of eClinicalWorks's infringement of the '526 patent, Plaintiff has been and continues to be damaged in an amount yet to be determined.

SECOND CLAIM FOR RELIEF FOR INDIRECTLY INFRINGING U.S. PATENT NO. 5,682,526

34. Plaintiff incorporates herein by reference the allegations set forth in paragraphs 1-33 of this Complaint as though fully set forth herein.

35. Defendant eClinicalWorks has indirectly infringed and continues to indirectly infringe the '526 patent by actively inducing direct infringement by other persons.

36. Customers of eClinicalWorks, including medical groups and/or individual medical providers use the eClinicalWorks EMR software. eClinicalWorks' customers, who directly infringe the '526 patent include, for example, Grove Medical Associates and Urban Health Plan. eClinicalWorks provides instruction regarding the use of the eClinicalWorks EMR software.

37. The eClinicalWorks EMR software infringes one or more of the claims of the '526 patent for the reasons set forth under the Facts Common to Each Claim for Relief and the allegations regarding direct infringement.

38. eClinicalWorks had knowledge of the '526 patent at least by May 26, 2011, when Plaintiff notified eClinicalWorks of the patent and its infringement. After this date, eClinicalWorks knew or should have known that its continued sale of the eClinicalWorks EMR software, and its continued support of the eClinicalWorks EMR software by existing users would induce direct infringement by those users. Further, eClinicalWorks intended that its continued actions would induce direct infringement by those users.

39. As a direct and proximate result of eClinicalWorks's indirect infringement of the '526 patent, Plaintiff has been and continues to be damaged in an amount yet to be determined.

THIRD CLAIM FOR RELIEF AGAINST DEFENDANT HP FOR CONTRIBUTING TO THE INFRINGEMENT OF U.S. PATENT NO. 5,682,526

40. Plaintiff incorporates herein by reference the allegations set forth in paragraphs 1-39 of this Complaint as though fully set forth herein.

41. By distributing, selling and/or installing its eClinicalWorks EMR software, eClinicalWorks provides non-staple articles of commerce to others for use in infringing EHR systems. Users of the eClinicalWorks EMR software directly

infringe the '526 patent for the reasons set forth under the Facts Common to Each Claim for Relief and the allegations regarding direct infringement. eClinicalWorks' customers, who directly infringe the '526 patent include, for example, Grove Medical Associates and Urban Health Plan.

42. Since at least by May 26, 2011, eClinicalWorks had knowledge of the '526 patent. After this date, eClinicalWorks had knowledge that its eClinicalWorks EMR software software, which are non-staple articles of commerce, was used as a material part of the claimed invention of the '526 patent.

43. As a direct and proximate result of eClinicalWorks's contributory infringement of the '526 patent, Plaintiff has been and continues to be damaged in an amount yet to be determined.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff prays for judgment against Defendant as follows:

1. For a judicial determination and declaration that Defendant has infringed and continues to infringe the '526 patent by making, using, importing, offering for sale, and/or selling its eClinicalWorks EHR software;

2. For a judicial determination and declaration that Defendant has induced, and continues to induce, the infringement of the '526 patent;

3. For a judicial determination and declaration that Defendant has contributorily infringed, and continues to contributorily infringe, the '526 patent;

4. For damages resulting from Defendant's past and present infringement of the '526 patent;

5. For a declaration that this is an exceptional case under 35 U.S.C. § 285 and for an award of attorneys' fees and costs in this action;

6. For an assessment of prejudgment interest; and

7. For such other and further relief as the Court may deem just and proper under the circumstances.

DATED: May 6, 2013

MCKOOL SMITH HENNIGAN, P.C.

By _____
Lawrence M. Hadley

Attorneys for UNILOC LUXEMBOURG S.A. and UNILOC USA, INC.

DEMAND FOR JURY TRIAL

Uniloc Luxembourg S.A. and Uniloc USA, Inc., hereby demand a jury trial pursuant to Rule 38 of the Federal Rules of Civil Procedure as to all issues in this lawsuit.

DATED: May 6, 2013

MCKOOL SMITH HENNIGAN, P.C.

By _____
Lawrence M. Hadley

Attorneys for UNILOC LUXEMBOURG S.A. and UNILOC USA, INC.

EXHIBIT A

US005682526A

United States Patent [19]

Smokoff et al.

[11] Patent Number: 5,682,526

[45] Date of Patent: Oct. 28, 1997

[54] **METHOD AND SYSTEM FOR FLEXIBLY ORGANIZING, RECORDING, AND DISPLAYING MEDICAL PATIENT CARE INFORMATION USING FIELDS IN A FLOWSHEET**

[75] Inventors: **Timothy L. Smokoff**, Renton; **Tom Marlin**, Edmonds, both of Wash.; **Herbert J. Uhrig**, Duluth, Ga.

[73] Assignee: **SpaceLabs Medical, Inc.**, Redmond, Wash.

[21] Appl. No.: **504,801**

[22] Filed: **Jul. 20, 1995**

[51] **Int. Cl.**[6] **G06F 17/30**

[52] **U.S. Cl.** **395/615**; 395/602; 395/611; 128/710

[58] **Field of Search** 364/413.01; 395/161, 395/600, 700, 608, 764, 768, 601, 603, 765, 202; 340/172.5; 128/710

[56] **References Cited**

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5,253,362	10/1993	Nolan et al.	395/601
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Petroni et al. "An Automatic Speech Recognition System for Bedside Data Entry in an Intensive Care Unit", Circuits and Systems, 1990 IEEE Midwest Symposium, pp. 791–794.

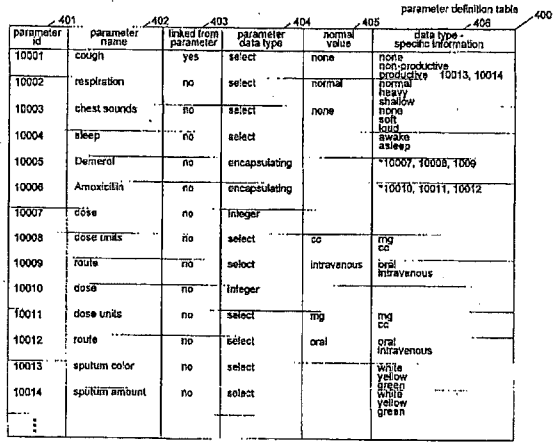
Saab et al. "Data Modeling and Design of a Patient Data Management System in an Intensive Care Unit", Computer Based Medical Systems, 1992 Symposium, May 1992, pp. 54–63.

Primary Examiner—Thomas G. Black
Assistant Examiner—Charles L. Rones
Attorney, Agent, or Firm—Seed and Berry LLP

[57] **ABSTRACT**

A method and system for flexibly organizing, recording, and displaying medical patient care information is provided. In a preferred embodiment, a patient information management facility enables users to customize a patient information hierarchy, which defines and organizes the information that may be stored about each patient, as well as patient data flowsheets, which define views in which the patient data stored according to the hierarchy may be entered and viewed, in a way that is optimized for the structure and procedures of the particular health care organization. The facility enables users to add, modify, and rearrange global or local patient information parameters that make up the hierarchy. Users may define the parameters to be any of a number of types. The user may also customize flowsheets used for entering and displaying result values of parameters defined in the hierarchy for particular patients. The user may expand and contract overview encapsulating parameters to display or hide the encapsulated parameters encapsulated therein. The facility also allows the user to link a result value of one parameter to other parameters, causing the linked-to parameters to be displayed when the result value is entered.

25 Claims, 21 Drawing Sheets



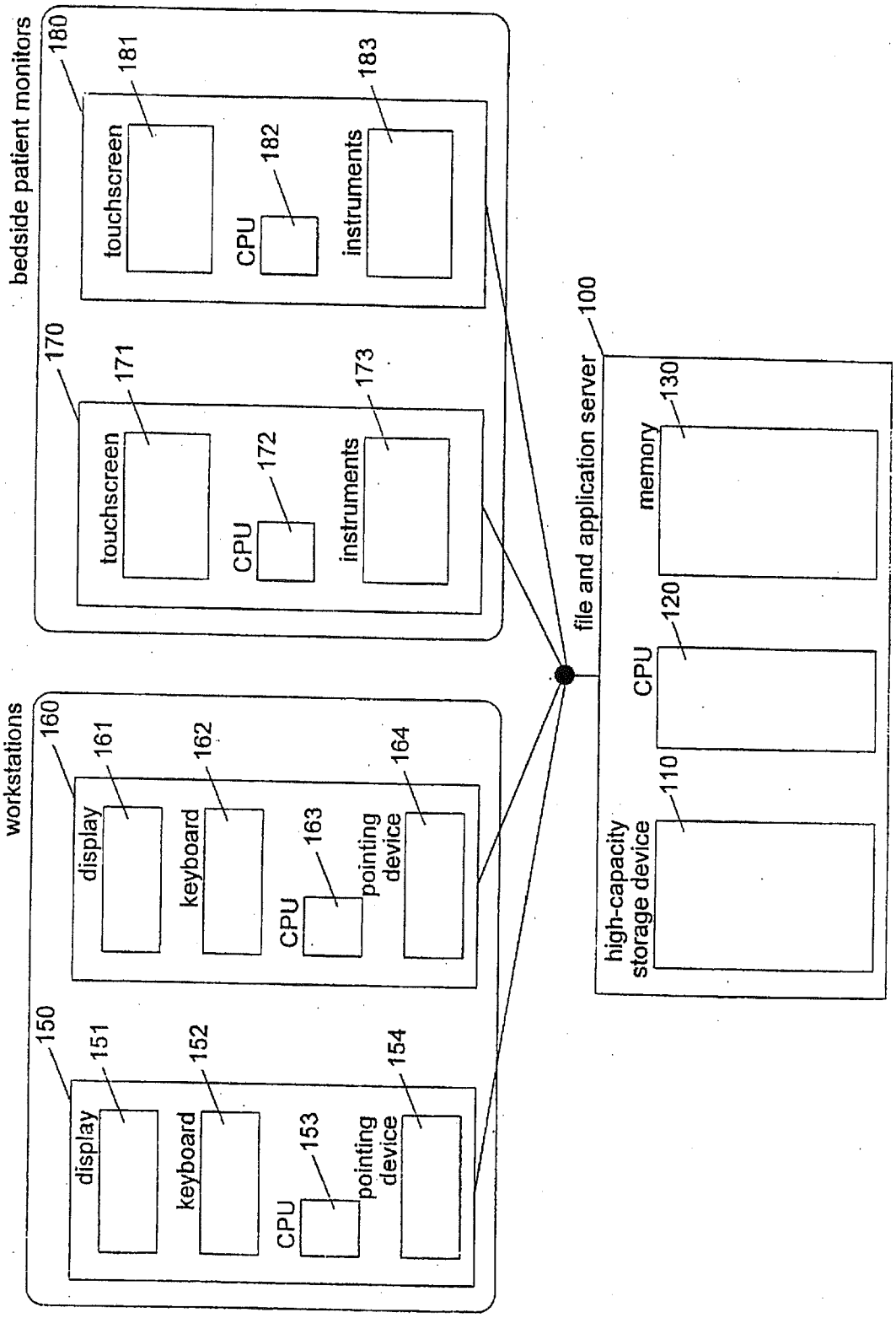

bedside patient monitors
180
touchscreen
181
CPU
182
instruments
183
170
touchscreen
171
CPU
172
instruments
173
workstations
160
display
161
keyboard
162
CPU
163
pointing device
164
150
display
151
keyboard
152
CPU
153
pointing device
154
file and application server
100
memory
130
CPU
120
high-capacity storage device
110

FIG. 1

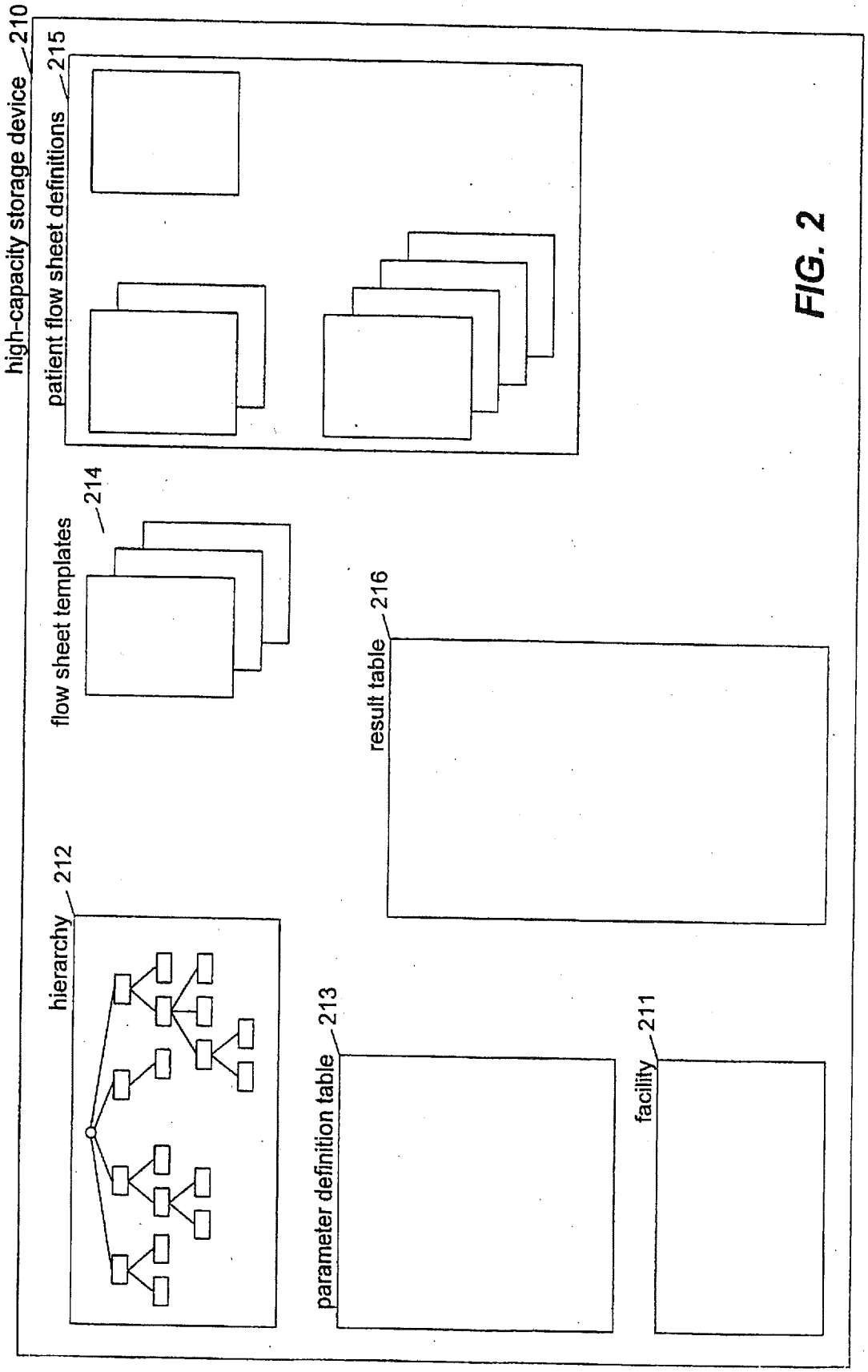

high-capacity storage device
210
patient flow sheet definitions
215
flow sheet templates
214
result table
216
hierarchy
212
parameter definition table
213
facility
211

FIG. 2

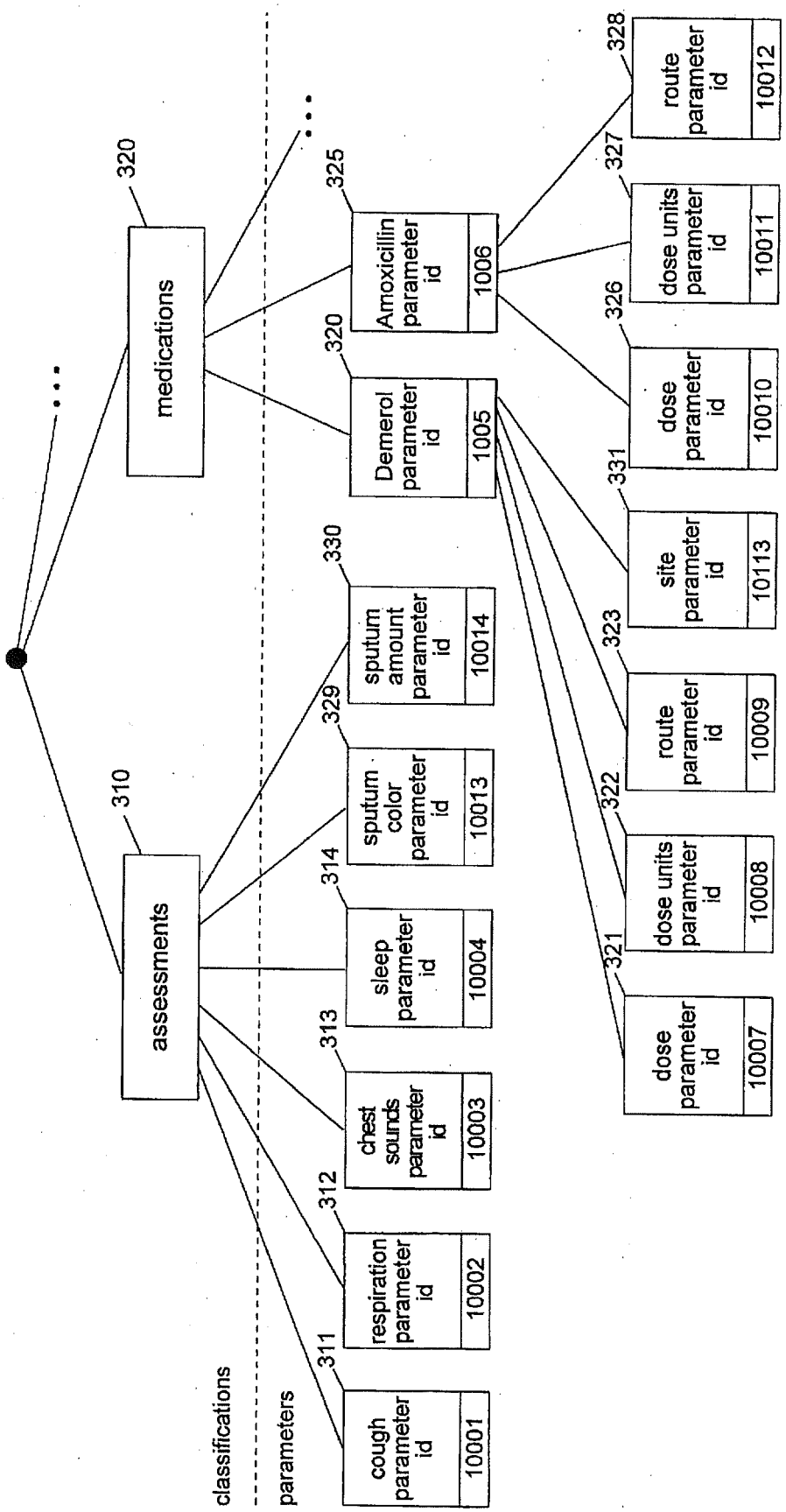

classifications
parameters
assessments
310
medications
320
cough parameter id 10001
311
respiration parameter id 10002
312
chest sounds parameter id 10003
313
sleep parameter id 10004
314
sputum color parameter id 10013
329
sputum amount parameter id 10014
330
Demerol parameter id 1005
320
Amoxicillin parameter id 1006
325
dose parameter id 10007
321
dose units parameter id 10008
322
route parameter id 10009
323
site parameter id 10113
331
dose parameter id 10010
326
dose units parameter id 10011
327
route parameter id 10012
328

FIG. 3

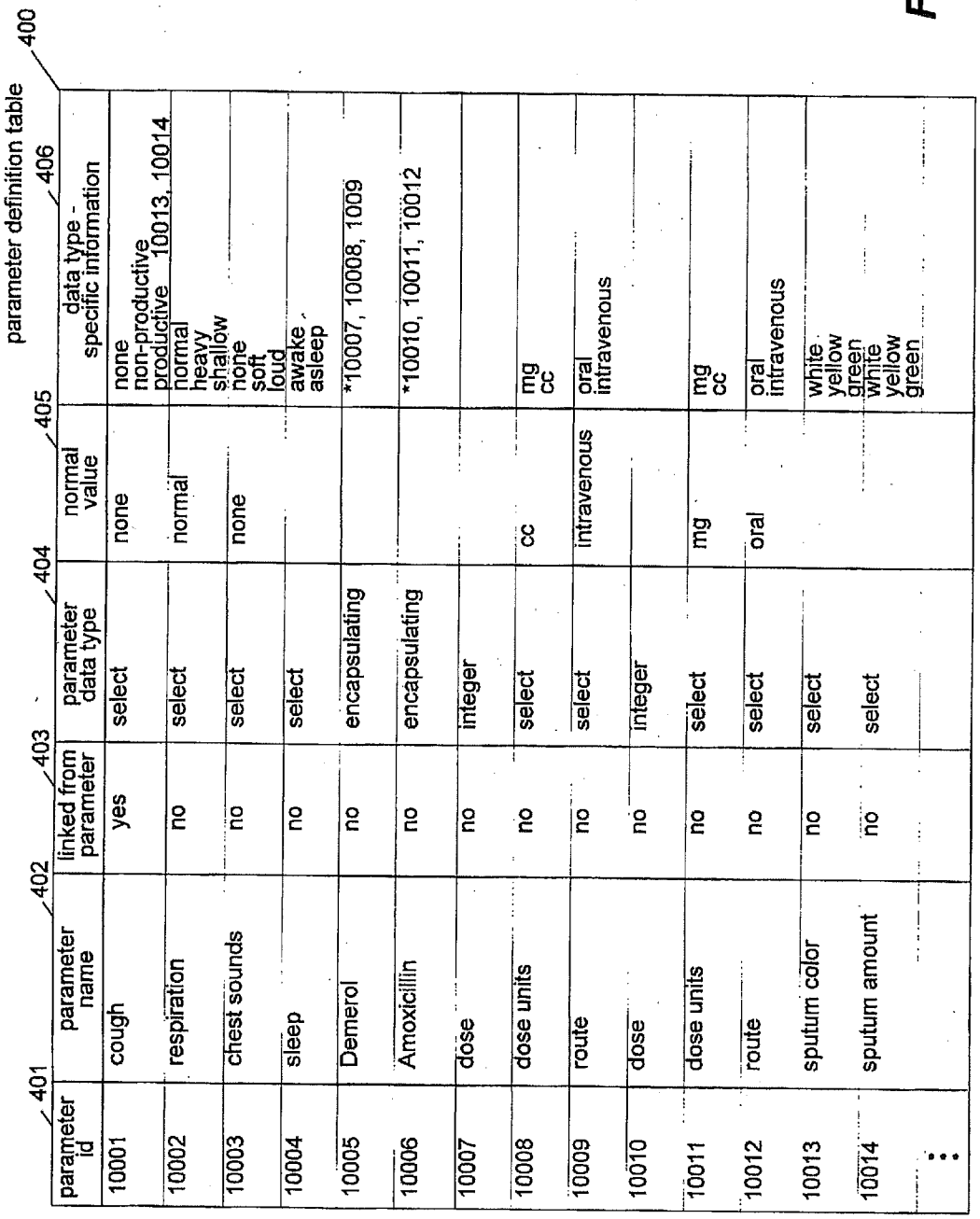

parameter definition table
400
401
402
403
404
405
406
parameter id
parameter name
linked from parameter
parameter data type
normal value
data type - specific information
10001
cough
yes
select
none
none
non-productive
productive
10013, 10014
10002
respiration
no
select
normal
normal
heavy
shallow
10003
chest sounds
no
select
none
none
soft
loud
10004
sleep
no
select
awake
asleep
10005
Demerol
no
encapsulating
*10007, 10008, 1009
10006
Amoxicillin
no
encapsulating
*10010, 10011, 10012
10007
dose
no
integer
10008
dose units
no
select
cc
mg
cc
10009
route
no
select
intravenous
oral
intravenous
10010
dose
no
integer
10011
dose units
no
select
mg
mg
cc
10012
route
no
select
oral
oral
intravenous
10013
sputum color
no
select
white
yellow
green
10014
sputum amount
no
select
white
yellow
green

FIG. 4

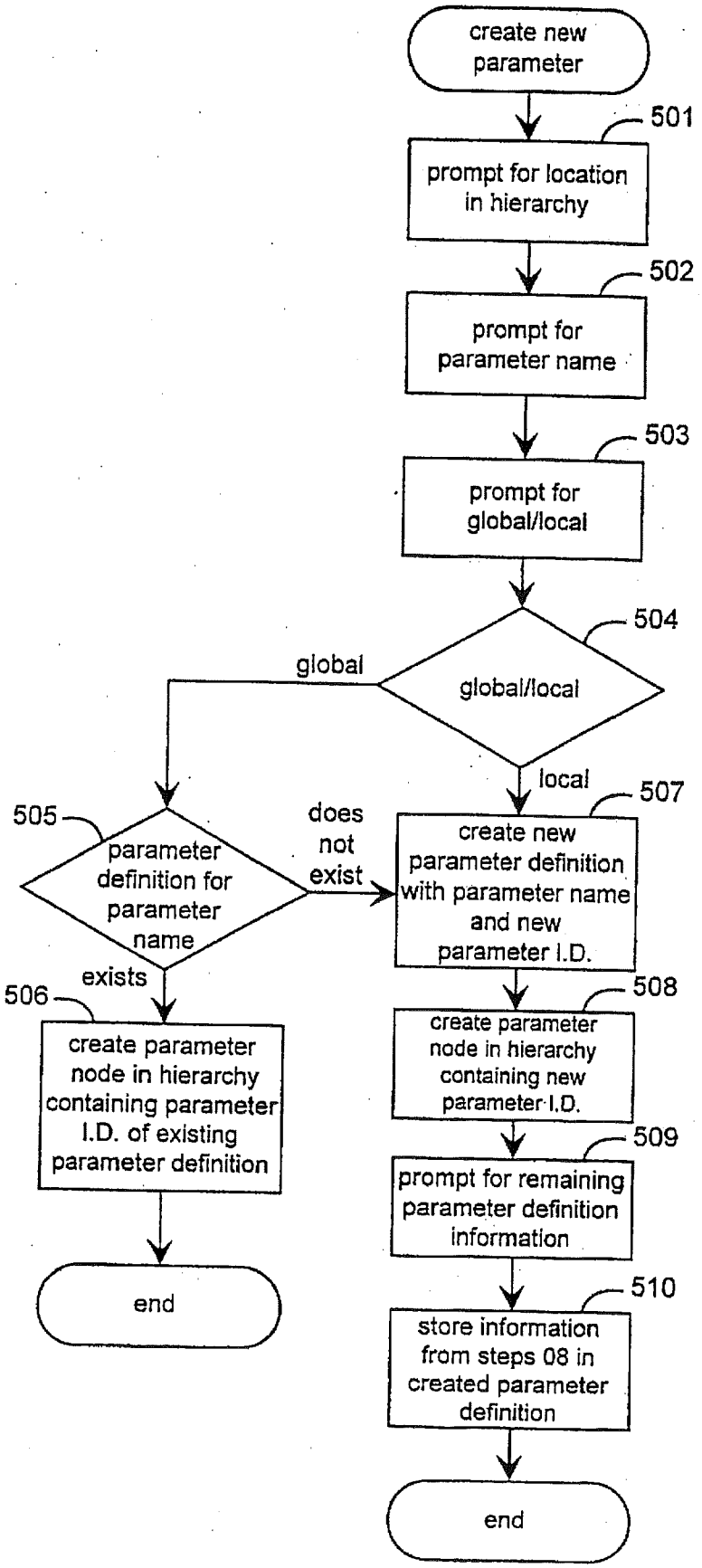

create new parameter
501
prompt for location in hierarchy
502
prompt for parameter name
503
prompt for global/local
504
global/local
global
local
505
parameter definition for parameter name
does not exist
exists
506
create parameter node in hierarchy containing parameter I.D. of existing parameter definition
end
507
create new parameter definition with parameter name and new parameter I.D.
508
create parameter node in hierarchy containing new parameter I.D.
509
prompt for remaining parameter definition information
510
store information from steps 08 in created parameter definition
end

FIG. 5

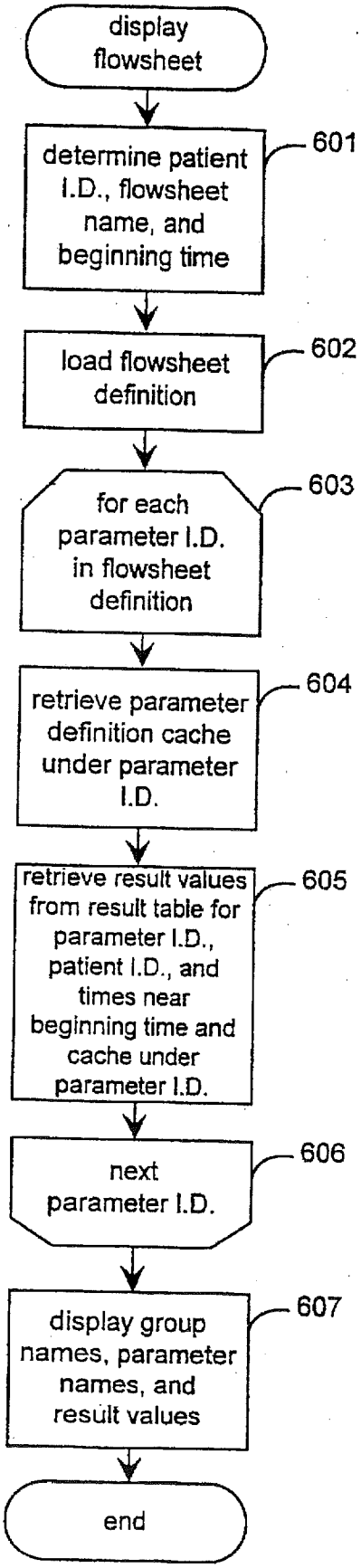

display flowsheet
determine patient I.D., flowsheet name, and beginning time
601
load flowsheet definition
602
for each parameter I.D. in flowsheet definition
603
retrieve parameter definition cache under parameter I.D.
604
retrieve result values from result table for parameter I.D., patient I.D., and times near beginning time and cache under parameter I.D.
605
next parameter I.D.
606
display group names, parameter names, and result values
607
end

FIG. 6

FIG. 7

result table 700

	701 patient i.d.	702 parameter i.d.	703 result time	704 result value
11	100001	10001	01/25 23:00	none
12	100001	10003	01/25 23:00	soft
13	100002	10001	01/25 23:00	non-productive
14	100002	10001	01/26 00:00	productive
15	100002	10004	01/25 23:00	asleep
16	100002	10004	01/26 00:00	asleep
17	100003	10007	01/26 00:00	100
18	100003	10008	01/26 00:00	mg
	...			

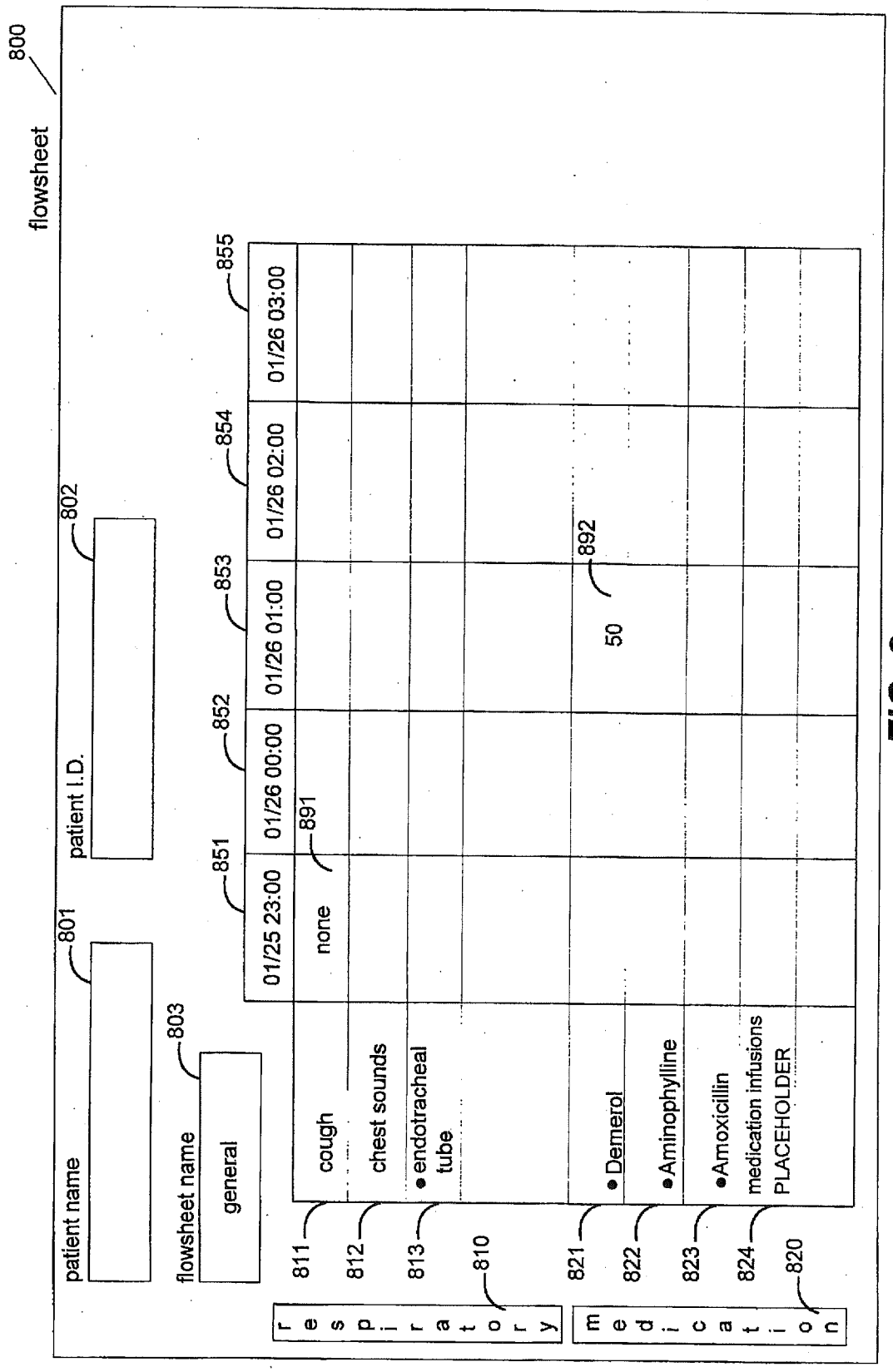

800
flowsheet
patient name
801
patient I.D.
802
flowsheet name
803
general
851
852
853
854
855
01/25 23:00
01/26 00:00
01/26 01:00
01/26 02:00
01/26 03:00
891
none
892
50
respiratory
811 cough
812 chest sounds
813 • endotracheal tube
810
medication
821 • Demerol
822 • Aminophylline
823 • Amoxicillin
824 medication infusions PLACEHOLDER
820

FIG. 8

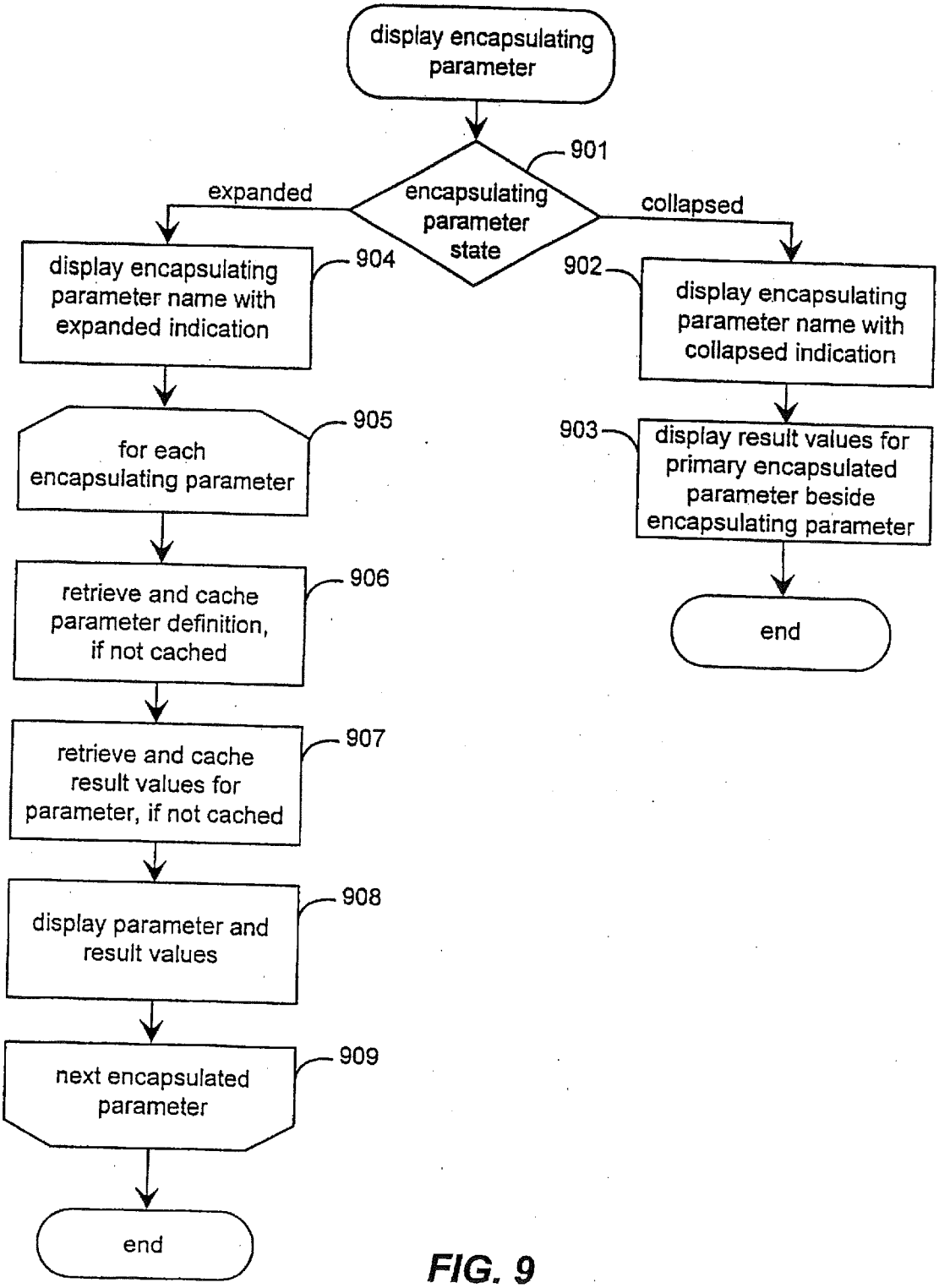

display encapsulating parameter
901
encapsulating parameter state
expanded
collapsed
display encapsulating parameter name with expanded indication
904
display encapsulating parameter name with collapsed indication
902
for each encapsulating parameter
905
display result values for primary encapsulated parameter beside encapsulating parameter
903
retrieve and cache parameter definition, if not cached
906
end
retrieve and cache result values for parameter, if not cached
907
display parameter and result values
908
next encapsulated parameter
909
end

FIG. 9

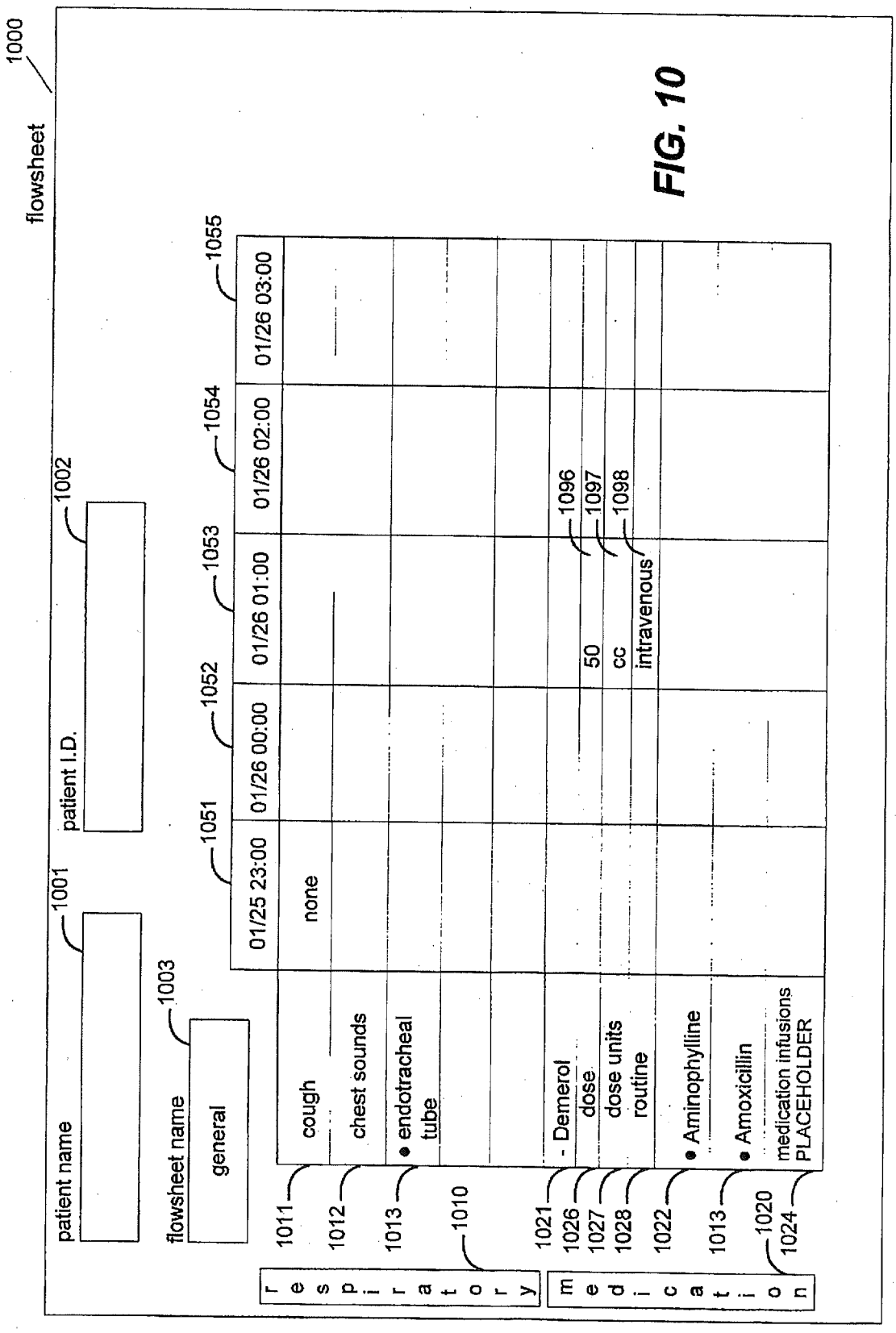

1000
flowsheet
patient name
1001
patient I.D.
1002
flowsheet name
general
1003
01/25 23:00
01/26 00:00
01/26 01:00
01/26 02:00
01/26 03:00
1051
1052
1053
1054
1055
respiratory
cough
none
1011
chest sounds
1012
endotracheal tube
1013
1010
medication
- Demerol
1021
dose
1026
50
1096
dose units
1027
cc
1097
routine
1028
intravenous
1098
Aminophylline
1022
Amoxicillin
1013
medication infusions
1020
PLACEHOLDER
1024

FIG. 10

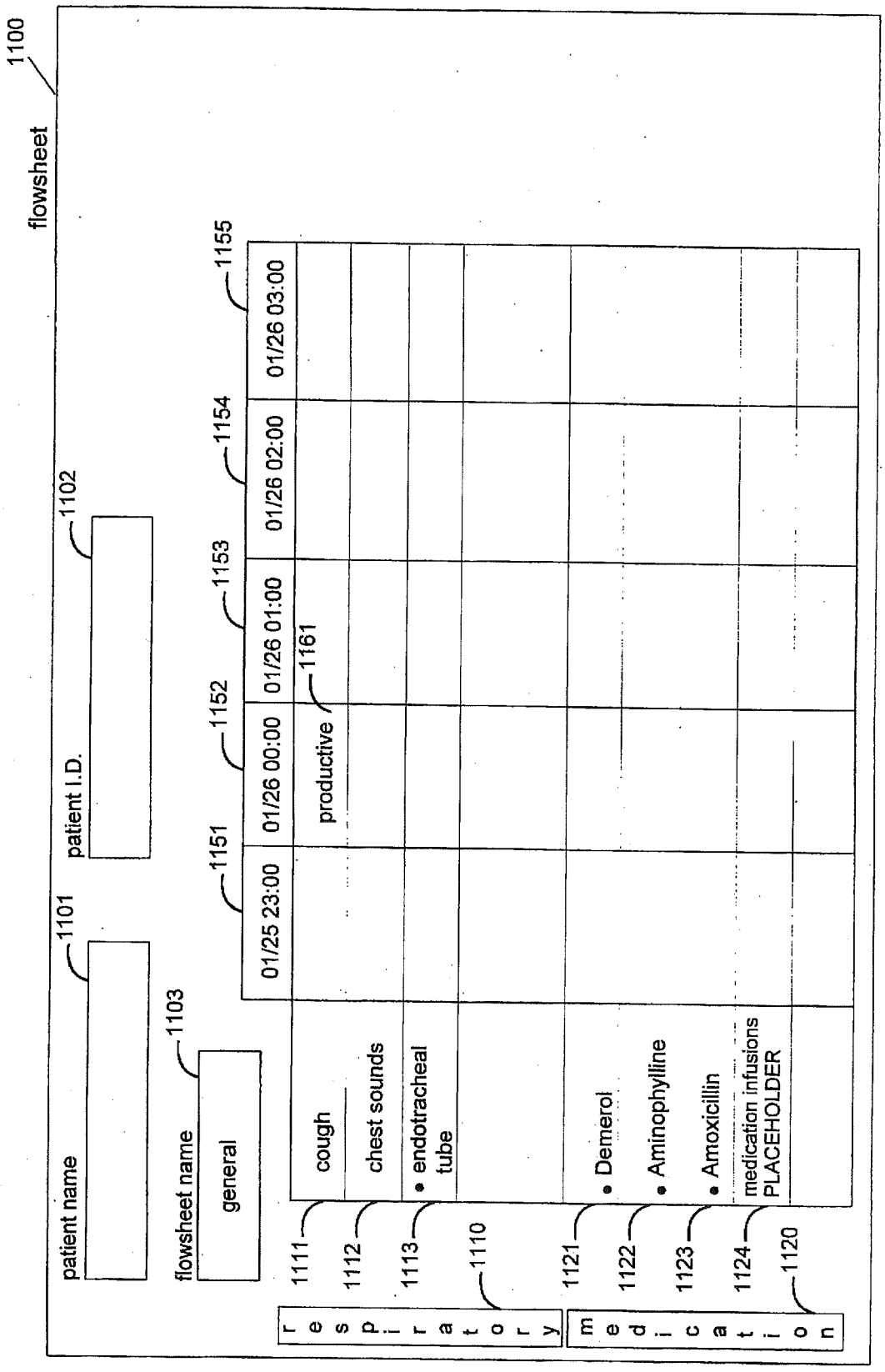

1100
flowsheet
patient name
1101
patient I.D.
1102
flowsheet name
1103
general
1151
01/25 23:00
1152
01/26 00:00
1153
01/26 01:00
1154
01/26 02:00
1155
01/26 03:00
respiratory
1110
1111
cough
productive
1161
1112
chest sounds
1113
endotracheal tube
medication
1120
1121
Demerol
1122
Aminophylline
1123
Amoxicillin
1124
medication infusions
PLACEHOLDER

FIG. 11

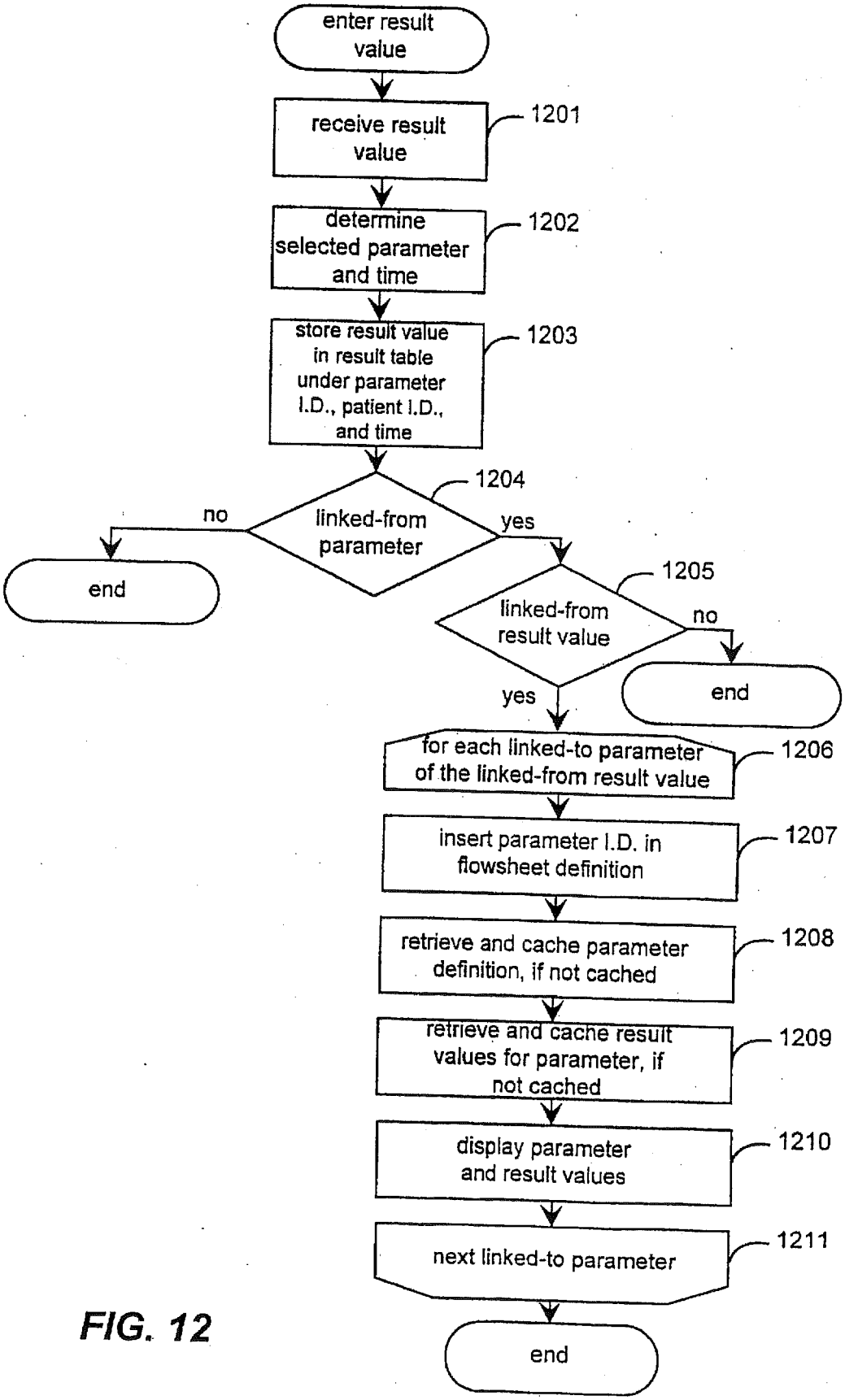

enter result value
receive result value
1201
determine selected parameter and time
1202
store result value in result table under parameter I.D., patient I.D., and time
1203
linked-from parameter
1204
no
yes
end
linked-from result value
1205
no
yes
end
for each linked-to parameter of the linked-from result value
1206
insert parameter I.D. in flowsheet definition
1207
retrieve and cache parameter definition, if not cached
1208
retrieve and cache result values for parameter, if not cached
1209
display parameter and result values
1210
next linked-to parameter
1211
end

FIG. 12

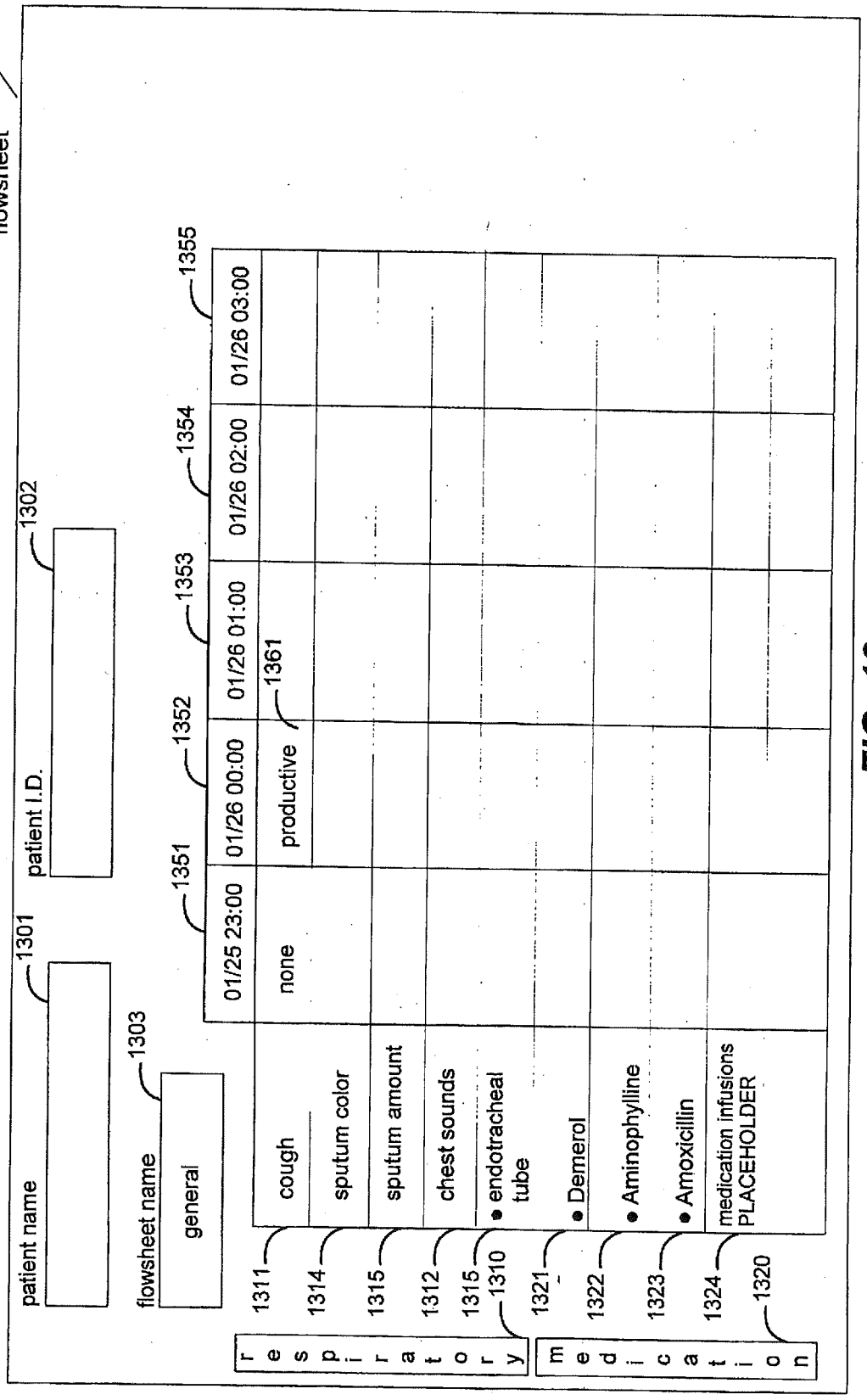

1300
flowsheet
patient name
1301
patient I.D.
1302
flowsheet name
general
1303
1351
1352
1353
1354
1355
01/25 23:00
01/26 00:00
01/26 01:00
01/26 02:00
01/26 03:00
respiratory
1311 cough
none
1314 sputum color
productive
1361
1315 sputum amount
1312 chest sounds
1315 endotracheal tube
1310
medication
1321 Demerol
1322 Aminophylline
1323 Amoxicillin
1324 medication infusions PLACEHOLDER
1320

FIG. 13

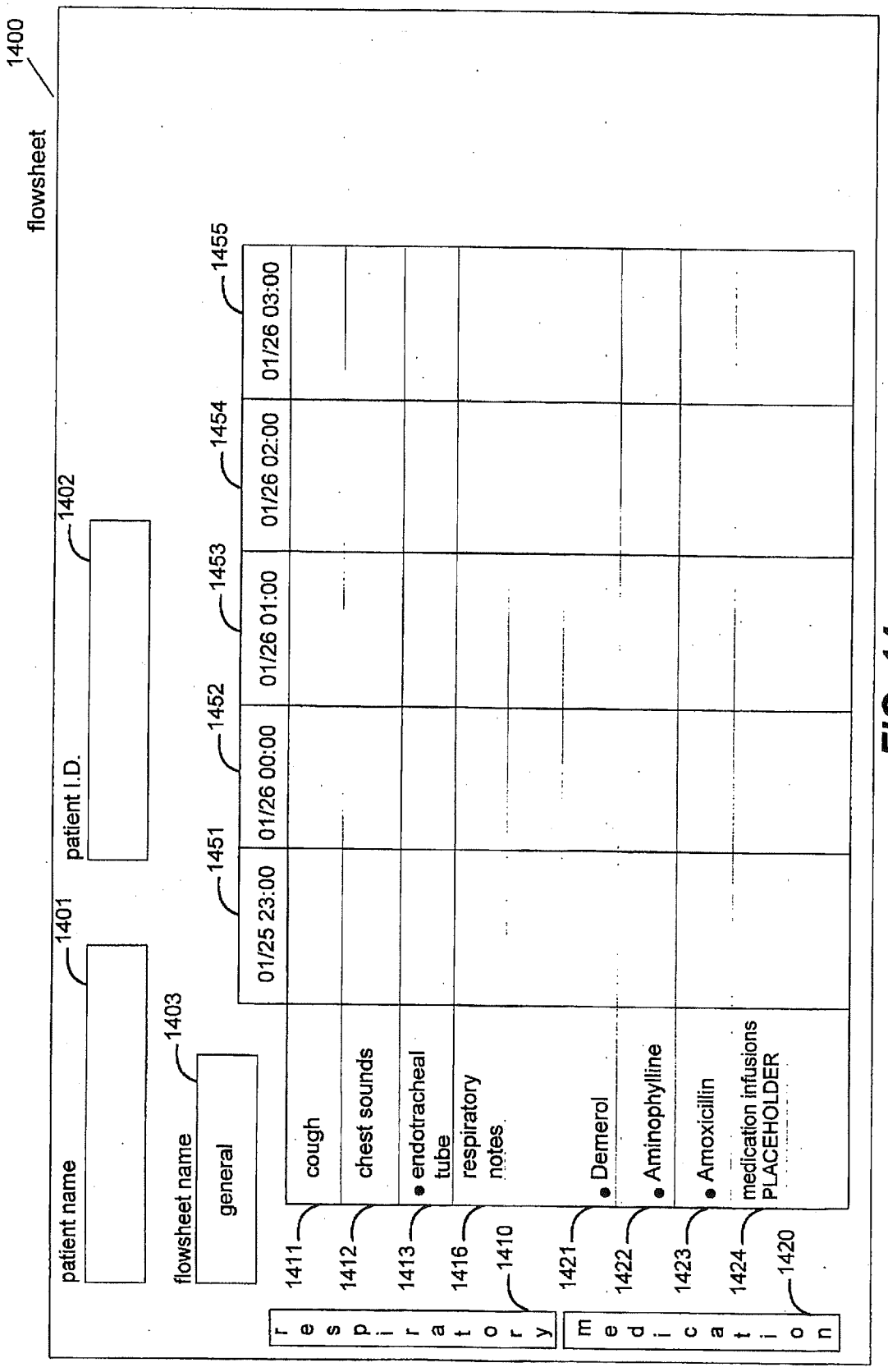

1400
flowsheet
patient name
1401
patient I.D.
1402
flowsheet name
1403
general
1451
1452
1453
1454
1455
01/25 23:00
01/26 00:00
01/26 01:00
01/26 02:00
01/26 03:00
respiratory
1410
1411 cough
1412 chest sounds
1413 • endotracheal tube
1416 respiratory notes
medication
1420
1421 • Demerol
1422 • Aminophylline
1423 • Amoxicillin
1424 medication infusions PLACEHOLDER

FIG. 14

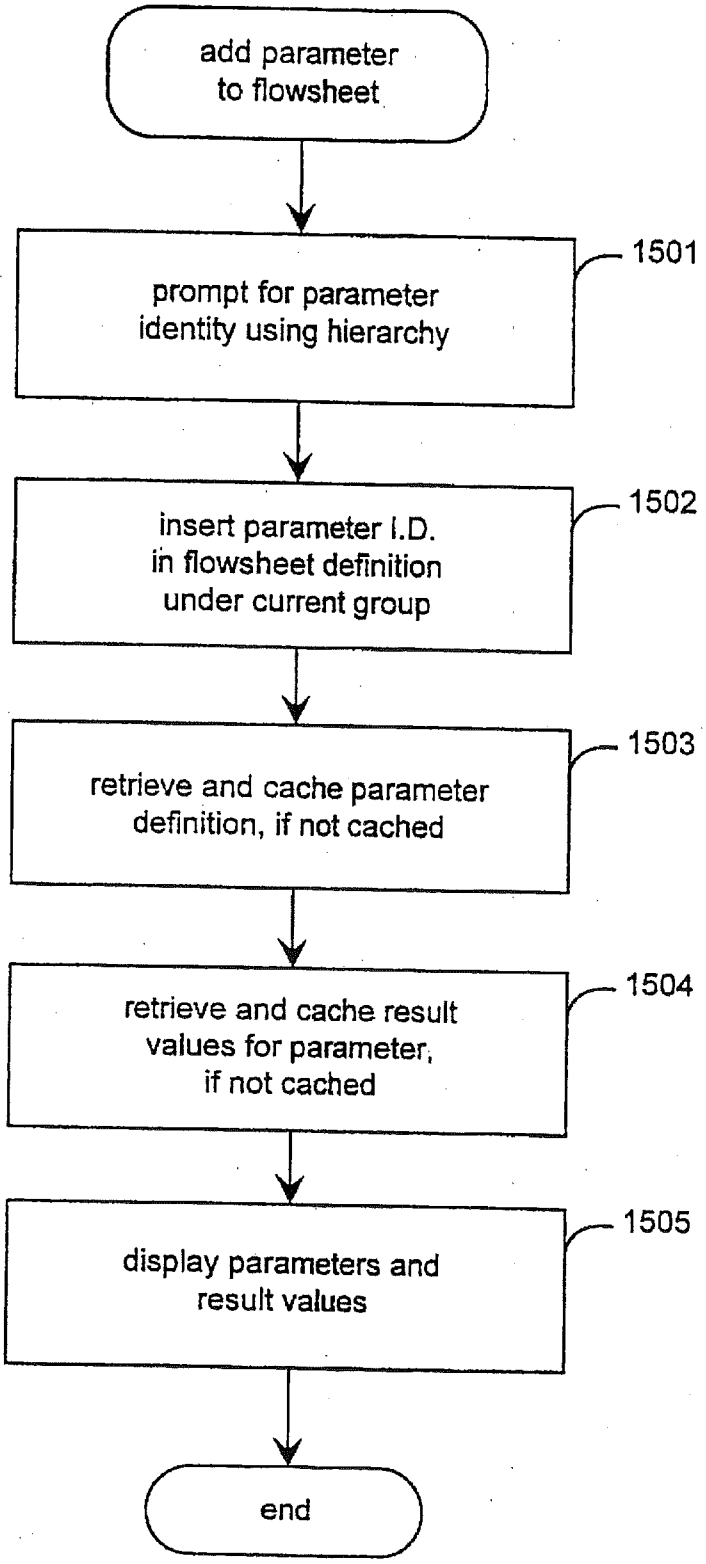

add parameter to flowsheet
prompt for parameter identity using hierarchy
1501
insert parameter I.D. in flowsheet definition under current group
1502
retrieve and cache parameter definition, if not cached
1503
retrieve and cache result values for parameter, if not cached
1504
display parameters and result values
1505
end

FIG. 15

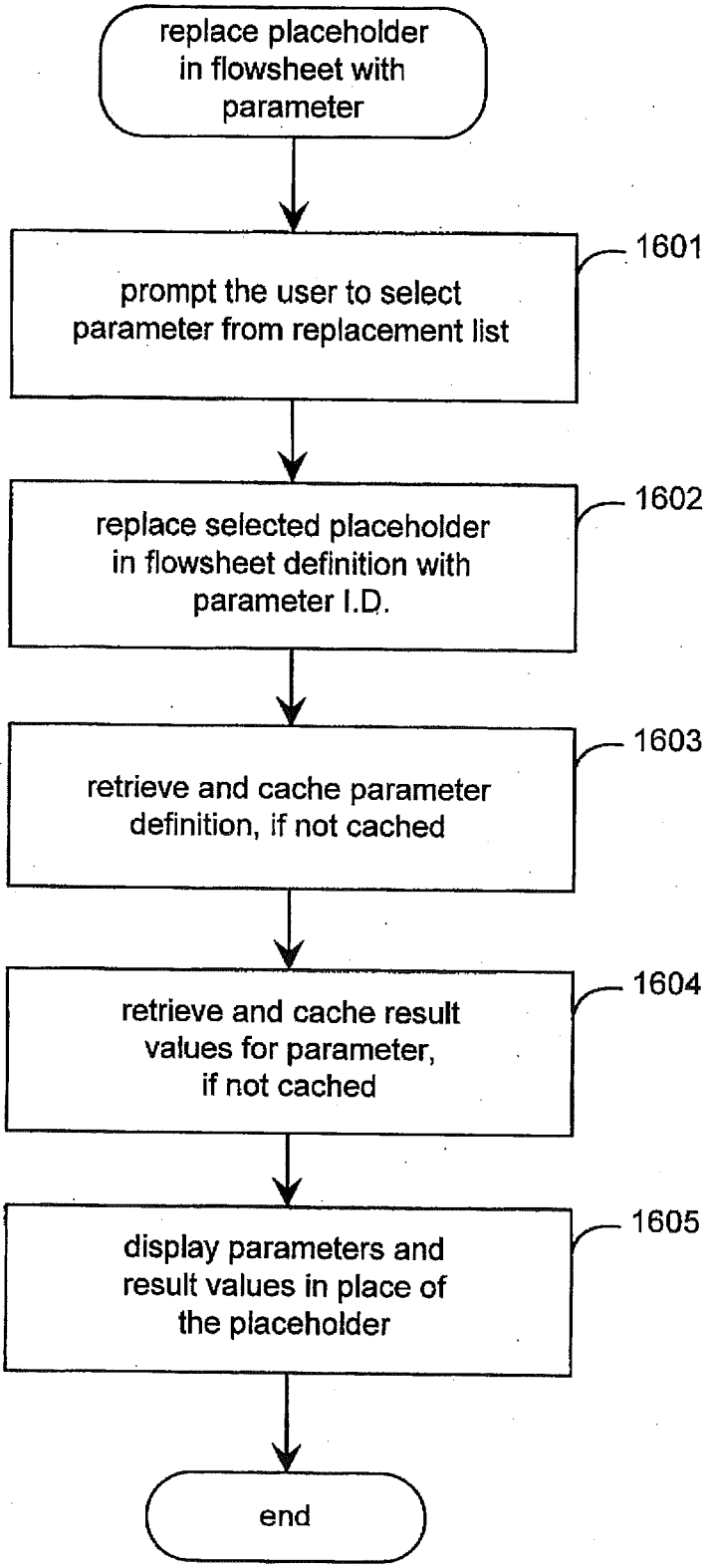

replace placeholder in flowsheet with parameter
prompt the user to select parameter from replacement list
1601
replace selected placeholder in flowsheet definition with parameter I.D.
1602
retrieve and cache parameter definition, if not cached
1603
retrieve and cache result values for parameter, if not cached
1604
display parameters and result values in place of the placeholder
1605
end

FIG. 16

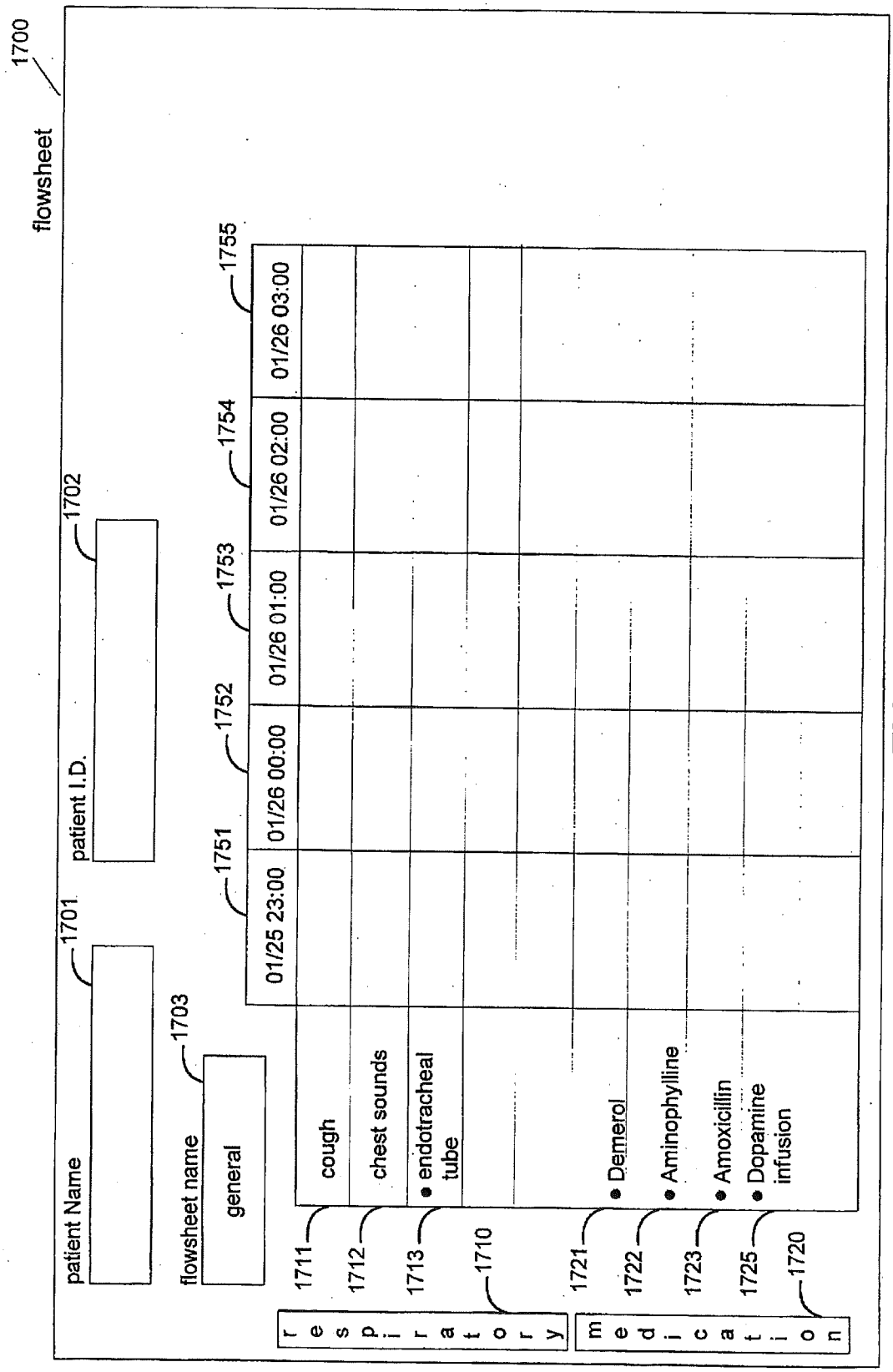

1700
flowsheet
patient Name
1701
patient I.D.
1702
flowsheet name
1703
general
1751
1752
1753
1754
1755
01/25 23:00
01/26 00:00
01/26 01:00
01/26 02:00
01/26 03:00
respiratory
1710
1711 cough
1712 chest sounds
1713 • endotracheal tube
medication
1720
1721 • Demerol
1722 • Aminophylline
1723 • Amoxicillin
1725 • Dopamine infusion

FIG. 17

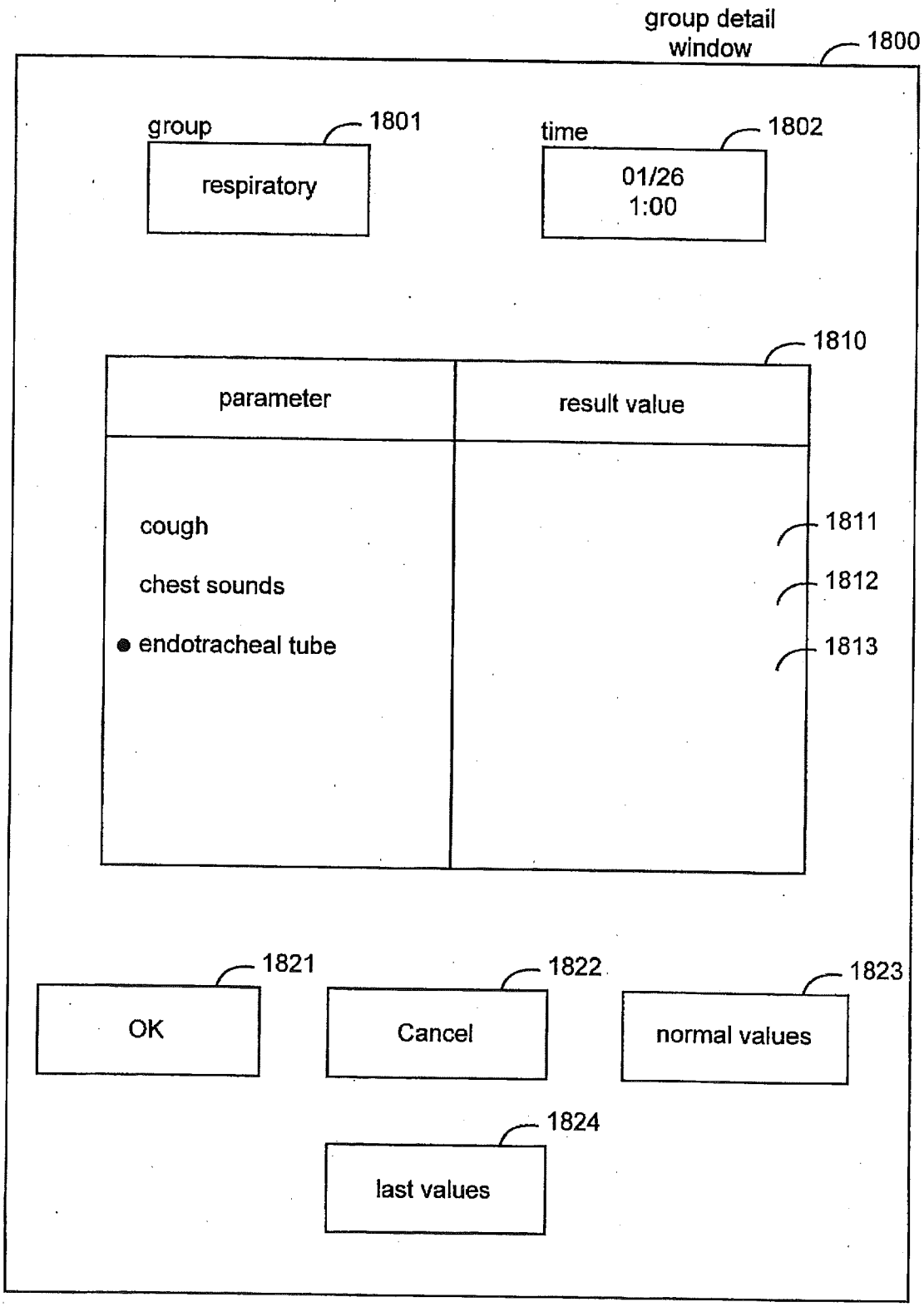

group detail window
1800
group
1801
respiratory
time
1802
01/26
1:00
1810
parameter
result value
cough
1811
chest sounds
1812
endotracheal tube
1813
1821
OK
1822
Cancel
1823
normal values
1824
last values

FIG. 18

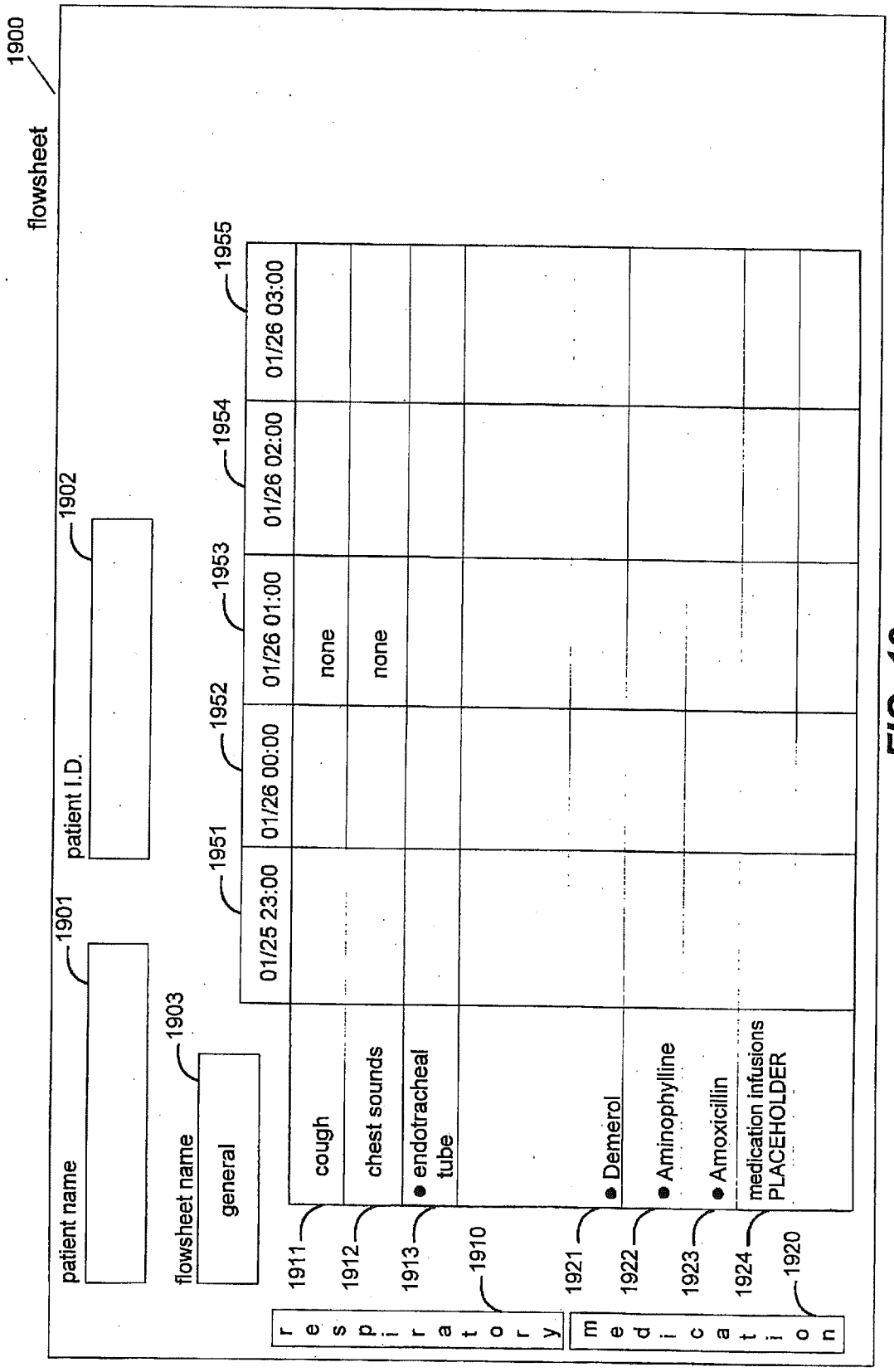

1900
flowsheet
patient name
1901
patient I.D.
1902
flowsheet name
1903
general
1951
01/25 23:00
1952
01/26 00:00
1953
01/26 01:00
1954
01/26 02:00
1955
01/26 03:00
respiratory
1911 cough
1912 chest sounds
1913 endotracheal tube
1910
medication
1921 Demerol
1922 Aminophylline
1923 Amoxicillin
1924 medication infusions PLACEHOLDER
1920
none
none

FIG. 19

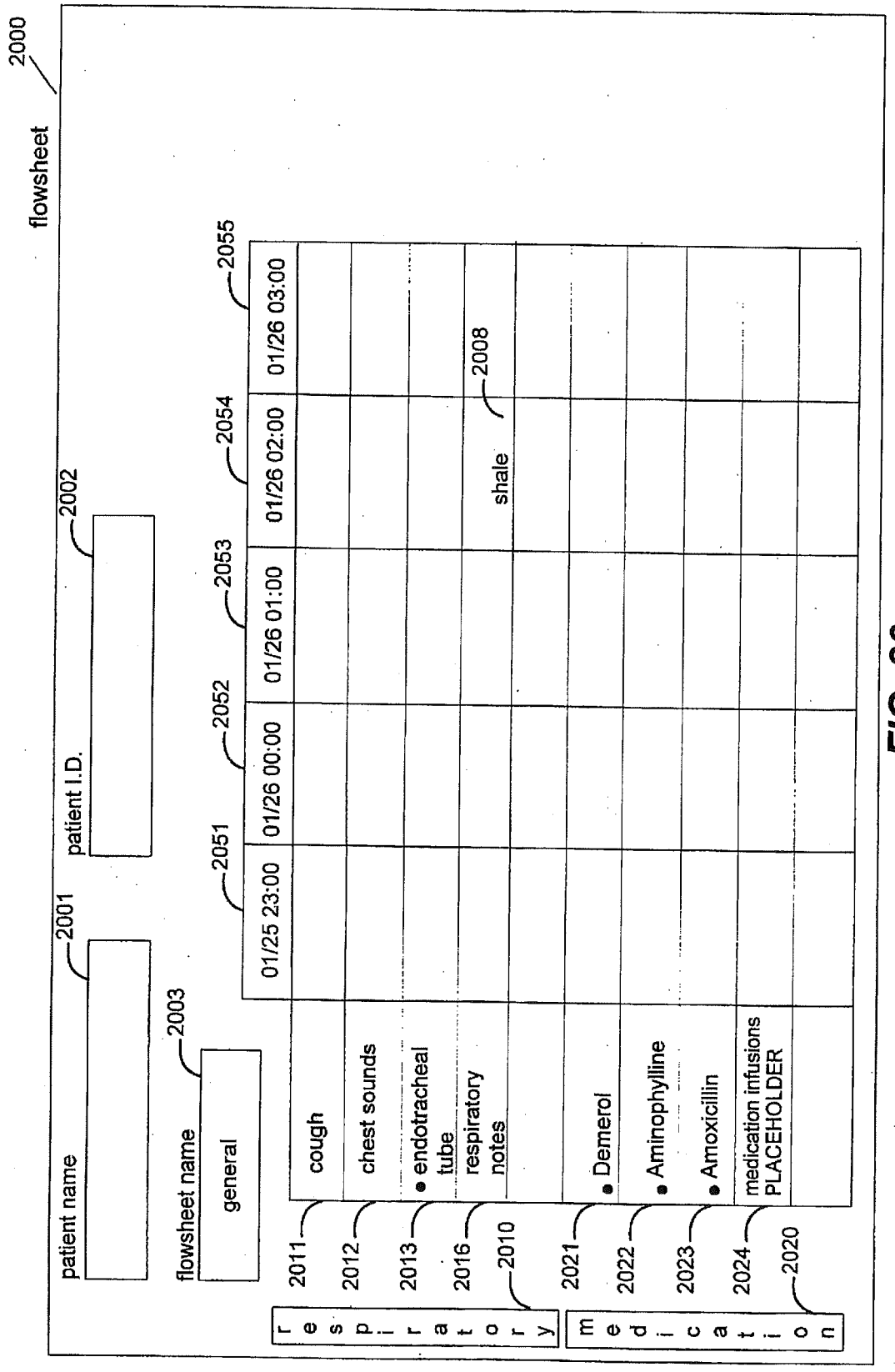

2000
flowsheet
patient name
2001
patient I.D.
2002
flowsheet name
2003
general
2051
01/25 23:00
2052
01/26 00:00
2053
01/26 01:00
2054
01/26 02:00
2055
01/26 03:00
respiratory
cough
chest sounds
• endotracheal tube
respiratory notes
2011
2012
2013
2016
2010
shale
2008
medication
• Demerol
• Aminophylline
• Amoxicillin
medication infusions PLACEHOLDER
2021
2022
2023
2024
2020

FIG. 20

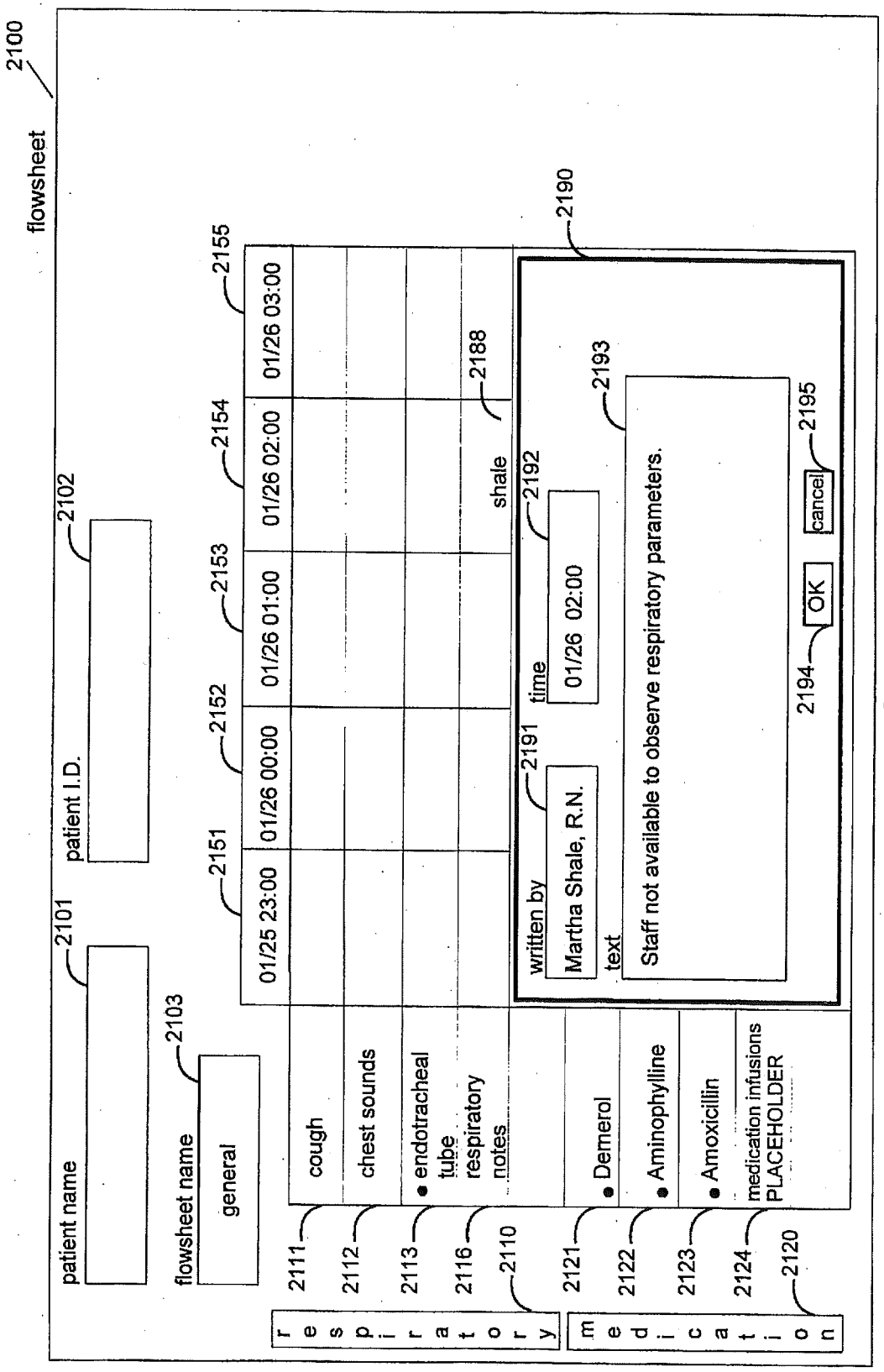

2100
flowsheet
patient name
2101
patient I.D.
2102
flowsheet name
general
2103
01/25 23:00
01/26 00:00
01/26 01:00
01/26 02:00
01/26 03:00
2151
2152
2153
2154
2155
respiratory
cough
chest sounds
endotracheal tube
respiratory notes
2111
2112
2113
2116
2110
medication
Demerol
Aminophylline
Amoxicillin
medication infusions PLACEHOLDER
2121
2122
2123
2124
2120
shale
2188
2190
written by
Martha Shale, R.N.
2191
time
01/26 02:00
2192
text
Staff not available to observe respiratory parameters.
2193
OK
2194
cancel
2195

FIG. 21

METHOD AND SYSTEM FOR FLEXIBLY ORGANIZING, RECORDING, AND DISPLAYING MEDICAL PATIENT CARE INFORMATION USING FIELDS IN A FLOWSHEET

TECHNICAL FIELD

The invention relates generally to a the field of patient information management, and, more specifically, to the field of medical patient care information organization and display.

BACKGROUND OF THE INVENTION

The provision of health care services to patients depends on the maintenance of significant quantities of patient information, including both clinical information relating to patient treatment and patient management information, such as referral, admission, insurance, and billing information. Health care providers have traditionally maintained such patient information manually, on physical "charts" comprised of paper forms, also known as "flowsheets." Such flowsheets typically show a time series progression of different pieces of patient information. Such pieces of patient information are commonly called "parameters," and may include information about indications of patient condition, laboratory test results, assessments, and the administration of treatments. Parameters may also include administrative information, such as details relating to facility, supply, and human resource usage.

The maintenance of patient information in physical charts often has significant disadvantages. Physical charts may only be viewed or modified in a single physical location. Also, data collected automatically from medical sensors and medical laboratories may not be automatically posted to physical charts. Physical charts further are subject to inadvertent destruction, and may contain illegible information. Disadvantages such as the above militate toward automating the maintenance of patient information.

Existing alternatives for automating the maintenance of patient information fall into the categories of general-purpose databases and rigid patient information databases, both of which have significant disadvantages. General-purpose databases generally lack any measure of support for the medical environment, as they generally do not include tools for entering and viewing information in familiar flowsheet formats and do not provide any basis for organizing patient information in a manner useful to health care providers. Rigid patient information databases, on the other hand, define a particular organization of particular parameters. Neither the parameter organization nor the parameters themselves are typically modifiable by the health care provider. It can be difficult for a health care provider to adapt to a rigid organization of patient information. More seriously, a health care provider that deems the tracking of a particular parameters not specified by the rigid patient information database to be necessary to responsible patient care may be precluded from recording these parameters, or may at least be forced to record these parameters manually. The above-discussed drawbacks of general-purpose databases and rigid patient information databases demonstrate a need for a method and system for flexibly organizing, recording, and displaying medical patient care information.

SUMMARY OF THE INVENTION

The present invention provides a method and system for flexibly organizing, recording, and displaying medical patient care information. In a preferred embodiment, a patient information management facility enables users to customize a patient information hierarchy, which defines and organizes the information that may be stored about each patient, as well as patient data flowsheets, which define views in which the patient data stored according to the hierarchy may be entered and viewed, in a way that is optimized for the structure and procedures of the particular health care organization. The facility enables users to add, modify, and rearrange global or local patient information parameters that make up the hierarchy. Users may define the parameters to be any of a number of types. The user may also customize flowsheets used for entering and displaying result values of parameters defined in the hierarchy for particular patients. The user may expand and contract overview encapsulating parameters to display or hide the encapsulated parameters encapsulated therein. The facility also allows the user to link a result value of one parameter to other parameters, causing the linked-to parameters to be displayed when the result value is entered.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a high-level block diagram of the general-purpose computer system upon which the facility preferably operates.

FIG. **2** is a block diagram showing the contents of the high-capacity storage device of the file and application server computer system.

FIG. **3** is a diagram showing the patient information hierarchy.

FIG. **4** is a tabular diagram showing the parameter definition table.

FIG. **5** is a flow diagram showing the steps performed by the facility in order to create a new parameter.

FIG. **6** is a flow diagram showing the steps preferably performed by the facility in order to display a flowsheet for a particular patient.

FIG. **7** is a diagram showing the contents of a sample result table.

FIG. **8** shows the display of a flowsheet having the sample flowsheet definition.

FIG. **9** is a flow diagram showing the steps preferably performed by the facility in order to display each encapsulating parameter.

FIG. **10** is a screen diagram of the sample flowsheet in which an encapsulating parameter has been expanded.

FIG. **11** is a screen diagram showing the user entering a result value.

FIG. **12** is a flow diagram showing the steps preferably performed by the facility in order to enter a received result value.

FIG. **13** is a display diagram showing the addition of linked-to parameters to the flowsheet in response to the entry of a linked-from result value.

FIG. **14** is a screen diagram showing the addition of a respiration parameter to the sample flowsheet.

FIG. **15** is a flow diagram showing the steps preferably performed by the facility in order to add a parameter to a flowsheet.

FIG. **16** is a flow diagram showing the steps preferably performed by the facility in order to replace such a placeholder with a particular parameter.

FIG. **17** is a display diagram showing the replacement of placeholder **824** with the Ibuprofen parameter **925**.

FIG. **18** is a partial screen diagram showing such a group detail window **1800** that contains indications oft he selected group **1801** and of the selected time **1802**.

FIG. **19** is a screen diagram showing the entry of the normal values for the respiratory group **1910** at 1:00 A.M. on Jan. 26th.

FIG. **20** is a screen diagram showing a parameter of the note data type displayed in abbreviated form.

FIG. **21** is a screen diagram showing the display of an entire note parameter result value.

DETAILED DESCRIPTION OF THE INVENTION

A method and system for flexibly organizing, recording, and displaying medical patient care information is provided. In a preferred embodiment, health care organizations are provided with a patient information system. A patient information management facility of the patient information system ("the facility") is comprised of software tools that enable each health care organization to customize the patient information system in a way that is optimized for the structure and procedures of the health care organization. The facility permits users to customize a patient information hierarchy ("the hierarchy"), which defines and organizes the information that may be stored about each patient. The facility further permits users to customize patient data flowsheets ("flowsheets"), which define views in which patient data stored according to the hierarchy may be entered and viewed.

The facility enables authorized users of the patient information system to add to, modify, and rearrange the patient information parameters ("parameters") that make up the hierarchy. If parameters at two different points in the hierarchy have the same name, the parameters may either be global or local. If the parameters are global, they share a single set of result values for each patient. On the other hand, if they are local, the parameters each have their own set of result values for each patient. Users may flexibly define the parameters to be any of a number of types. Many of the parameter types specify a time sequence of values.

The facility further enables users to customize flowsheets that may be used for entering and displaying result values for subsets of the parameters defined in the hierarchy for particular patients. Flowsheets may contain parameters defined in the hierarchy as encapsulating parameters and parameters that are linked to other parameters. When displaying a flowsheet containing an encapsulating parameter that encapsulating one or more other parameters, the facility preferably enables the user to toggle between expanding the encapsulating parameter to display its encapsulated parameters and their result values and contracting the encapsulating parameter to display only the encapsulating parameter name. When displaying a flowsheet containing a parameter defined as a linked-from parameter, if the user enters a result value for the linked-from parameter that is linked to other fields, the facility preferably adds these linked-to parameters to the flowsheet. The flowsheets displayed by the facility may further contain parameter placeholders that the user may replace with particular parameters.

FIG. **1** is a high level block diagram showing the computer network upon which the facility preferably operates. The network connects a file and application server computer system **100** with workstation computer systems, such as **150** and **160**, and bedside patient monitor in computer systems, such as **170** and **180**. While only a small number of workstation computer systems and bedside patient monitoring computer systems are shown for clarity, it will be recognized by those skilled in the art that a typical network may contain many more of both types of computer systems. The file and application server computer system **100** contains a high-capacity storage device **110**, such as a hard disk drive; one or more central processing units (CPUs) **120**; and random access memory **130**. The patient information system is maintained on the file and application server **100**. Workstation computer systems, such as **150**, contain a display device **151** such as a video monitor, a keyboard **152**; one or more CPUs **153**; and a pointing device **154** such as a mouse. The workstation computer systems **150**, **160** may be used to access the patient information system. Bedside patient monitoring computer systems, such as **170**, are used for collecting data from electronic medical instruments **173** and displaying it on a touch screen **171**. The bedside patient monitoring computer systems **170**, **180** also have one or more CPUs **172**, and may be used to access the patient information system. While the preferred embodiment is shown in FIG. **1**, those skilled in the art will appreciate that the facility may operate on virtually any network configuration.

FIG. **2** is a block diagram showing the contents of the high-capacity storage device **110** of the file and application server computer system **100**. The high-capacity storage device **110** contains a facility **211** that enables users to interact with the patient information system. The facility is discussed in greater detail below. The high-capacity storage device contains a patient information hierarchy **212**. The patient information hierarchy is used to organize the parameters, in conjunction with which pieces of patient information are stored, in a logical organization from which users may easily select them. Authorized users may modify the hierarchy by adding or deleting parameters, or by relocating parameters within the hierarchy. The patient information hierarchy is discussed in greater detail below in conjunction with FIG. **3**. The high-capacity storage device also contains a parameter definition table **213**. The parameter definition table contains definitional information for each parameter identified in the patient information hierarchy **212**, and is discussed below in greater detail in conjunction with FIG. **4**. The high-capacity storage device also contains flowsheet definition templates **214**. Authorized users may modify existing flowsheet definition templates and add new flowsheet definition templates. The flowsheet definition templates each define a patient-independent flowsheet for entering and viewing parameters in their result values. Any of the flowsheet definition templates may be used for any patient. The high-capacity storage device further contains patient flowsheet definitions **215**. The patient flowsheet definitions are used for particular patients to enter and display parameters and their result values. The patient flowsheet definitions may either be automatically copied ("templated") from the flowsheet definition templates **214**, or may be created from scratch. Users may modify patient flowsheet definitions. The high-capacity storage device further contains a result table **216**. The result table stores all of the parameter result values corrected for each station. The result table is discussed in greater detail below in conjunction with FIG. **7**.

FIG. **3** is a diagram showing the patient information hierarchy, which is comprised of classifications, such as **310** and **320**, and parameters, such as **311–331**. The classifications correspond to different categories of parameters, under which parameters may be grouped in a way that is logical to users of the patient information system. For example, the assessments classification **310** contains parameters relating to observable aspects of patient condition, while the medi-

cations **320** contains parameters relating to the administration of particular medications. The parameters correspond to actual pieces of patient data that may be stored and displayed for each patient. For example, the cough parameter **311** corresponds to a parameter that indicates whether a particular patient at a particular time exhibits no cough, a non-productive cough, or a productive cough. Each of the parameters contains a parameter identifier ("parameter i.d."). The labels shown in conjunction with each parameter, such as "cough parameter i.d." shown in conjunction with cough parameter **311**, are for illustrative purposes only and not actually stored in the tree comprising the patient information hierarchy. Each of the parameters that constitutes a leaf of the tree, e.g., **311–314**, **321–323**, **326–328**, and **329–331**, is called a result parameter, and may contain a result value for a particular patient at a particular time. Parameters that are not leaves of the tree, e.g., **320** and **325**, are called encapsulating parameters. Encapsulating parameters may not contain result values, but rather "encapsulate," or represent at a high level, one or more other parameters, called "encapsulated parameters." For example, encapsulating parameter **320** (Demerol) encapsulates encapsulated parameters **321**, **322**, **323**, and **331** (dose, dose units, route, and site).

FIG. **4** is a tabular diagram showing the parameter definition table. The parameter definition table contains definitional information for each parameter identified in the patient information hierarchy. The parameter definition table **400** contains the following columns, or fields, which may each contain information for each parameter: parameter i.d. column **401**, parameter name **402**, linked-from parameter column **403** which contains an indication of whether the parameter is linked to any other parameters, a parameter data type **404**, a normal value **405** containing a result value for the parameter that a well patient, and a column containing data type-specific information **406**. Table 1 below shows the nature of data type-specific information for several data types.

TABLE 1

parameter data type	data type-specific information
selection	choices, linked parameters i.d.s therefor and primary encapsulated parameter
encapsulating	parameter i.d.s of encapsulated parameters
calculated	formula
string	(none)
integer	(none)
note	(none)
float	(none)

The rows are preferably indexed on the parameter i.d. column to allow the row for a particular parameter to be quickly retrieved using the parameter i.d. of the parameter. Each row of the table corresponds to a single parameter identified in the patient information hierarchy. For example, the row for parameter i.d. **10001** shows the name of the parameter to be cough, the parameter to be a linked-from parameter, the parameter to be of the select data type, the normal value of the parameter to be none and the selection choices stored in the data-type-specific information column to be none, non-productive, and productive. The data-type-specific information column further indicates that the productive selection choice is linked to the parameters having parameter i.d.s **10013** and **10014**. The row for parameter i.d. **1005** shows that the Demerol parameter is of the encapsulating data type, that it encapsulates the parameters having parameter i.d.s **10007**, **10008**, and **10009**, and that the parameter having parameter i.d. **10007** is its primary encapsulated parameter.

Authorized users may create new parameters in order to store and display new pieces of patient information, or to represent an existing piece of patient information at an additional location in the hierarchy. FIG. **5** is a flow diagram showing the steps performed by the facility in order to create a new parameter. In step **501**, the facility prompts the user for the location of the parameter in the hierarchy. Step **501** preferably involves presenting the user with a list of classifications and receiving input from the user selecting one of the classifications. Step **501** further preferably involves displaying a list of the encapsulating parameters for the selected classification and receiving from the user an indication of which of the encapsulating parameters, if any, the new parameter should be an encapsulated parameter of. In step **502**, the facility prompts the user for the name of the new parameter and receives the name of the new parameter from the user. In step **503**, the facility prompts the user for an indication of whether the new parameter is global or local. An indication that the new parameter is local indicates that a new row in the parameter definition table should be created for the new parameter, and that a new, unique parameter i.d. should be assigned to the new parameter. A global indication indicates that the facility should search for an existing parameter in the parameter definition table having the same parameter name, and assign the parameter i.d. of the existing parameter to the new parameter. In step **504**, if the user indicates that the new parameter is global, then the facility continues at step **505**, else if the user indicates that the new parameter should be local, then the facility continues at step **507**. In step **505**, if a parameter definition for the parameter name selected by the user exists, then the facility continues at step **506**, else the facility continues at step **507**. In step **506**, the facility creates a parameter node in the hierarchy containing the parameter i.d. of the existing parameter definition for the selected parameter name. After step **506**, these steps conclude.

In step **507**, the facility creates a new parameter definition in the parameter definition table having the selected parameter name and a new, unique parameter i.d. In step **508**, the facility creates a parameter node in the hierarchy containing the new parameter i.d. In step **509**, the facility prompts the user for the remaining parameter definition information, including parameter data type, normal value, and data type-specific information. The facility preferably uses the data type to determine which data type-specific information to prompt the user for. For example, for a parameter having the encapsulating data type, the facility preferably prompts the user to identify encapsulated parameters, and to indicate which of the encapsulated parameters is the primary encapsulated parameter that is to be displayed in conjunction with the encapsulating parameter when the encapsulating parameter is collapsed. The facility preferably prompts the user for encapsulated parameters by prompting the user to choose them from a list of parameters organized according to the hierarchy. As is discussed in further detail below, to do so, the facility preferably displays a list of default encapsulated parameters associated with the new parameter's classification as encapsulated parameters of the encapsulating parameter, which may each either be retained or deleted by the user. For parameters of the select data type, the facility preferably prompts the user for the selection choices for parameters of the select data type. The facility further preferably prompts the user for any linked-to parameters for each of the selection choices. For parameters of the calculated type, the facility preferably prompts the user for a

formula from which result values for the parameter may be calculated. The facility preferably allows the user to enter such a formula using a special visual interface discussed in detail in U.S. application Ser. No. 08/504,703 which is filed concurrently herewith and is hereby incorporated by reference. In step **510**, the facility stores the information received in step **509** and the parameter definition created in step **507**. These steps then conclude.

A user may use a flowsheet to display a set of parameters and their result values for a particular patient over a time. FIG. **6** is a flow diagram showing the steps preferably performed by the facility in order to display a flowsheet for a particular patient. In step **601**, the facility determines the name of the flowsheet to display, the patient i.d. of the patient for which the flowsheet is to be displayed, and a beginning time at which to begin displaying result values. The user may select either the name of an existing patient flowsheet definition **215**, or the name of a flowsheet definition template **214**. If a patient flowsheet definition having the selected name exists for the selected patient i.d., the facility loads this patient flowsheet definition in step **602**. If no patient flowsheet definition exists for this flowsheet name, the facility preferably copies the flowsheet definition template having this flowsheet name to create a patient flowsheet definition having this name and the patient i.d. of the selected patient in step **602**. The facility then loads this new patient flowsheet definition in step **602**. Table 2 below shows a sample flowsheet definition.

TABLE 2

Sample flowsheet definition

```
1   group respiratory
2       {   <cough parameter i.d.> 10001
3           <chest sounds parameter i.d.> 10103
4           <endotracheal tube parameter i.d.> 10204
5       }
6
7   group medications
8       {   <Demerol parameter i.d.> 10005
9           <Aminophylline parameter i.d.> 10037
10          <Amoxicillin parameter i.d.> 10006
11          <medication infusions placeholder> 90005
12      }
```

The sample flowsheet definition is comprised of definitions for two flowsheet groups. A flowsheet group is a collection of parameters that are related for purposes of displaying result values for and adding result values to parameters in the flowsheet. The parameters contained in a particular flowsheet group may be selected from any point in the hierarchy, including points in the hierarchy under different classifications. A respiratory group is defined in lines **1–5**, and a medications group is defined in lines **7–12**. Each of lines **2–4** identify a parameter in the respiratory group. For example, line **2** identifies the cough parameter of the assessments classification, and contains the parameter i.d. for the cough parameter, **10001**. The label text, e.g., "<cough parameter i.d. >", is merely illustrative, and is not actually included in the flowsheet definition. The sample flowsheet definition further contains a parameter placeholder on line **11**, which allows users to easily add a particular parameter to the flowsheet during flowsheet use. Lines **3** and **4** identify a chest sounds parameter of the respiratory assessments classification and an endotracheal tube parameter of the tubes classification. The sample flowsheet definition causes the facility to display a flowsheet containing a respiratory group and a medications group. Each parameter identified with each group is displayed in conjunction with its result values for the relevant period of time. FIG. **8** shows the display of a flowsheet having the sample flowsheet definition, and is discussed in greater detail below.

In steps **602–606**, the facility loops through each parameter i.d. contained in the flowsheet definition. Steps **604–605** are therefore repeated for each parameter i.d. In step **604**, the facility retrieves the parameter definition for the parameter i.d. from the parameter definition table **400** and caches it in memory, indexed by the parameter i.d. In step **605**, the facility retrieves the result values from the result table **700** having the parameter i.d., the current patient i.d., and a time near the beginning time. The facility further caches the retrieved result values in memory, indexed by the parameter i.d.

FIG. **7** is a diagram showing the contents of a sample result table. The sample result table contains patient i.d. column **701**, parameter i.d. column **702**, result time column **703**, and result value column **704**. The table is preferably indexed by the patient i.d., parameter i.d., and result time columns to facilitate rapid retrieval of its rows. Each row of the result table, e.g., **711–718**, contains a single result value for a particular parameter at a particular time for a particular patient. For example, row **712** indicates that the patient having patient i.d. **100001** for the respiration parameter having parameter i.d. **100003** at 11:00 p.m. on Jan. 25th had a result value of high. While the contents of the result time and the result value column may be encoded to minimize the storage resources consumed by the result table, the contents of these columns are preferably stored in full textual form in order to ensure that backups of the result table will be restorable. After each parameter i.d. in the flowsheet definition has been processed, the facility continues at step **607**. In step **607**, the facility displays the group names in the flowsheet definition, and, for each parameter i.d. in the flowsheet definition, the parameter name and result values. These steps then conclude.

FIG. **8** is a screen diagram showing the display of the sample flowsheet **800**. The flowsheet displays the name of the patient **801** and the corresponding patient i.d. **802** to identify the patient for which result values are displayed. The flowsheet also displays the name of the flowsheet **803**. Along the left, the flowsheet displays the names of the parameters in each of the groups identified in the flowsheet definition. For example, the respiratory group **810** is displayed, which contains the cough parameter **811**, the chest sounds parameter **812**, and the endotracheal parameter **813**. The medications group **820** similarly contains parameters **821–823**. To the right of each parameter is a series of cells in which to display result values for that parameter for the designated patient times near the beginning time. Above the cells are time labels **851–855**. Each time label represents a point in time for which parameters may have a result value. For example, cell **891** shows that the cough parameter **811** has a result value of none for time **851**, i.e., 11:00 p.m. on Jan. 25th.

In FIG. **8**, the facility has displayed round bullets in from of parameter names for parameters **821–823**, indicating that they are encapsulating parameters rather than result parameters and that they do not directly contain any result values. As discussed above, encapsulating parameters may either be displayed in collapsed form, in which only the encapsulating parameter is displayed (as shown in FIG. **8**), or in an expanded form, in which the encapsulated parameters encapsulated by the encapsulating parameter are displayed beneath the encapsulating parameter.

FIG. **9** is a flow diagram showing the steps preferably performed by the facility in order to display each encapsu-

lating parameter. The collapsed/expanded state of the encapsulating parameter may be toggled by the user by clicking on the expanded or collapsed indication with which the encapsulating parameter name is displayed. In step **901**, if the encapsulating parameter is collapsed, then the facility continues at step **902**, else if the encapsulating parameter expanded, then the facility continues at step **904**. In step **902**, the facility displays the name of the encapsulating parameter with a round bullet to indicate that the encapsulating parameter is collapsed. In step **903**, if a primary encapsulated parameter is defined in the parameter definition for the encapsulating parameter, the facility displays result values for the primary encapsulated parameter beside the encapsulating parameter. An example is result value **892**, which is a result value for the dose encapsulated parameter of the Demerol encapsulating parameter that is displayed beside the Demerol encapsulating parameter. After step **903**, these steps conclude.

In step **904**, the facility displays the encapsulating parameter name with an expanded indication. FIG. **10** is a screen diagram of the sample flowsheet in which the Demerol parameter **1021** has been expanded. The diagram shows that the Demerol parameter **1021** is displayed with a horizontal bar indicating that the encapsulating parameter expanded. In steps **905–909**, the facility loops through each encapsulated parameter of the encapsulating parameter. Steps **906–908** are therefore repeated for each encapsulated parameter. In step **906**, the facility retrieves and caches the parameter definition for the encapsulated parameter if it is not already cached. In step **907**, if the encapsulated parameter has a result value, the facility retrieves and caches result values for the parameter if result values are not already cached. In step **908**, the facility displays the encapsulated parameter and any result values. If the encapsulated parameter is itself an encapsulating parameter, it has its own collapsed/expanded state, and the facility preferably repeats the steps of FIG. **9** recursively for the encapsulated parameter. FIG. **10** shows the display of encapsulated parameters **1026–1028**, as well as their corresponding result values **1096–1098**. After the facility loops through each encapsulated parameter, these steps conclude.

Users may use a flowsheet to enter one or more result values. Result values may also preferably be entered automatically in response to automatically receiving data from electronic medical sensors or from medical laboratories. If the user enters a linked-from result value, the parameters to which the result value are linked are added to the flowsheet. FIG. **12** is a flow diagram showing the steps preferably performed by the facility in order to enter such a received result value. In step **1201**, the facility receives the result value. In step **1202**, the facility determines the parameter and time for which the result value were received. If the result value is received from a user, step **1202** is performed by determining the parameter and time of the cell that the user selected before entering the result value. FIG. **11** is a screen diagram showing the user entering a result value. The diagram shows the user entering a productive result value **1161** for the cough parameter **1111** at midnight on Jan. 26th. If the result value is received from an external source such as an electronic medical sensor or a medical laboratory, the parameter and time for which the result value was sent is preferably transmitted with the result value. In step **1203**, the facility stores the result value by creating a new row in the result table containing the current parameter i.d., patient i.d., and time and the received result value. In step **1204**, if the cached parameter definition indicates that the current parameter is a linked-from parameter, then the facility continues at step **1205**, else these steps conclude. In step **1205**, if the received result value is a linked-from result value for which linked-to parameters are listed in the parameter definition, then the facility continues at step **1206**, else these steps conclude. In steps **1206–1211**, the facility loops through each linked-to parameter to which the result value is linked. Steps **1207–1210** are therefore repeated for each linked-to parameter. In step **1207**, the facility inserts the parameter i.d. for the linked-to parameter in the flowsheet definition after the linked-from parameter. In step **1208**, the facility retrieves and caches the parameter definition for the linked-to parameter if it is not already cached. In step **1209**, the facility retrieves and caches result values for the linked-to parameter, if not already cached. In step **1210**, the facility displays the linked-to parameter and its result values beneath the linked-from parameter. After the facility processes each linked-to parameter, these steps conclude.

FIG. **13** is a display diagram showing the addition of linked-to parameters to the flowsheet in response to the entry of the productive result value **1361** for the linked-from cough parameter **1311**. Linked-to parameters sputum color **1314** and sputum amount **1315** have been added to the flowsheet and are displayed under the cough parameter **1311**. This permits the user to enter results for these parameters, which often occur in conjunction with the linked-from result value.

Users may also add a parameter to a flowsheet. A new parameter may be added either to a patient flowsheet or to a flowsheet template. FIG. **14** is a screen diagram showing the addition of a respiratory notes parameter **1416** to the sample flowsheet. FIG. **15** is a flow diagram showing the steps preferably performed by the facility in order to add a parameter to a flowsheet. In step **1501**, the facility prompts the user for the identity of the parameter to add to the flowsheet. Step **1501** preferably involves displaying the parameters according to the patient information hierarchy and allowing the user to select one. In step **1502**, the facility inserts the parameter i.d. in the flowsheet definition under the current group of the flowsheet. Table 3 shows the addition of line **4A** to the sample flowsheet definition, which contains the respiratory notes parameter i.d. **10251**.

TABLE 3

Sample flowsheet definition

```
1    group respiratory
2        {   <cough parameter i.d.> 10001
3            <chest sounds parameter i.d.> 10103
4            <endotracheal tube parameter i.d.> 10204
4A           respiratory notes parameter i.d.> 10251
5        }
6
7    group medications
8        {   <Demerol parameter i.d.> 10005
9            <Aminophylline parameter i.d.> 10037
10           <Amoxicillin parameter i.d.> 10006
11           <medication infusion placeholder i.d.> 90005
12       }
```

In step **1503**, the facility retrieves and caches the parameter definition for the new parameter if it is not already cached. In step **1504**, the facility retrieves and caches result values for the new parameter if they are not already cached. In step **1505**, the facility displays the new parameter and its result values. These steps then conclude.

The facility permits parameter placeholders to be included in flowsheet definitions in order to represent a large number of combinations of parameters that are likely to be displayed

on the flowsheet. For example, displaying information about a medication infusion can involve the display of many different combinations of parameters. Placeholders are preferably defined in a table analogous to the parameter definition table. Each placeholder has a placeholder i.d., a name, and a list of parameters with which the placeholder may be replaced by the user. When the flowsheet is displayed, a user may select a display placeholder and replace it with one of its replacement parameters. In response, the facility replaces the placeholders with the selected replacement parameter, including any encapsulated parameters encapsulated by the selected replacement parameter. Placeholders, like parameters, may preferably be created and modified by authorized users in order to optimize them for the procedures of a particular health care organization. A placeholder may also encapsulate one or more other parameters or placeholders. Placeholders and parameters encapsulated by a placeholder are handled in the same manner as other placeholders and parameters. FIG. **16** is a flow diagram showing the steps preferably performed by the facility in order to replace such a placeholder with a particular parameter. These steps are largely similar to those shown in FIG. **15** for adding a parameter to the flowsheet, with the following exceptions: step **1601** prompts the user to select the parameter with which to replace the placeholder from the replacement list defined for the placeholder; step **1602** replaces the selected placeholder in the flowsheet definition with the selected parameter i.d.; and step **1605** displays the selected parameter and its results in place of the placeholder. FIG. **17** is a display diagram showing the replacement of medication infusion placeholder **824** with the dopamine infusion parameter **925**.

The facility preferably also enables a user to quickly enter normal result values for each parameter in a group at a particular time. If the user selects a group, such as respiratory group **810** and a time label, such as time label **853** for 1:00 A.M. on Jul. 26th, the facility displays a group detail window. FIG. **18** is a partial screen diagram showing such a group detail window **1800** that contains indications of the selected group **1801** and of the selected time **1802**. The window **1800** further contains a table **1810** containing the current result values **1811–1813** for the parameters of the selected group. The window **1800** further contains a normal values button **1823**. If the user issues a normal values command by pressing the normal values button, the normal values for each of the parameters in the group are retrieved from their cached parameter definitions and entered as the result values for these parameters at the selected time. FIG. **19** is a screen diagram showing the entry of the normal values for the respiratory group **1910** at 1:00 A.M. on Jan. 26th. For example, the result value for the cough parameter **1911** is none, the normal value for the cough parameter.

Similarly, the facility preferably also enables a user to quickly copy the last result values recorded for each parameter in a flowsheet group forward to a later time. In order to do so, the user presses a last values button **1824** (FIG. **18**).

Users may enter result values for parameters of a notes type, which can contain several paragraphs of text. Result values of parameters of the notes type are shown normally shown within a flowsheet in an abbreviated form. FIG. **20** is a screen diagram that showing a note parameter result value **2088** in abbreviated form, which is the last name of the writer. FIG. **21** is a screen diagram showing the display of the entire note parameter result value **2190** when the user selects the cell containing the abbreviated note parameter result value **2188**. The entire result value shows all of the information associated with the note, including the full name of the writer **2191**, the time at which the note was written **2192**, and the complete note text **2193**. The user may dismiss the window containing the entire result value by selecting either the OK button **2194** or the cancel button **2195**.

The facility farther permits users to specify, for each classification, one or more default parameters. When the user creates a new encapsulating parameter in a classification, the facility displays the default parameters for the classification as proposed encapsulated parameters for the encapsulating parameters. The user may then delete any of the default parameters, and add any other desired encapsulated parameters to the created encapsulating parameters. Default parameters are useful in classifications such as medications, in which many drug parameters encapsulate the same encapsulated parameters, such as dose, dose units, and route.

In an additional preferred embodiment, the facility permits encapsulating parameters, as well as non-encapsulating result parameters, to be defined to contain result values. Those skilled in the art will recognize that the description of the facility described above may straightforwardly be adapted to enable encapsulating parameters to have result values. Such an adaptation merely requires the separation of data type and encapsulating information in the parameter definition table, which is discussed above in conjunction with FIG. **4**; separate treatment of encapsulation and data type information in the parameter creation process, which is discussed above in conjunction with FIG. **5**; and displaying an encapsulating parameter's result values instead of the result values of a primary encapsulated parameter of the encapsulating parameter beside the encapsulating parameter's name in a flowsheet, which is discussed above in conjunction with FIG. **8**.

While this invention has been shown and described with reference to preferred embodiments, it will be understood by those skilled in the art that various changes or modifications in form and detail may be made without departing from the scope of the invention.

We claim:

1. A method in a computer system for designing, under the control of a user, a patient information hierarchy, the hierarchy containing a plurality of parameters including a linked-from parameter having a linked-from possible result value that is linked to one or more linked-to parameters, the method comprising the steps of:

(a) receiving an instruction from the user to create a new parameter within the patient information hierarchy;

(b) in response to step (a), creating a new parameter within the patient information hierarchy;

(c) receiving an instruction from the user to specify a plurality of indicated possible result values for the new parameter;

(d) in response to step (c), specifying the indicated possible result values as possible result values of the new parameter;

(e) receiving an instruction from the user to link an indicated linked-from possible result value among the possible result values of the new parameter to one or more indicated linked-to parameters contained within the patient information hierarchy; and

(f) in response to step (e), within the patient information hierarchy, linking the indicated linked-from possible result value to the indicated linked-to parameters, such that the new parameter is a linked-from parameter, and such that, when the new parameter is displayed for a particular patient, if the new parameter has the linked-

from possible result value, the linked-to parameters are displayed in conjunction with the new parameter.

2. The method of claim **1** wherein step (e) comprises the steps of:

(e)(1) receiving an instruction from the user to link an indicated linked-from possible result value among the possible result values for the new parameter to other parameters within the patient information hierarchy;

(e)(2) in response to step (e)(1), displaying a representation of the patient information hierarchy showing the parameters contained therein; and

(e)(3) receiving one or more indications each indicating that an indicated parameter contained within the patient information hierarchy displayed in step (e)(2) has been selected as a linked-to parameter by the user.

3. The method of claim **1**, further including the steps of, for a particular patient:

displaying the linked-from parameter;

receiving a result value for the linked-from parameter;

determining whether the received result value is a linked-from possible result value; and

in response to determining that the received result value is a linked-from possible result value, displaying each of the linked-to parameters that are linked to the linked-from possible result value.

4. A method in a computer system for designing, under the control of a user, a patient information hierarchy, the patient information hierarchy containing a plurality of parameters that may be displayed in conjunction with a particular patient, the parameters including both result parameters that may have a result value for each patient and encapsulating parameters that each identify and encapsulate one or more other parameters to represent them together at a higher conceptual level, the method comprising the steps of:

(a) receiving an instruction to create a first result parameter that may have a result value for each patient, the instruction specifying a parameter name and a data type;

(b) in response to step (a), creating within the patient information hierarchy a first result parameter having the parameter name and data type specified in the instruction received in step (a);

(c) receiving an instruction to create a second result parameter that may have a result value for each patient, the instruction specifying a parameter name and a data type;

(d) in response to step (c), creating within the patient information hierarchy a second result parameter having the parameter name and data type specified in the instruction received in step (c);

(e) receiving an instruction to create a first encapsulating parameter and for encapsulating one or more other parameters to represent them together at a higher conceptual level, the instruction specifying a parameter name and a list of encapsulated parameters, the specified list of encapsulated parameters including the first result parameter and excluding the second result parameter;

(f) in response to step (e), creating within the patient information hierarchy a first encapsulating parameter having the parameter name and the list of encapsulated parameters specified in the instruction received in step (e);

(g) receiving an instruction to display the patient information hierarchy for a particular patient in a user-selected flowsheet, the user-selected flowsheet including the second result parameter and the first encapsulatory parameter; and

(h) in response to step (g), displaying a list of parameters including the first encapsulating parameter and the second result parameter and excluding the first result parameter.

5. The method of claim **4**, further including the steps of:

(i) after step (h), receiving an instruction from the user to expand the first encapsulating parameter; and

(j) in response to step (i), displaying the encapsulated parameters of the first encapsulating parameter, including the first result parameter, in conjunction with the first encapsulating parameter.

6. The method of claim **5**, further including the steps of:

(k) after step (j), receiving an instruction from the user to collapse the first encapsulating parameter; and

(l) in response to step (k), displaying the first encapsulating parameter without the encapsulated parameters of the first encapsulating parameter, including the first result parameter.

7. The method of claim **4**, further including the step of receiving an instruction to display the result value for a selected primary one of the list of encapsulated parameters of the first encapsulating parameter as the result value for the first encapsulating parameter, and wherein step (h) includes the step of displaying the result value for the selected primary encapsulated parameter as the result value for the first encapsulating parameter.

8. The method of claim **4** wherein the patient information hierarchy further includes a plurality of classifications each for grouping related parameters, each of the parameters in the patient information hierarchy being associated with one of the classifications, and wherein a set of default encapsulated parameters may be associated with each classification, and wherein step (e) includes the step of receiving an indication of a classification with which to associate the first encapsulating parameter, and wherein step (f) includes the step of defaulting the list of encapsulated parameters of the created first encapsulating parameter to contain the parameters in the set of default encapsulated parameters associated with the classification indicated by the received classification indication.

9. The method of claim **8**, further including the step of permitting the user to override the default encapsulated parameters in the list of encapsulated parameters of the first encapsulating parameter.

10. A method in a computer system for designing and maintaining the contents of a patient information hierarchy comprised of a plurality of parameters that may contain result values for a particular patient, the patient information hierarchy having associated with it one or more flowsheets for displaying and modifying the result values of parameters for a particular patient, each flowsheet being comprised of one or more flowsheet groups that specify a subset of the parameters of the patient information hierarchy, the method comprising the steps of:

(a) associating predetermined result values with a plurality of the parameters specified by a selected flowsheet group of a selected flowsheet;

(b) receiving an instruction from the user to display the parameters specified by the selected flowsheet group of the selected flowsheet for a specified patient;

(c) in response to step (b), displaying the parameters specified by the selected flowsheet group of the selected flowsheet for the specified patient;

(d) receiving an instruction from the user to set to the predetermined result values the result values for the specified patient of the displayed the parameters specified by the selected flowsheet group of the selected flowsheet; and

(e) in response to step (d), for each parameter specified by the selected flowsheet group of the selected flowsheet with which a predetermined result value is associated, storing the predetermined result value in conjunction with the parameter for the specified patient.

11. A method in a computer system for designing and maintaining the contents of a plurality of named parameters identified by parameter identifiers that may contain result values for a particular patient, the parameters being arranged in a patient information hierarchy, the method comprising the steps of:

(a) receiving instructions from a user to create a parameter having a first name at a first location in the patient information hierarchy and a second location in the patient information hierarchy, the instructions further specifying that the parameter having the first name is a global parameter;

(b) in response to step (a), creating parameters at the first and second locations in the patient information hierarchy that are both identified by a first parameter identifier;

(c) receiving instructions from a user to create a parameter having a second name at a third location in the patient information hierarchy and a fourth location in the patient information hierarchy, the instructions further specifying that the parameter having the second name is a local parameter;

(d) in response to step (c), creating a parameter at the third location in the patient information hierarchy that is identified by a second parameter identifier and creating a parameter at the fourth location in the patient information hierarchy that is identified by a third parameter identifier, wherein the second and third parameter identifiers are distinct.

12. The method of claim **11** wherein each result value contained by a parameter is stored in a row of a result table containing the parameter identifier that identifies the parameter, further including the steps of:

(e) receiving a first result value for the parameter having the first name at the first location in the patient information hierarchy;

(f) in response to step (e), storing the first result value in a row of the result table containing the first parameter identifier;

(g) receiving a second result value for the parameter having the first name at the second location in the patient information hierarchy;

(h) in response to step (g), storing the second result value in a row of the result table containing the first parameter identifier;

(i) receiving a third result value for the parameter having the second name at the third location in the patient information hierarchy;

(j) in response to step (i), storing the third result value in a row of the result table containing the second parameter identifier;

(k) receiving a fourth result value for the parameter having the second name at the fourth location in the patient information hierarchy; and

(l) in response to step (k), storing the fourth result value in a row of the result table containing the third parameter identifier.

13. The method of claim **12**, further including the steps of:

(m) after step (e), receiving an instruction to display the result value for the parameter having the first name at the first location in the patient information hierarchy;

(n) in response to step (m), retrieving the first result value from the row of the result table containing the first parameter identifier;

(o) after step (g), receiving an instruction to display the result value for the parameter having the first name at the second location in the patient information hierarchy;

(p) in response to step (o), retrieving the second result value from a row of the result table containing the first parameter identifier;

(q) after step (i), receiving an instruction to display the result value for the parameter having the second name at the third location in the patient information hierarchy;

(r) in response to step (q), retrieving the third result value from a row of the result table containing the second parameter identifier;

(s) after step (k), receiving an instruction to display the result value for the parameter having the second name at the fourth location in the patient information hierarchy; and

(t) in response to step (s), retrieving the fourth result value from a row of the result table containing the third parameter identifier.

14. A method in a computer system for designing and maintaining the contents of a patient information hierarchy comprised of a plurality of parameters that may contain result values for a particular patient, the patient information hierarchy having associated with it a flowsheet for displaying and modifying the result values of a subset of the parameters of the patient information hierarchy for a particular patient, the subset of the parameters that may be displayed and modified using the flowsheet including a parameter of a patient note type, having a result value comprising an author name field, a time field, and a note text field, the method comprising the steps of:

(a) receiving an instruction from the user to display parameter result values for a selected patient using the flowsheet;

(b) in response to step (a), displaying parameter result values for the selected patient using the flowsheet such that the result value of the parameter of the patient note type is displayed in an abbreviated form in conjunction with the other parameters in the subset, such that at least a portion of the author name field is displayed;

(c) receiving an indication that the user has selected the result value of the parameter of the patient note type is displayed in an abbreviated form; and

(d) in response to step (c), displaying the entire contents of the result value of the parameter of the patient note type, such that the complete contents of the author name, time and note text fields are displayed.

15. A method in a computer system for designing and maintaining the contents of a patient information hierarchy comprised of a plurality of parameters that may contain result values for a particular patient, the patient information hierarchy having associated with it one or more flowsheets for displaying and modifying the result values of parameters for a particular patient, each flowsheet being comprised of one or more flowsheet groups that specify a subset of the parameters of the patient information hierarchy, a selected

flowsheet group of a selected flowsheet further specifying a parameter placeholder not associated with any particular parameter, the method comprising the steps of:

(a) receiving an instruction from the user to display the parameters specified by the selected flowsheet group of the selected flowsheet for a specified patient;

(b) in response to step (a), displaying the parameters and the parameter placeholder specified by the selected flowsheet group of the selected flowsheet for the specified patient;

(c) receiving an instruction from the user to replace the parameter placeholder with a selected parameter of the patient information hierarchy;

(d) in response to step (c), replacing the parameter placeholder specified by the selected flowsheet group of the selected flowsheet for the specified patient with the selected parameter; and

(e) after step (d), displaying the parameters specified by the selected flowsheet group of the selected flowsheet for the specified patient, including the selected parameter and excluding the parameter placeholder.

16. The method of claim **15**, further including the steps of:

after step (d), receiving a result value for the selected parameter for the selected patient; and

storing the received result value in conjunction with the selected parameter for the selected patient, and wherein step (e) includes the step of displaying the received result value in conjunction with the selected parameter.

17. The method of claim **15** wherein the parameter placeholder encapsulates an encapsulated parameter, and wherein step (b) also displays the encapsulated parameter.

18. The method of claim **15** wherein the parameter placeholder encapsulates a second parameter placeholder, and wherein step (b) also displays the second parameter placeholder, further including the steps of:

(f) receiving an instruction from the user to replace the second parameter placeholder with a second selected parameter of the patient information hierarchy;

(g) in response to step (f), replacing the second parameter placeholder with the second selected parameter; and

(h) after step (g), displaying the parameters specified by the selected flowsheet group of the selected flowsheet for the specified patient, including the second selected parameter and excluding the second parameter placeholder.

19. The method of claim **15** wherein the selected parameter is an encapsulating parameter encapsulating one or more encapsulated parameters, and wherein step (e) includes the step of displaying the encapsulated parameters of the selected parameter.

20. The method of claim **15** wherein a list of a plurality of parameters of the hierarchy that may be substituted for the parameter placeholder is associated with the parameter placeholder, and wherein step (c) includes the steps of:

displaying the list of parameters that may be substituted for the parameter placeholder; and

receiving input indicating that the user has selected the selected parameter from the displayed list.

21. A method in a computer system for designing, under the control of a user, a patient information hierarchy, the hierarchy containing a plurality of parameters that may each have a result value for each patient, the hierarchy further containing a plurality of classifications each for grouping related parameters, each of the parameters in the patient information hierarchy being associated with one of the classifications, and wherein the patient information hierarchy has associated with it one or more flowsheets for displaying and modifying the result values of parameters for a particular patient, each flowsheet being comprised of one or more flowsheet groups that specify a subset of the parameters of the patient information hierarchy, the method comprising the steps of, in response to a step of receiving an instruction from the user to create a new parameter:

(a) prompting the user for the name of a new parameter;

(b) receiving from the user the name of a new parameter;

(c) prompting the user to identify the classification with which the new parameter should be associated;

(d) receiving from the user an indication of the classification with which the new parameter should be associated;

(e) prompting the user to select the data type of the new parameter;

(f) receiving from the user an indication of the data type of the new parameter;

(g) creating in the patient information hierarchy a new parameter that has the received name, that is associated with the indicated classification, and that has the indicated data type;

(h) displaying the parameters specified by a selected flowsheet group of a selected flowsheet in conjunction with their result values for a selected patient, the displayed parameters excluding the new parameter;

(i) receiving an instruction from the user to add a parameter to the selected flowsheet group of the selected flowsheet;

(j) in response to step (i), displaying a portion of the patient information hierarchy including the name of the new parameter;

(k) receiving an instruction from the user selecting the displayed name of the new parameter;

(l) in response to step (k), adding the new parameter to the selected flowsheet group of the selected flowsheet; and

(m) in response to step (l), displaying the new parameter among the parameters specified by a selected flowsheet group of a selected flowsheet in conjunction with their result values for a selected patient.

22. The method of claim **21** wherein step (e) includes the step of prompting the user to select the data type of the new parameter from a plurality of available data types, and wherein the plurality of data types includes a selection data type, parameters of which may contain one of a predefined set of possible result values, and further including the steps of, if the indication of the data type of the new parameter received in step (f) indicates the selection data type:

(h) prompting the user to input the set of possible result values for the new parameter; and

(i) receiving from the user the set of possible result values for the new parameter, and wherein step (g) creates a new parameter having the received set of possible result values.

23. The method of claim **21** wherein step (e) includes the step of prompting the user to select the data type of the new parameter from a plurality of available data types, and wherein the plurality of data types includes a calculated data type, parameters of which may contain a formula based on the result values of other parameters, and further including the steps of, if the indication of the data type of the new parameter received in step (f) indicates the selection data type:

(h) prompting the user to input the formula for the new parameter; and

(i) receiving from the user the formula for the new parameter, and wherein step (g) creates a new parameter having the received formula.

24. The method of claim **21** wherein step (c) includes the step of displaying a list of the plurality of classifications, and wherein step (d) includes the step of receiving an indication that the user has selected a particular one of the classifications in the displayed list, and wherein step (e) includes the step of displaying a list of available data types, and wherein step (f) includes the step of receiving an indication that the user has selected a particular one of the available data types in the displayed list.

25. The method of claim **10** wherein the associating step associates with the plurality of the parameters specified by the selected flowsheet group of the selected flowsheet normal result values for these parameters.

* * * * *

UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA

NOTICE OF ASSIGNMENT TO UNITED STATES MAGISTRATE JUDGE FOR DISCOVERY

This case has been assigned to District Judge John F. Walter and the assigned discovery Magistrate Judge is Victor B. Kenton.

The case number on all documents filed with the Court should read as follows:

CV13- 3244 JFW (VBKx)

Pursuant to General Order 05-07 of the United States District Court for the Central District of California, the Magistrate Judge has been designated to hear discovery related motions.

All discovery related motions should be noticed on the calendar of the Magistrate Judge

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NOTICE TO COUNSEL

A copy of this notice must be served with the summons and complaint on all defendants (if a removal action is filed, a copy of this notice must be served on all plaintiffs).

Subsequent documents must be filed at the following location:

[X] **Western Division**
312 N. Spring St., Rm. G-8
Los Angeles, CA 90012

[ ] **Southern Division**
411 West Fourth St., Rm. 1-053
Santa Ana, CA 92701-4516

[ ] **Eastern Division**
3470 Twelfth St., Rm. 134
Riverside, CA 92501

Failure to file at the proper location will result in your documents being returned to you.

AO 440 (Rev. 06/12) Summons in a Civil Action

UNITED STATES DISTRICT COURT

for the

Central District of California

UNILOC LUXEMBOURG S.A., and
UNILOC USA, INC.

Plaintiff(s)

v.

eCLINICAL WORKS, LLC

Defendant(s)

Civil Action No. CV13-03244-JFW (VBKx)

SUMMONS IN A CIVIL ACTION

To: *(Defendant's name and address)* eCLINICAL WORKS, LLC
110 Turnpike Road
Westborough, MA 01581-2864

A lawsuit has been filed against you.

Within 21 days after service of this summons on you (not counting the day you received it) — or 60 days if you are the United States or a United States agency, or an officer or employee of the United States described in Fed. R. Civ. P. 12 (a)(2) or (3) — you must serve on the plaintiff an answer to the attached complaint or a motion under Rule 12 of the Federal Rules of Civil Procedure. The answer or motion must be served on the plaintiff or plaintiff's attorney, whose name and address are:

Lawrence M. Hadley
McKool Smith Hennigan, P.C.
865 S. Figueroa Street, Suite 2900
Los Angeles, CA 90017

If you fail to respond, judgment by default will be entered against you for the relief demanded in the complaint. You also must file your answer or motion with the court.

CLERK OF COURT

Date: MAY - 7 2013

MARILYN DAVIS

Signature of Clerk or Deputy Clerk

1227

Civil Action No.

PROOF OF SERVICE

(This section should not be filed with the court unless required by Fed. R. Civ. P. 4 (l))

This summons for *(name of individual and title, if any)* _____

was received by me on *(date)* _____ .

❒ I personally served the summons on the individual at *(place)* _____

_____ on *(date)* _____ ; or

❒ I left the summons at the individual's residence or usual place of abode with *(name)* _____

_____ , a person of suitable age and discretion who resides there,

on *(date)* _____ , and mailed a copy to the individual's last known address; or

❒ I served the summons on *(name of individual)* _____ , who is

designated by law to accept service of process on behalf of *(name of organization)* _____

_____ on *(date)* _____ ; or

❒ I returned the summons unexecuted because _____ ; or

❒ Other *(specify):*

My fees are $ _____ for travel and $ _____ for services, for a total of $ 0.00 .

I declare under penalty of perjury that this information is true.

Date: _____

_____

Server's signature

_____

Printed name and title

_____

Server's address

Additional information regarding attempted service, etc:

UNITED STATES DISTRICT COURT, CENTRAL DISTRICT OF CALIFORNIA
CIVIL COVER SHEET

I. (a) PLAINTIFFS (Check box if you are representing yourself ☐)

UNILOC LUXEMBOURG S.A., and UNILOC USA, INC.

DEFENDANTS (Check box if you are representing yourself ☐)

eCLINICAL WORKS, LLC

(b) Attorneys (Firm Name, Address and Telephone Number. If you are representing yourself, provide same.)

Lawrence M. Hadley (SBN 157728)
McKool Smith Hennigan, P.C.
865 S. Figueroa Street, Suite 2900
Los Angeles, CA 90017 Telephone: (213)694-1200; Facsimile: (213) 694-1234

(b) Attorneys (Firm Name, Address and Telephone Number. If you are representing yourself, provide same.)

II. BASIS OF JURISDICTION (Place an X in one box only.)

- ☐ 1. U.S. Government Plaintiff
- ☒ 3. Federal Question (U.S. Government Not a Party)
- ☐ 2. U.S. Government Defendant
- ☐ 4. Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES-For Diversity Cases Only (Place an X in one box for plaintiff and one for defendant)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated or Principal Place of Business in this State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated and Principal Place of Business in Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. ORIGIN (Place an X in one box only.)

☒ 1. Original Proceeding ☐ 2. Removed from State Court ☐ 3. Remanded from Appellate Court ☐ 4. Reinstated or Reopened ☐ 5. Transferred from Another District (Specify) ☐ 6. Multi-District Litigation

V. REQUESTED IN COMPLAINT: JURY DEMAND: ☒ Yes ☐ No (Check "Yes" only if demanded in complaint.)

CLASS ACTION under F.R.Cv.P. 23: ☐ Yes ☒ No ☐ **MONEY DEMANDED IN COMPLAINT:** $ _____

VI. CAUSE OF ACTION (Cite the U.S. Civil Statute under which you are filing and write a brief statement of cause. Do not cite jurisdictional statutes unless diversity.)

35 U.S.C. Section 1, Patent Infringement

VII. NATURE OF SUIT (Place an X in one box only).

OTHER STATUTES
- ☐ 375 False Claims Act
- ☐ 400 State Reapportionment
- ☐ 410 Antitrust
- ☐ 430 Banks and Banking
- ☐ 450 Commerce/ICC Rates/Etc.
- ☐ 460 Deportation
- ☐ 470 Racketeer Influenced & Corrupt Org.
- ☐ 480 Consumer Credit
- ☐ 490 Cable/Sat TV
- ☐ 850 Securities/Commodities/Exchange
- ☐ 890 Other Statutory Actions
- ☐ 891 Agricultural Acts
- ☐ 893 Environmental Matters
- ☐ 895 Freedom of Info. Act
- ☐ 896 Arbitration
- ☐ 899 Admin. Procedures Act/Review of Appeal of Agency Decision
- ☐ 950 Constitutionality of State Statutes

CONTRACT
- ☐ 110 Insurance
- ☐ 120 Marine
- ☐ 130 Miller Act
- ☐ 140 Negotiable Instrument
- ☐ 150 Recovery of Overpayment & Enforcement of Judgment
- ☐ 151 Medicare Act
- ☐ 152 Recovery of Defaulted Student Loan (Excl. Vet.)
- ☐ 153 Recovery of Overpayment of Vet. Benefits
- ☐ 160 Stockholders' Suits
- ☐ 190 Other Contract
- ☐ 195 Contract Product Liability
- ☐ 196 Franchise

REAL PROPERTY
- ☐ 210 Land Condemnation
- ☐ 220 Foreclosure
- ☐ 230 Rent Lease & Ejectment

REAL PROPERTY CONT.
- ☐ 240 Torts to Land
- ☐ 245 Tort Product Liability
- ☐ 290 All Other Real Property

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Fed. Employers' Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury
- ☐ 362 Personal Injury-Med Malpratice
- ☐ 365 Personal Injury-Product Liability
- ☐ 367 Health Care/ Pharmaceutical Personal Injury Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

IMMIGRATION
- ☐ 462 Naturalization Application
- ☐ 465 Other Immigration Actions

TORTS

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

CIVIL RIGHTS
- ☐ 440 Other Civil Rights
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accomodations
- ☐ 445 American with Disabilities-Employment
- ☐ 446 American with Disabilities-Other
- ☐ 448 Education

PRISONER PETITIONS

Habeas Corpus:
- ☐ 463 Alien Detainee
- ☐ 510 Motions to Vacate Sentence
- ☐ 530 General
- ☐ 535 Death Penalty

Other:
- ☐ 540 Mandamus/Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition
- ☐ 560 Civil Detainee Conditions of Confinement

FORFEITURE/PENALTY
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt. Relations
- ☐ 740 Railway Labor Act
- ☐ 751 Family and Medical Leave Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Employee Ret. Inc. Security Act

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405 (g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405 (g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS-Third Party 26 USC 7609

FOR OFFICE USE ONLY: Case Number: CV13-03244

AFTER COMPLETING PAGE 1 OF FORM CV-71, COMPLETE THE INFORMATION REQUESTED ON PAGE 2.

UNITED STATES DISTRICT COURT, CENTRAL DISTRICT OF CALIFORNIA

CIVIL COVER SHEET

VIII(a). IDENTICAL CASES: Has this action been previously filed in this court and dismissed, remanded or closed? ☐ NO ☒ YES

If yes, list case number(s): 11-cv-10122-MWF (PLAx)

VIII(b). RELATED CASES: Have any cases been previously filed in this court that are related to the present case? ☐ NO ☒ YES

If yes, list case number(s): 11-cv-10122-MWF (PLAx)

Civil cases are deemed related if a previously filed case and the present case:

(Check all boxes that apply)

☐ A. Arise from the same or closely related transactions, happenings, or events; or

☒ B. Call for determination of the same or substantially related or similar questions of law and fact; or

☒ C. For other reasons would entail substantial duplication of labor if heard by different judges; or

☒ D. Involve the same patent, trademark or copyright, and one of the factors identified above in a, b or c also is present.

IX. VENUE: (When completing the following information, use an additional sheet if necessary.)

(a) List the County in this District; California County outside of this District; State if other than California; or Foreign Country, in which **EACH** named plaintiff resides.

☐ Check here if the government, its agencies or employees is a named plaintiff. If this box is checked, go to item (b).

County in this District:*	California County outside of this District; State, if other than California; or Foreign Country
LOS ANGELES	

(b) List the County in this District; California County outside of this District; State if other than California; or Foreign Country, in which **EACH** named defendant resides.

☐ Check here if the government, its agencies or employees is a named defendant. If this box is checked, go to item (c).

County in this District:*	California County outside of this District; State, if other than California; or Foreign Country
	MASSACHUSETTS

(c) List the County in this District; California County outside of this District; State if other than California; or Foreign Country, in which **EACH** claim arose.
NOTE: In land condemnation cases, use the location of the tract of land involved.

County in this District:*	California County outside of this District; State, if other than California; or Foreign Country
LOS ANGELES	

***Los Angeles, Orange, San Bernardino, Riverside, Ventura, Santa Barbara, or San Luis Obispo Counties**
Note: In land condemnation cases, use the location of the tract of land involved

X. SIGNATURE OF ATTORNEY (OR SELF-REPRESENTED LITIGANT): _____ DATE: May 6, 2013

Notice to Counsel/Parties: The CV-71 (JS-44) Civil Cover Sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law. This form, approved by the Judicial Conference of the United States in September 1974, is required pursuant to Local Rule 3-1 is not filed but is used by the Clerk of the Court for the purpose of statistics, venue and initiating the civil docket sheet. (For more detailed instructions, see separate instructions sheet).

Key to Statistical codes relating to Social Security Cases:

Nature of Suit Code	Abbreviation	Substantive Statement of Cause of Action
861	HIA	All claims for health insurance benefits (Medicare) under Title 18, Part A, of the Social Security Act, as amended. Also, include claims by hospitals, skilled nursing facilities, etc., for certification as providers of services under the program. (42 U.S.C. 1935FF(b))
862	BL	All claims for "Black Lung" benefits under Title 4, Part B, of the Federal Coal Mine Health and Safety Act of 1969. (30 U.S.C. 923)
863	DIWC	All claims filed by insured workers for disability insurance benefits under Title 2 of the Social Security Act, as amended; plus all claims filed for child's insurance benefits based on disability. (42 U.S.C. 405 (g))
863	DIWW	All claims filed for widows or widowers insurance benefits based on disability under Title 2 of the Social Security Act, as amended. (42 U.S.C. 405 (g))
864	SSID	All claims for supplemental security income payments based upon disability filed under Title 16 of the Social Security Act, as amended.
865	RSI	All claims for retirement (old age) and survivors benefits under Title 2 of the Social Security Act, as amended. (42 U.S.C. 405 (g))