US 20020165443A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2002/0165443 A1

Mori (43) Pub. Date: Nov. 7, 2002

(54) VITAL SIGNS DETECTION SYSTEM, VITAL SIGNS DETECTION METHOD, VITAL SIGNS PROCESSING APPARATUS, AND HEALTH CONTROL METHOD

(76) Inventor: **Yasuhiro Mori**, Osaka (JP)

Correspondence Address:
RATNER AND PRESTIA
One Westlakes, Berwyn, Suite 301
P.O. Box 980
Valley Forge, PA 19482-0980 (US)

(21) Appl. No.: **10/057,669**

(22) Filed: **Jan. 25, 2002**

(30) **Foreign Application Priority Data**

Jan. 25, 2001 (JP) 2001-017,046

Publication Classification

(51) **Int. Cl.**[7] **A61B 5/05**

(52) **U.S. Cl.** **600/407**

(57) **ABSTRACT**

A vital signs detection system has

a terminal capable of being connected to detecting means of detecting vital signs;

a program server of storing a program and/or data to operate the detecting means; and

an information server of communicating with the terminal;

wherein:

when an operation switch of the detecting means is turned ON, the terminal transmits information including the type of the detecting means to the program server;

on receiving the information, the program server transmits a predetermined program and/or data corresponding to the information to the terminal according to the information;

the detecting means operates according to the predetermined program and/or data received by the terminal, and thereby detects vital signs; and

the terminal transmits the vital signs detected by the detecting means to the information server.

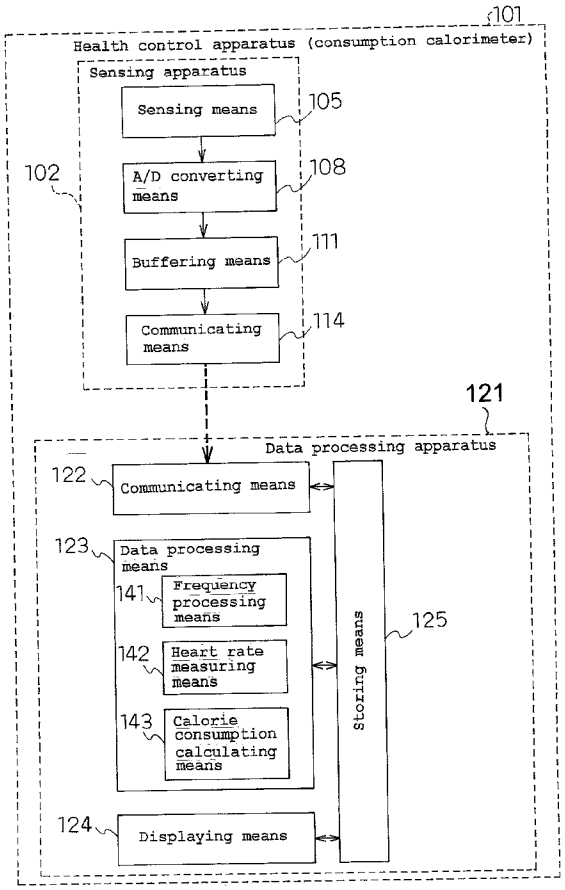


Fig. 1

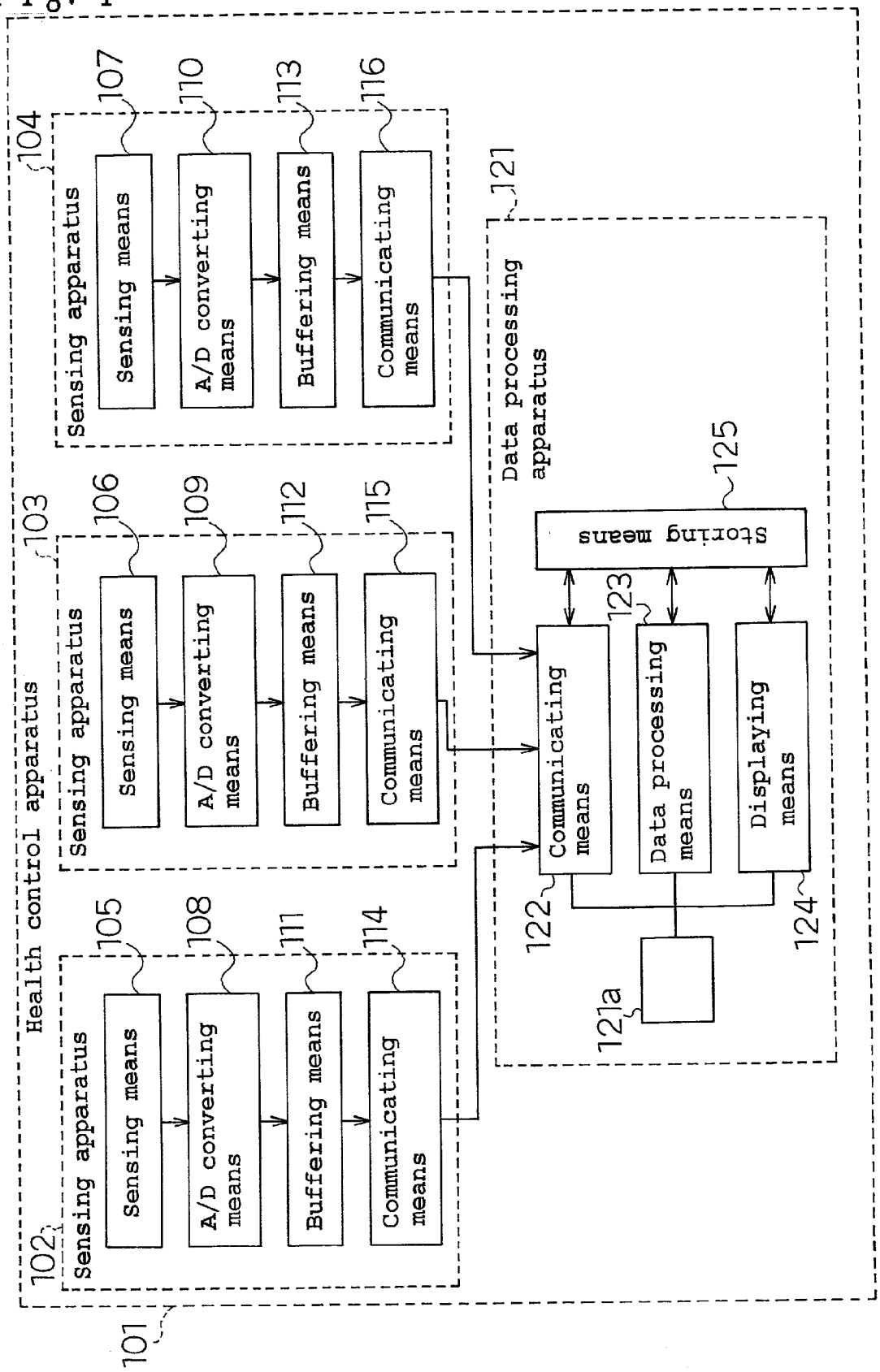

101
Health control apparatus
102
Sensing apparatus
Sensing means
105
A/D converting means
108
Buffering means
111
Communicating means
114
103
Sensing apparatus
Sensing means
106
A/D converting means
109
Buffering means
112
Communicating means
115
104
Sensing apparatus
Sensing means
107
A/D converting means
110
Buffering means
113
Communicating means
116
121
Data processing apparatus
Communicating means
122
Data processing means
123
Displaying means
124
Storing means
125
121a

Fig. 2

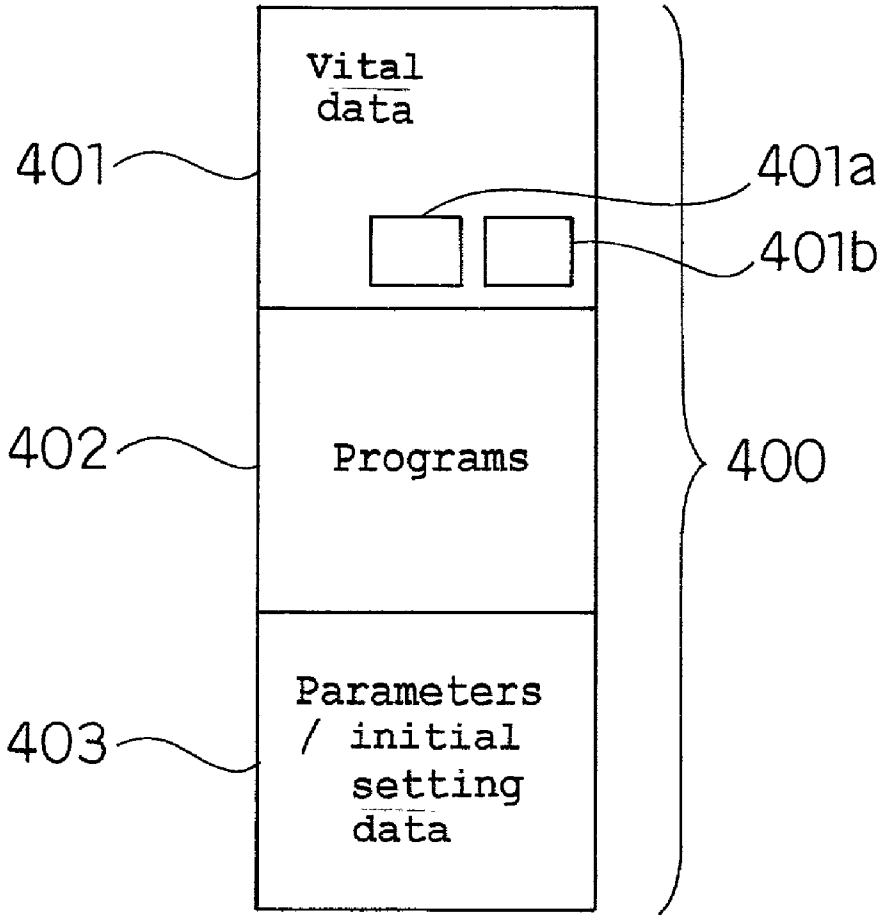

Vital data
401
401a
401b
402
Programs
400
Parameters / initial setting data
403

Fig. 3

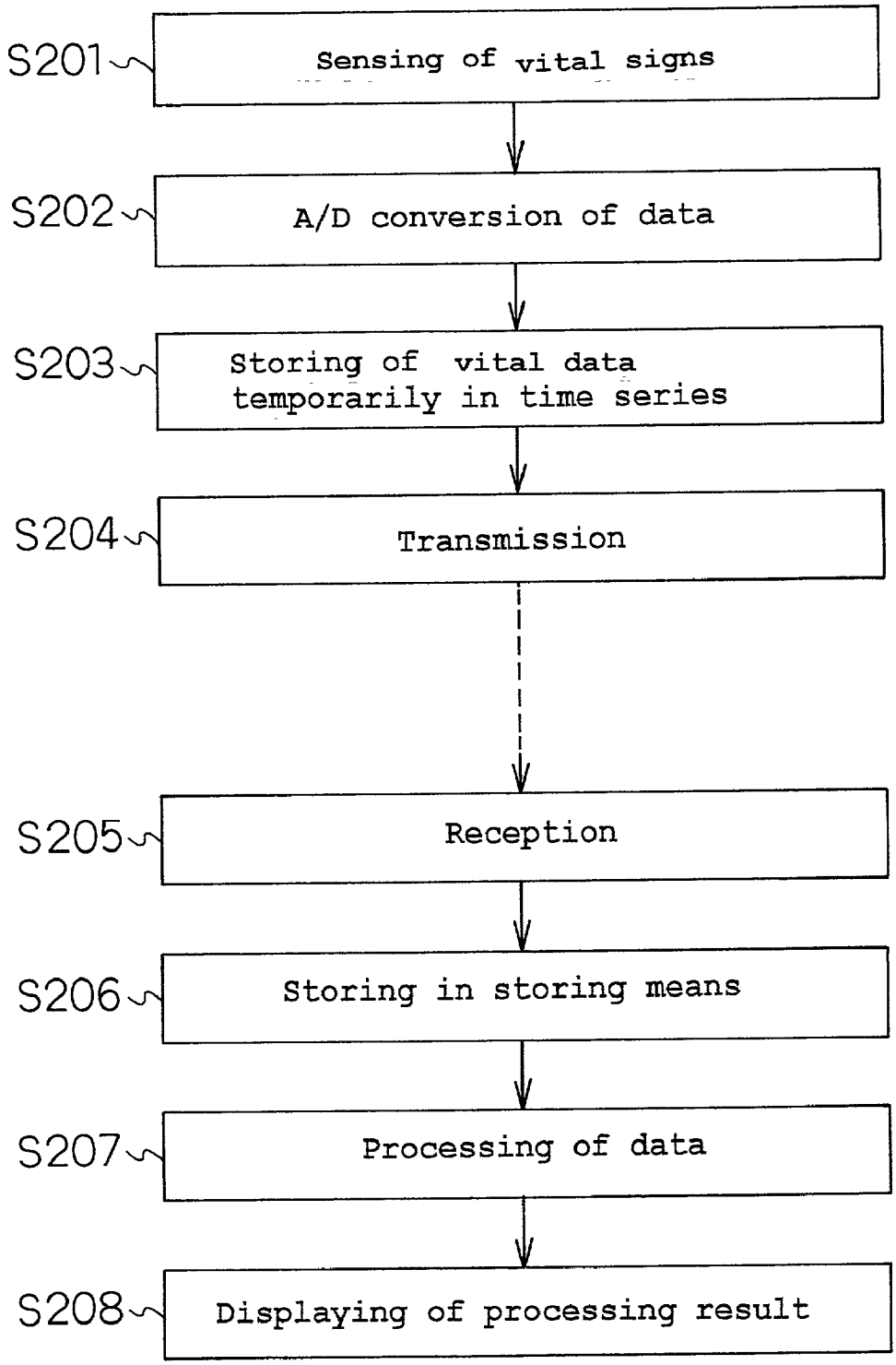

S201
Sensing of vital signs
S202
A/D conversion of data
S203
Storing of vital data temporarily in time series
S204
Transmission
S205
Reception
S206
Storing in storing means
S207
Processing of data
S208
Displaying of processing result

Fig. 4

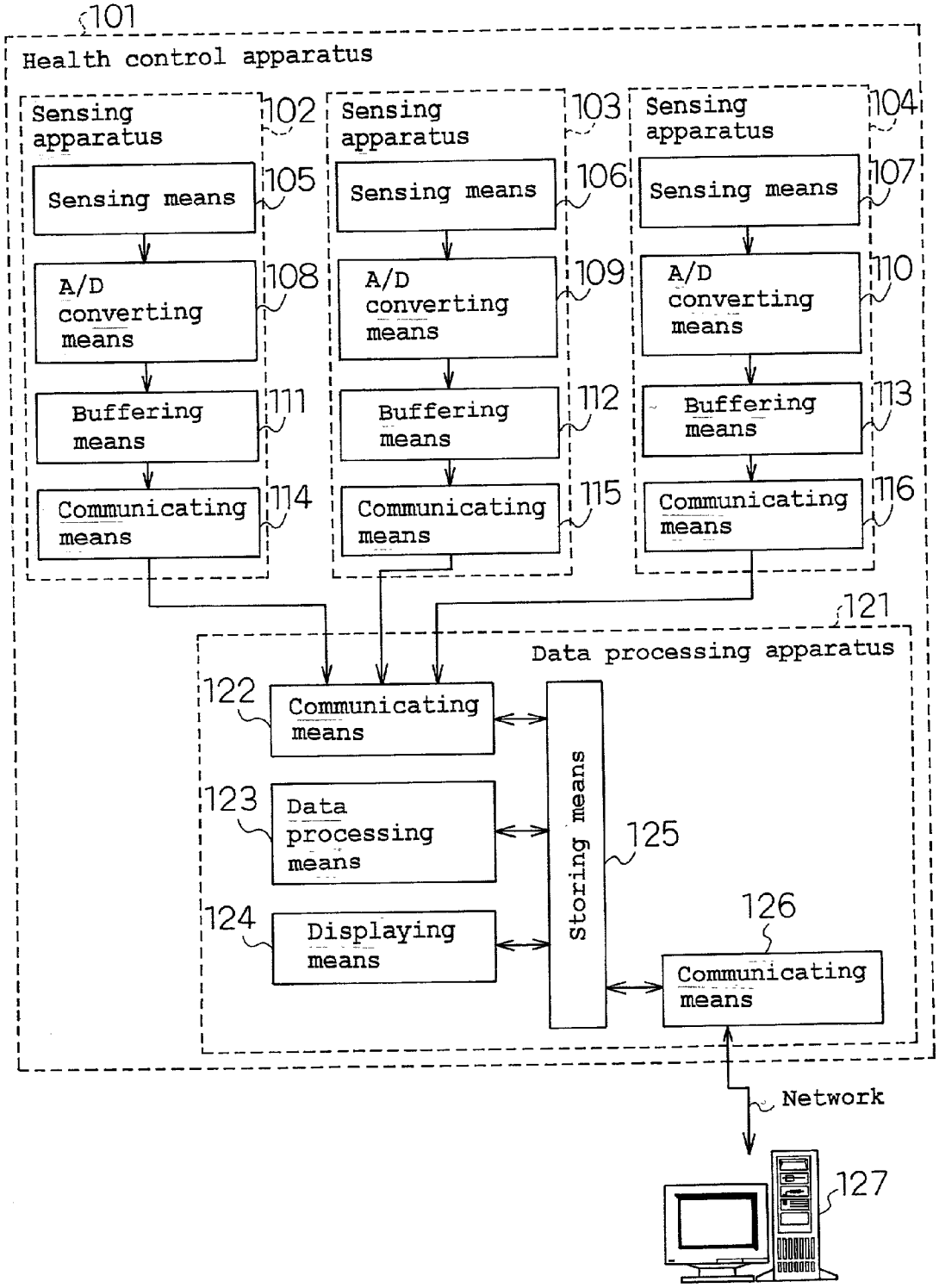

101
Health control apparatus
Sensing apparatus
102
Sensing means
105
A/D converting means
108
Buffering means
111
Communicating means
114
Sensing apparatus
103
Sensing means
106
A/D converting means
109
Buffering means
112
Communicating means
115
Sensing apparatus
104
Sensing means
107
A/D converting means
110
Buffering means
113
Communicating means
116
121
Data processing apparatus
122
Communicating means
123
Data processing means
124
Displaying means
Storing means
125
126
Communicating means
Network
127

Fig. 5

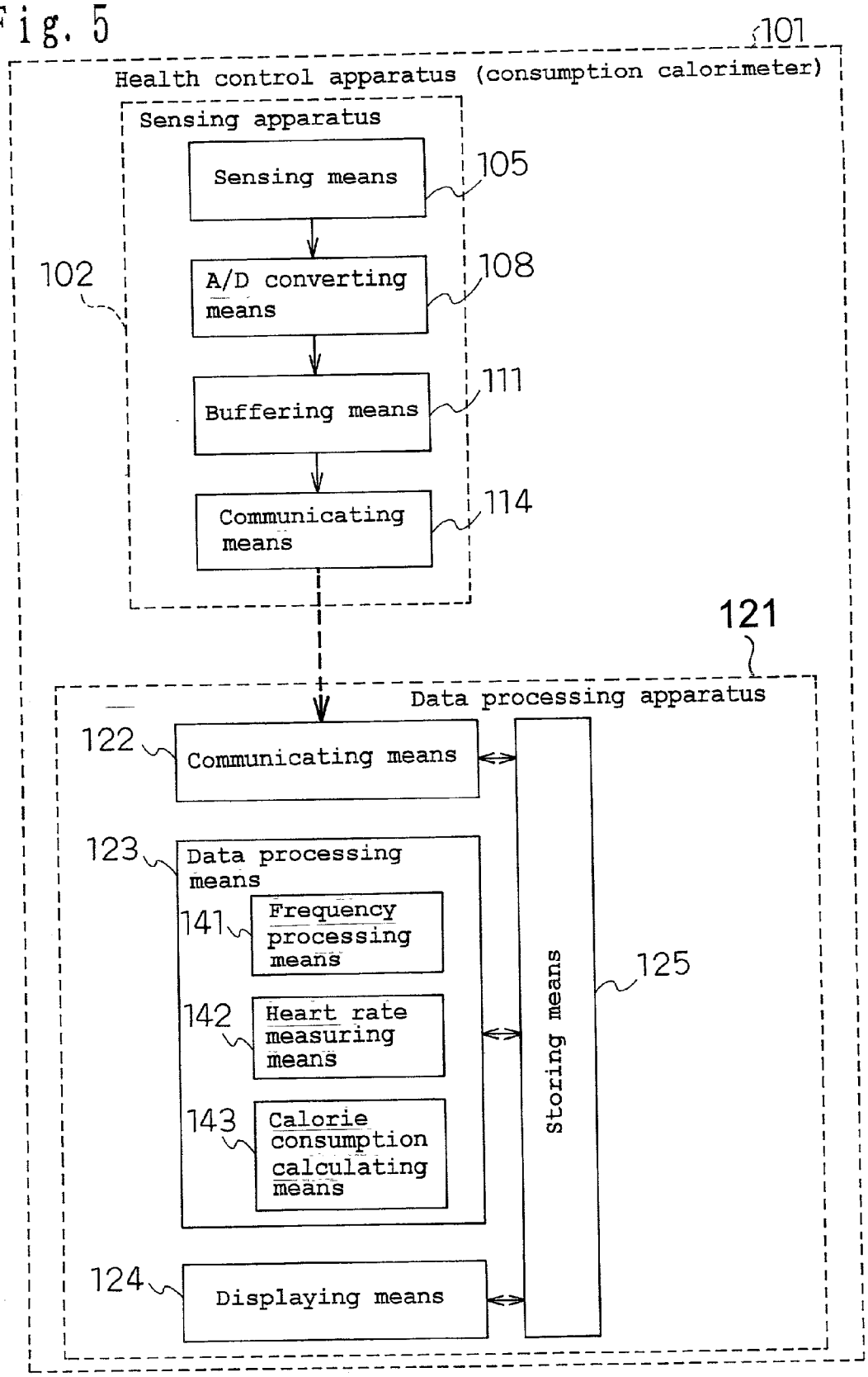

101
Health control apparatus (consumption calorimeter)
Sensing apparatus
Sensing means
105
A/D converting means
108
102
Buffering means
111
Communicating means
114
121
Data processing apparatus
122
Communicating means
123
Data processing means
141
Frequency processing means
142
Heart rate measuring means
143
Calorie consumption calculating means
Storing means
125
124
Displaying means

Fig. 6

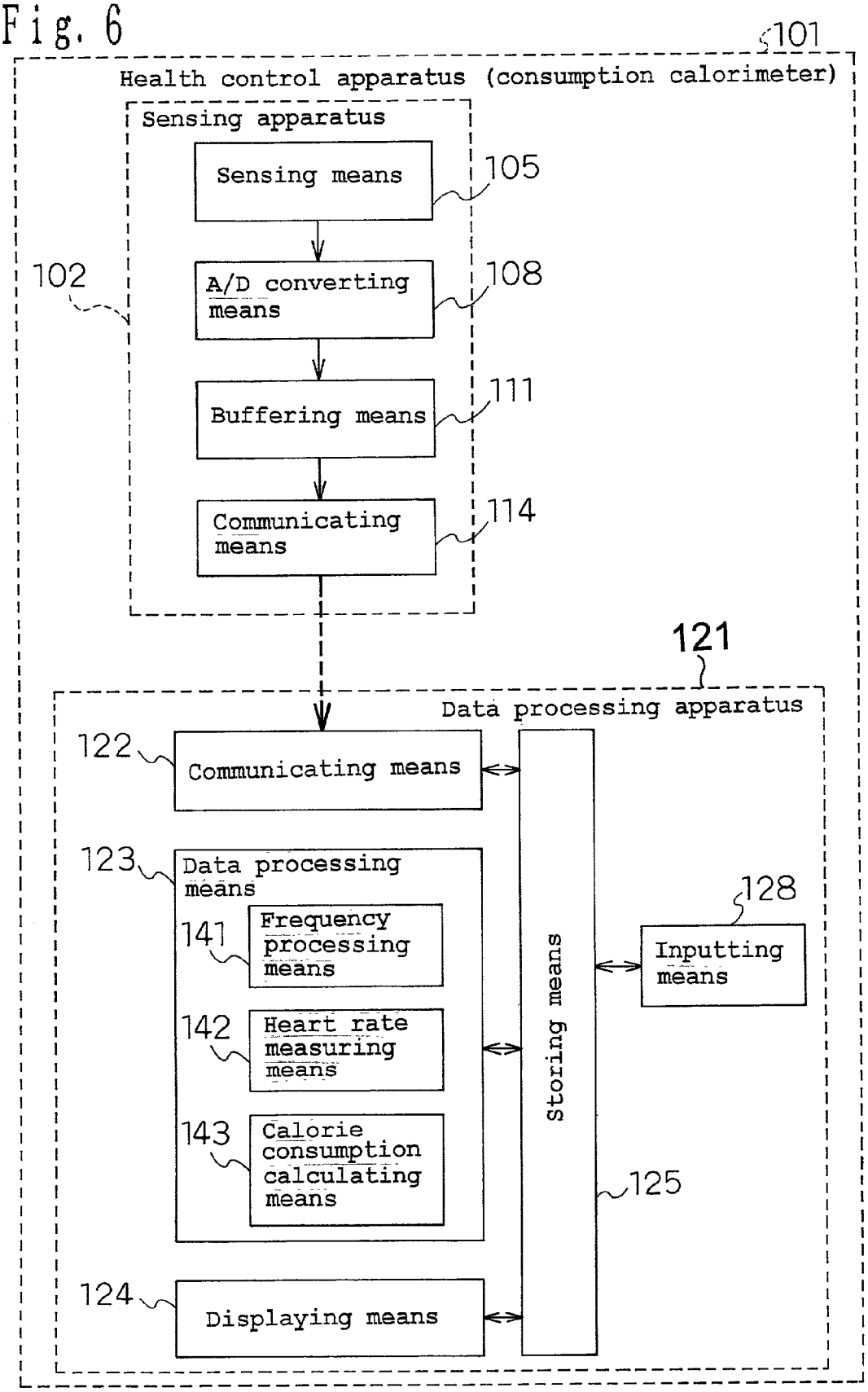

101
Health control apparatus (consumption calorimeter)
Sensing apparatus
Sensing means
105
102
A/D converting means
108
Buffering means
111
Communicating means
114
121
Data processing apparatus
122
Communicating means
123
Data processing means
141
Frequency processing means
142
Heart rate measuring means
143
Calorie consumption calculating means
Storing means
125
128
Inputting means
124
Displaying means

Fig. 7

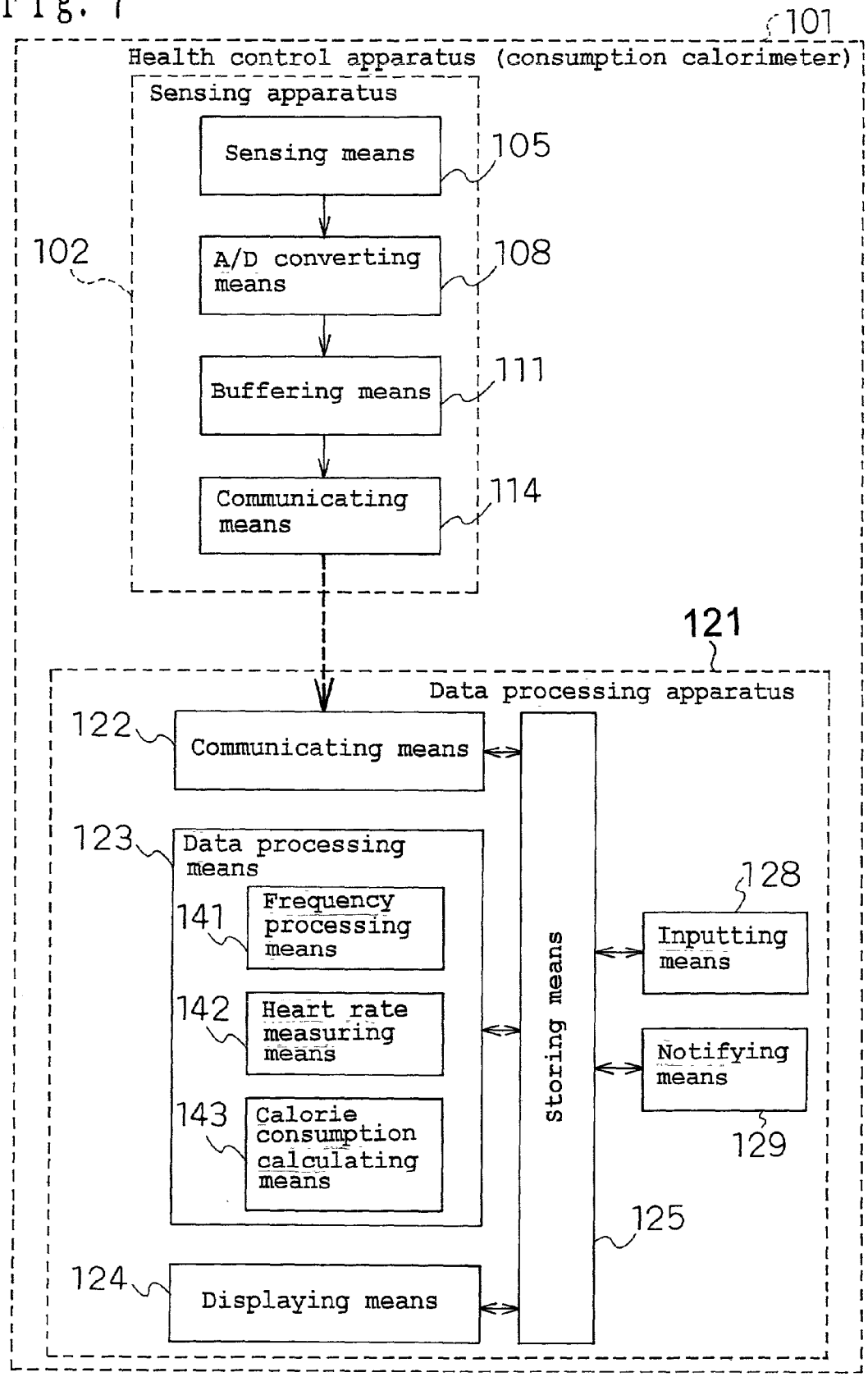

101
Health control apparatus (consumption calorimeter)
Sensing apparatus
Sensing means
105
102
A/D converting means
108
Buffering means
111
Communicating means
114
121
Data processing apparatus
122
Communicating means
123
Data processing means
141
Frequency processing means
142
Heart rate measuring means
143
Calorie consumption calculating means
Storing means
128
Inputting means
Notifying means
129
125
124
Displaying means

Fig. 8

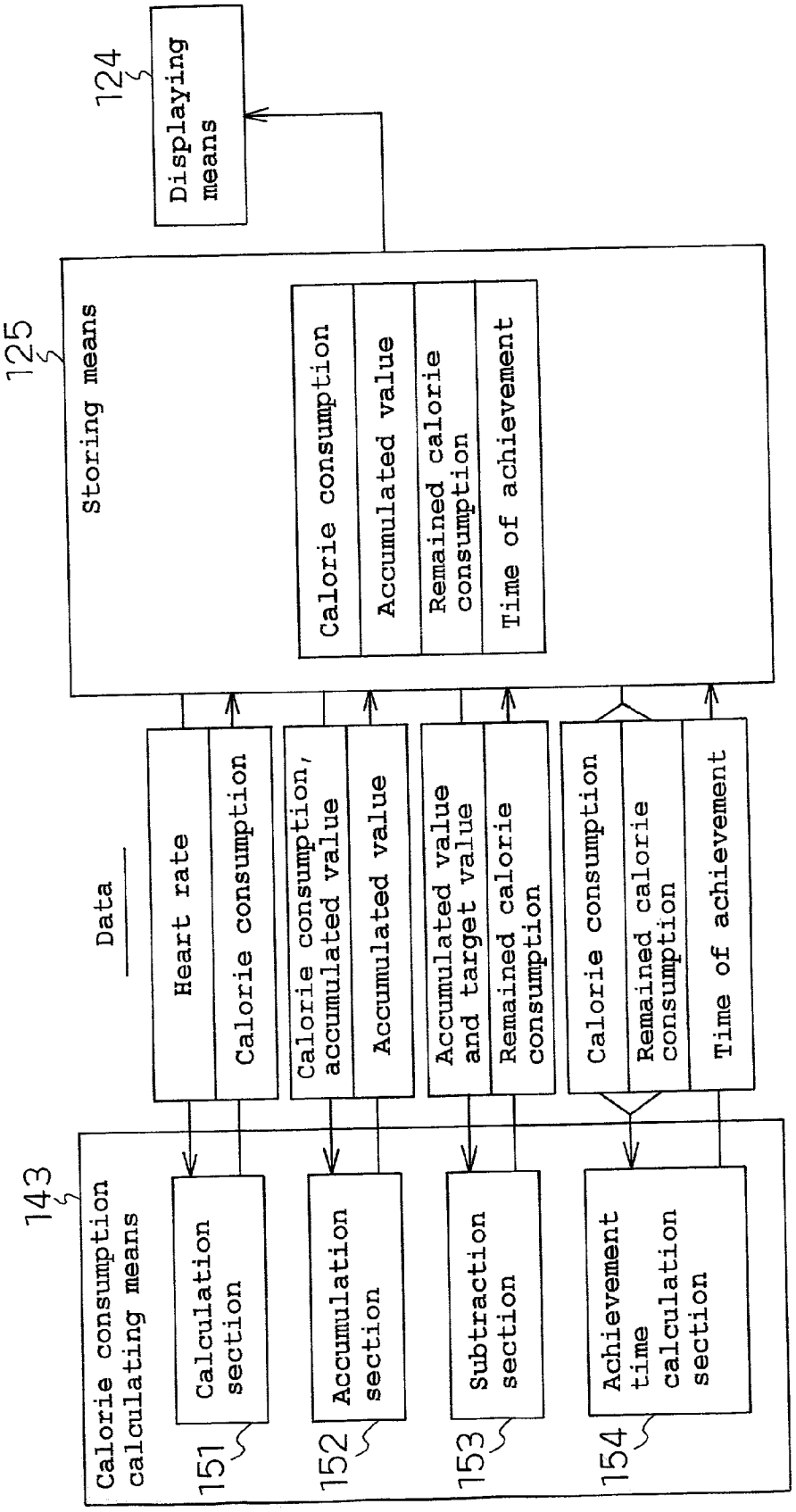

124
Displaying means
125
Storing means
Calorie consumption
Accumulated value
Remained calorie consumption
Time of achievement
Data
Heart rate
Calorie consumption
Calorie consumption, accumulated value
Accumulated value
Accumulated value and target value
Remained calorie consumption
Calorie consumption
Remained calorie consumption
Time of achievement
143
Calorie consumption calculating means
Calculation section
151
Accumulation section
152
Subtraction section
153
Achievement time calculation section
154

Fig. 9

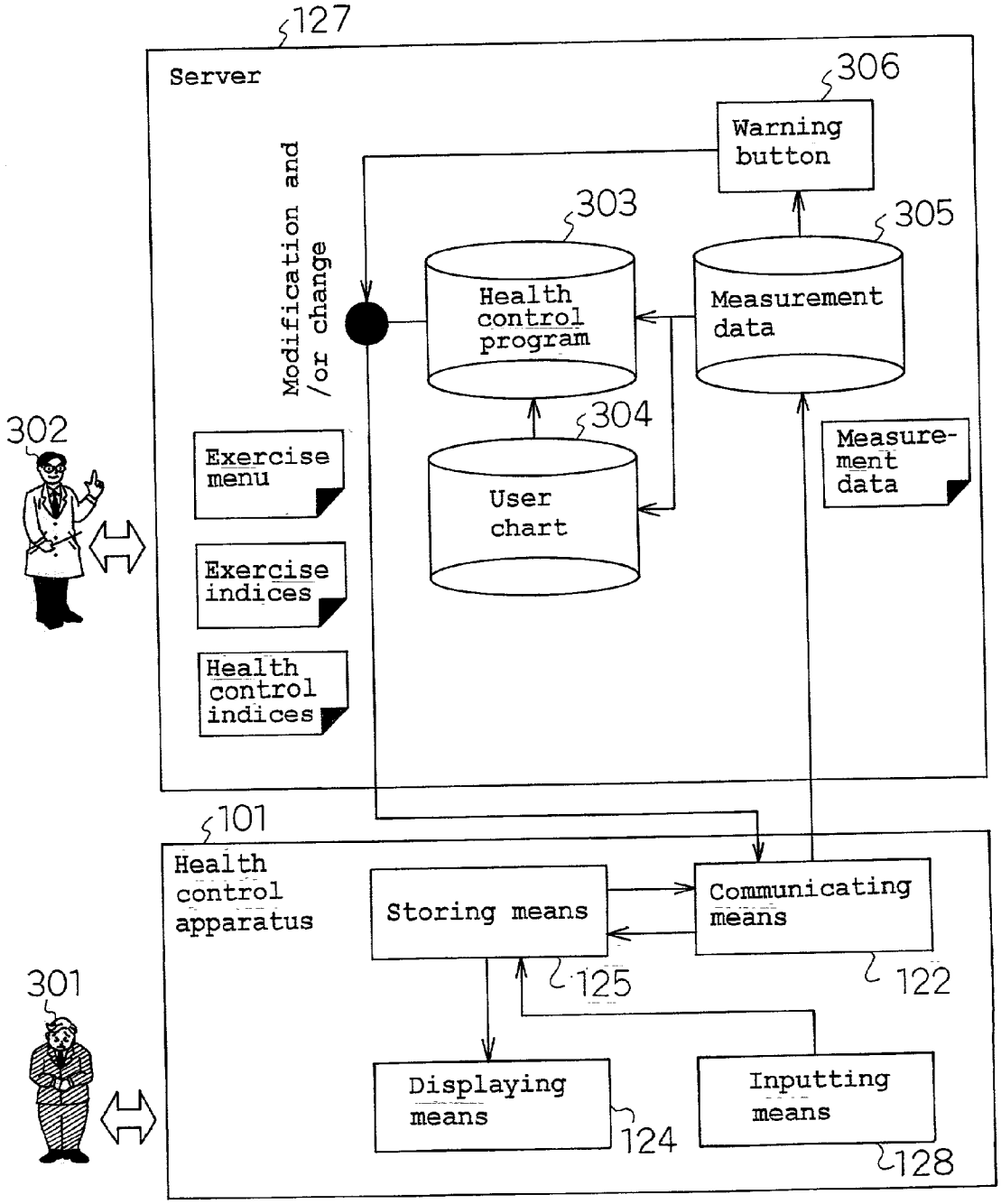

127
Server
306
Warning button
303
305
Modification and /or change
Health control program
Measurement data
304
302
Exercise menu
User chart
Measurement data
Exercise indices
Health control indices
101
Health control apparatus
Storing means
Communicating means
125
122
301
Displaying means
Inputting means
124
128

Fig. 10

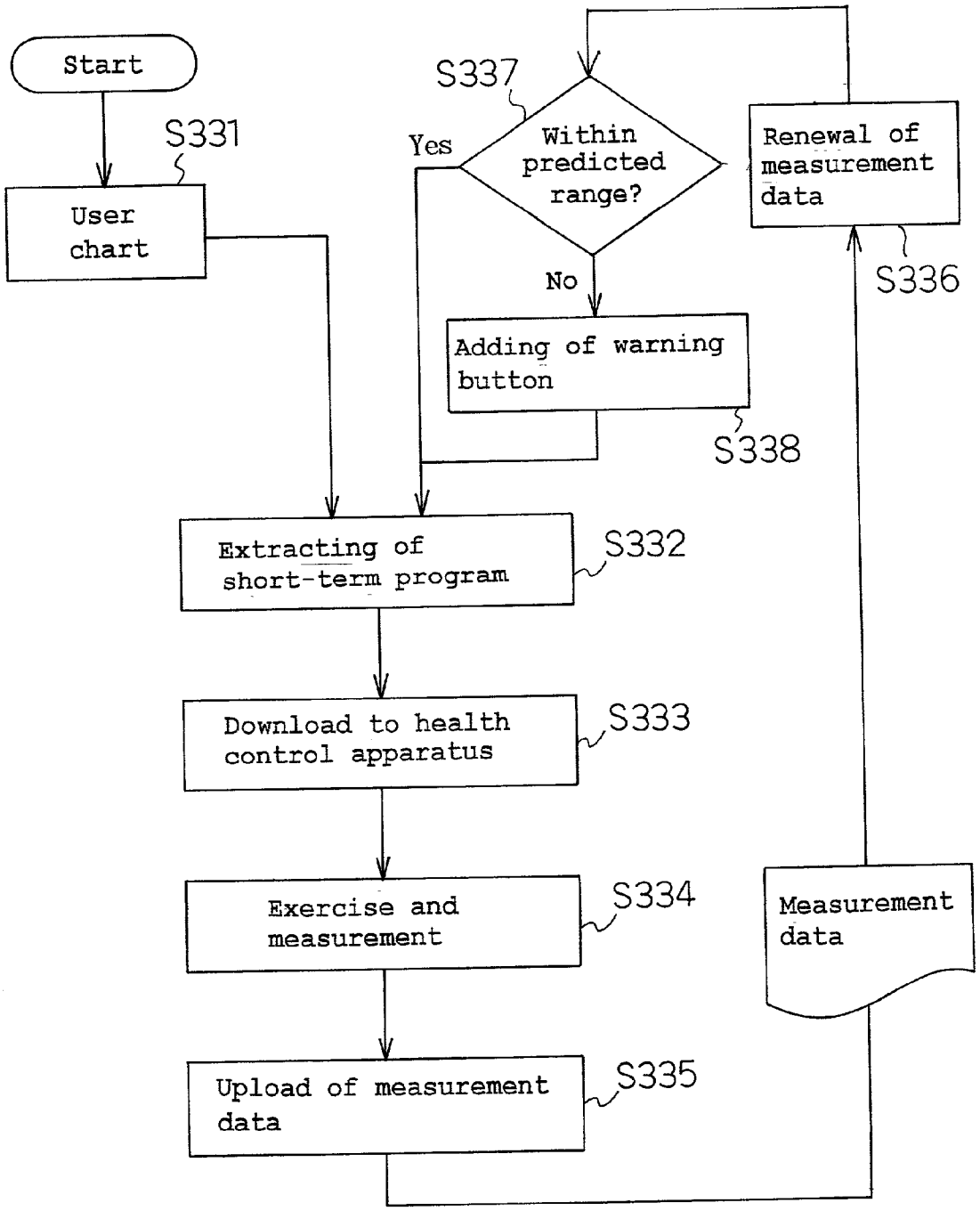

Start
S331
User chart
S337
Within predicted range?
Yes
No
Renewal of measurement data
S336
Adding of warning button
S338
Extracting of short-term program
S332
Download to health control apparatus
S333
Exercise and measurement
S334
Measurement data
Upload of measurement data
S335

Fig. 11

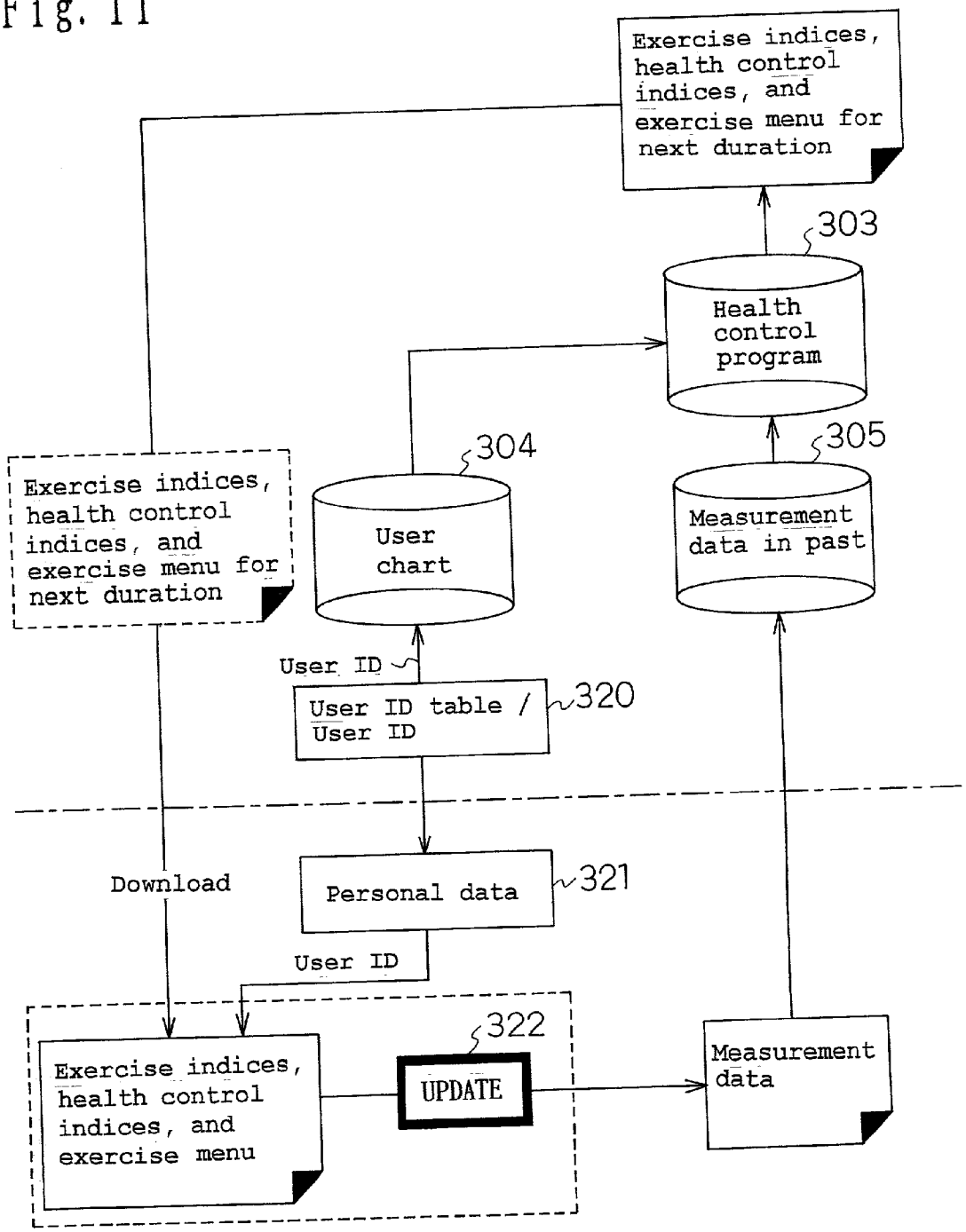

Exercise indices, health control indices, and exercise menu for next duration
303
Health control program
304
305
Exercise indices, health control indices, and exercise menu for next duration
User chart
Measurement data in past
User ID
User ID table / User ID
320
Download
Personal data
321
User ID
322
Exercise indices, health control indices, and exercise menu
UPDATE
Measurement data

Fig. 12

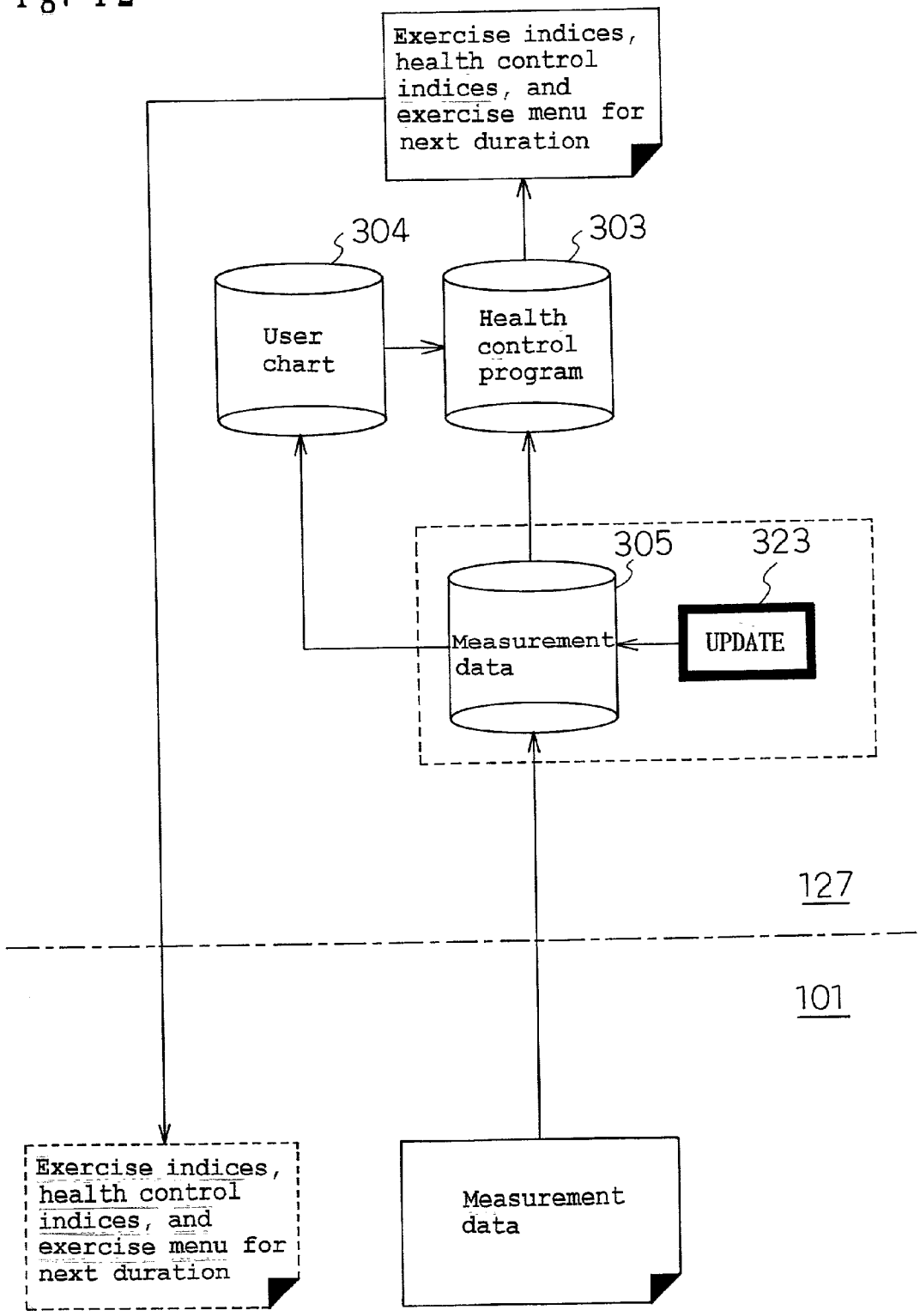

Exercise indices, health control indices, and exercise menu for next duration
304
303
User chart
Health control program
305
323
Measurement data
UPDATE
127
101
Exercise indices, health control indices, and exercise menu for next duration
Measurement data

Fig. 13

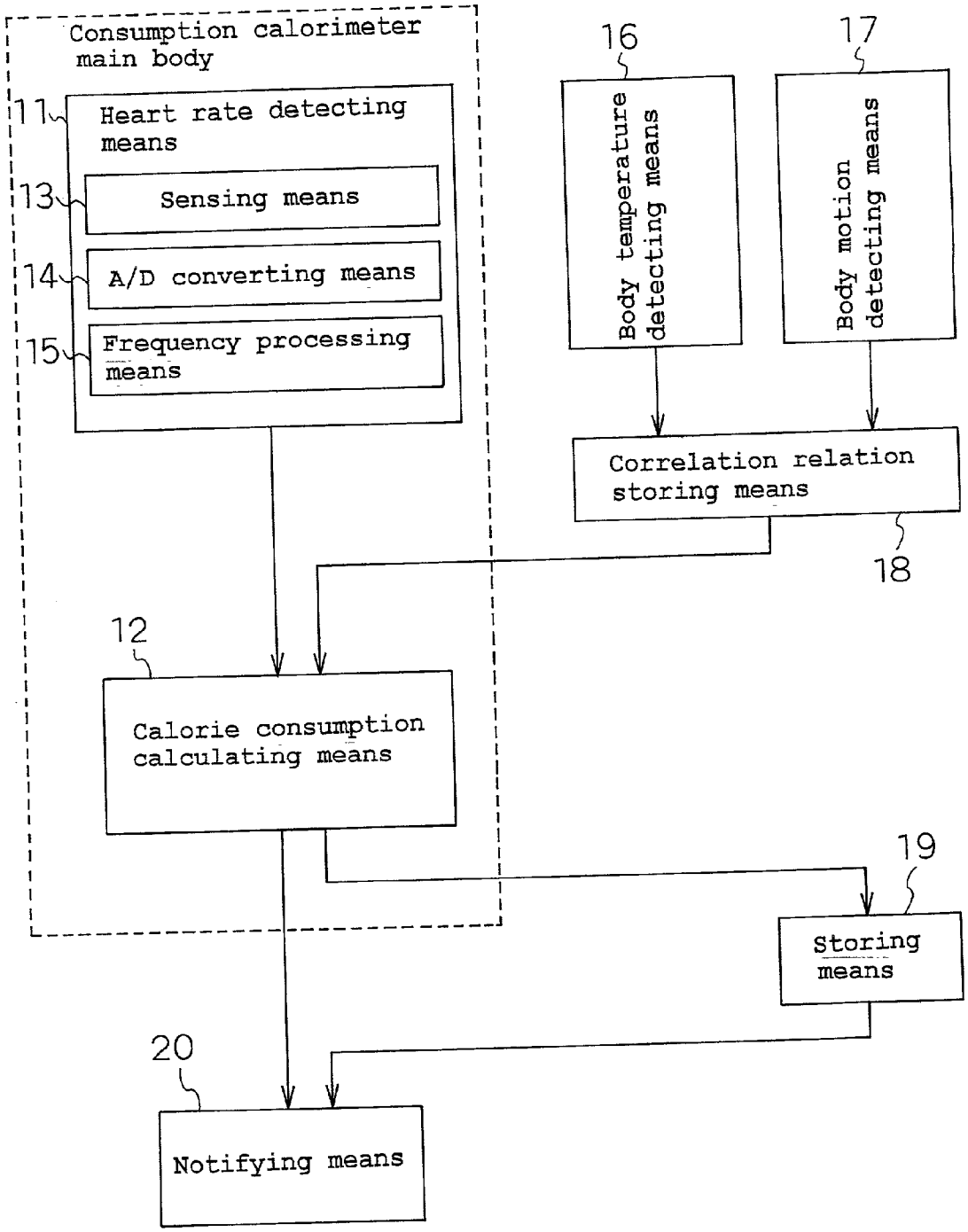

Consumption calorimeter main body
11
Heart rate detecting means
13
Sensing means
14
A/D converting means
15
Frequency processing means
16
Body temperature detecting means
17
Body motion detecting means
Correlation relation storing means
18
12
Calorie consumption calculating means
19
Storing means
20
Notifying means

Fig. 14

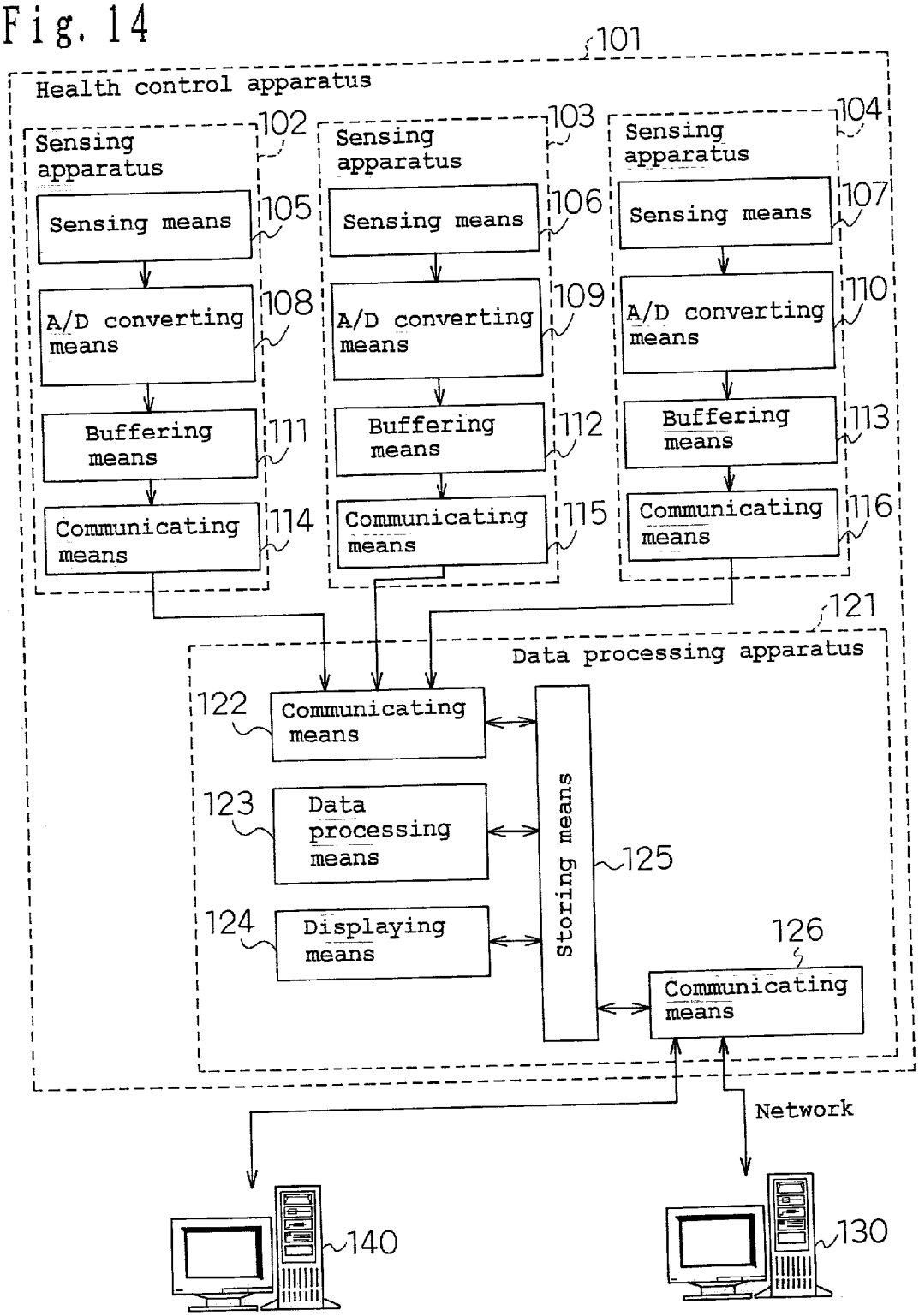

101
Health control apparatus
Sensing apparatus
102
Sensing means
105
A/D converting means
108
Buffering means
111
Communicating means
114
Sensing apparatus
103
Sensing means
106
A/D converting means
109
Buffering means
112
Communicating means
115
Sensing apparatus
104
Sensing means
107
A/D converting means
110
Buffering means
113
Communicating means
116
121
Data processing apparatus
122
Communicating means
123
Data processing means
124
Displaying means
Storing means
125
126
Communicating means
Network
140
130

Fig. 15

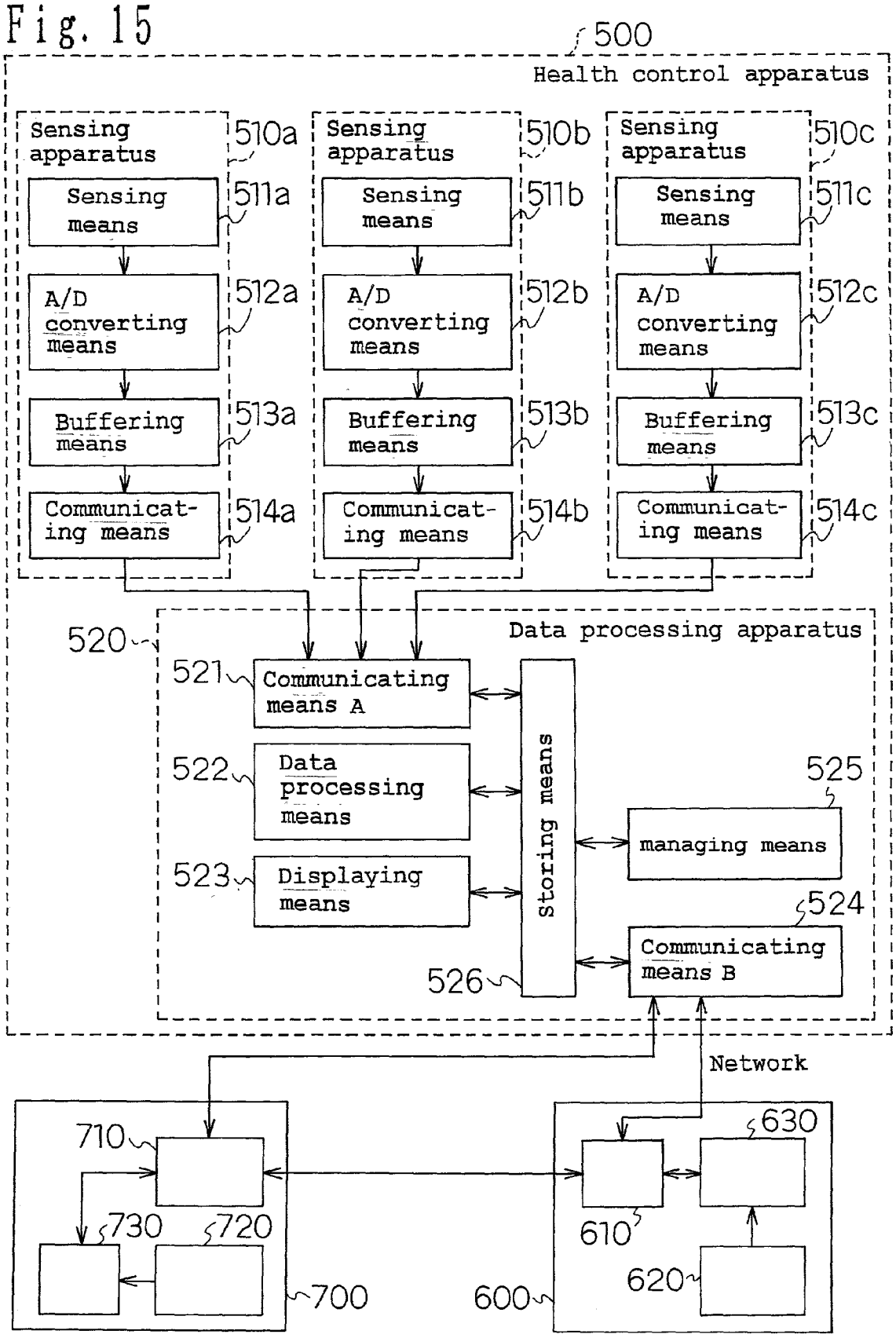

500
Health control apparatus
Sensing apparatus
510a
Sensing means
511a
A/D converting means
512a
Buffering means
513a
Communicating means
514a
Sensing apparatus
510b
Sensing means
511b
A/D converting means
512b
Buffering means
513b
Communicating means
514b
Sensing apparatus
510c
Sensing means
511c
A/D converting means
512c
Buffering means
513c
Communicating means
514c
520
Data processing apparatus
521
Communicating means A
522
Data processing means
523
Displaying means
Storing means
526
525
managing means
524
Communicating means B
Network
710
730
720
700
600
610
630
620

Fig. 16-1

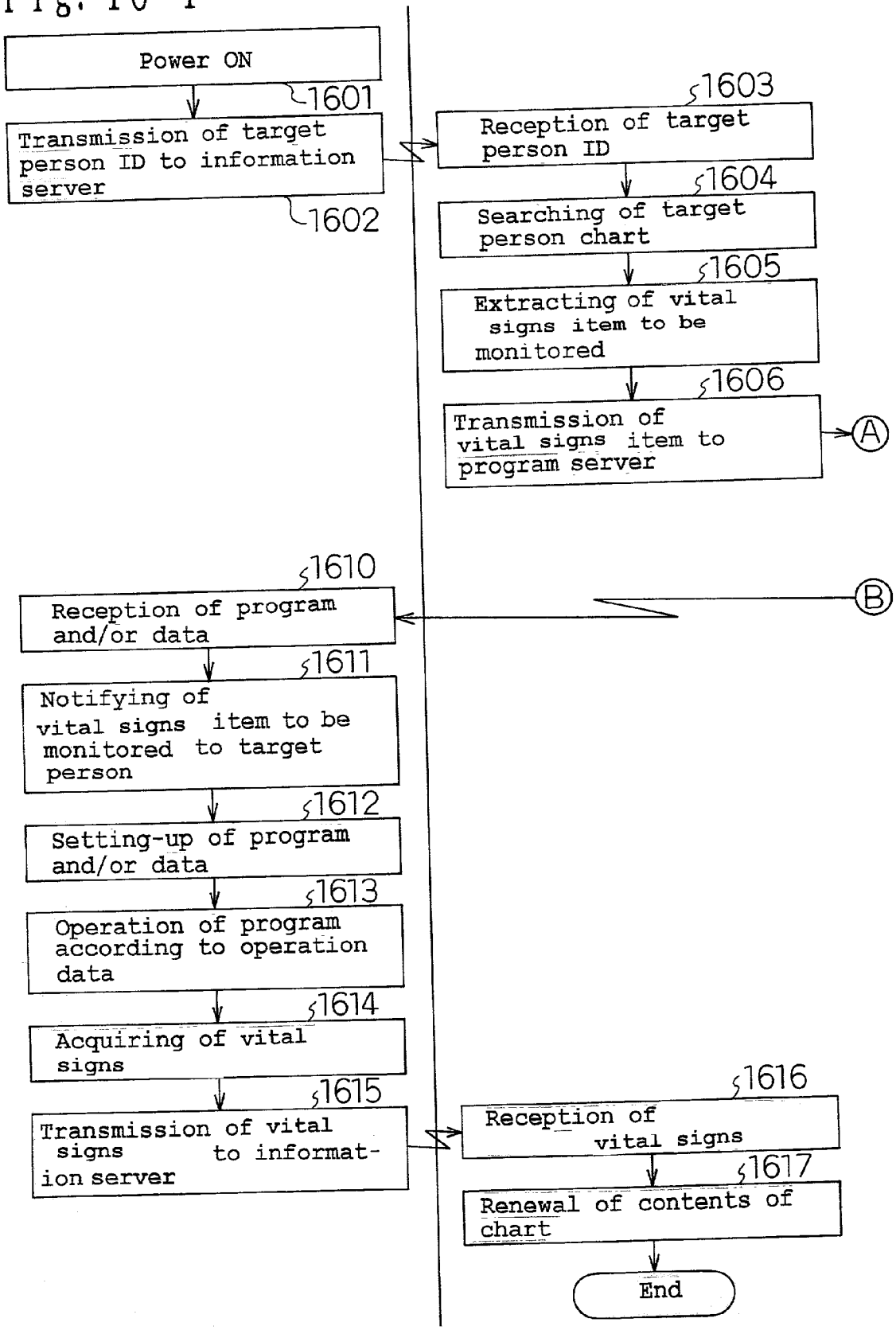

Power ON
1601
Transmission of target person ID to information server
1602
1603
Reception of target person ID
1604
Searching of target person chart
1605
Extracting of vital signs item to be monitored
1606
Transmission of vital signs item to program server
A
B
1610
Reception of program and/or data
1611
Notifying of vital signs item to be monitored to target person
1612
Setting-up of program and/or data
1613
Operation of program according to operation data
1614
Acquiring of vital signs
1615
Transmission of vital signs to information server
1616
Reception of vital signs
1617
Renewal of contents of chart
End

Fig. 16-2

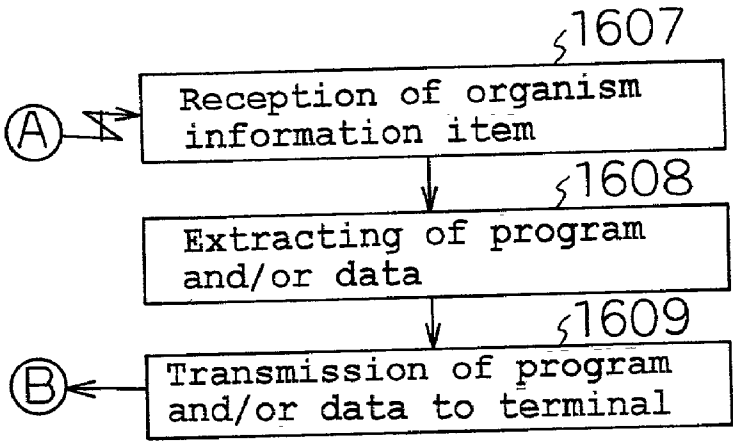

1607
A
Reception of organism information item
1608
Extracting of program and/or data
1609
B
Transmission of program and/or data to terminal

Fig. 17-1

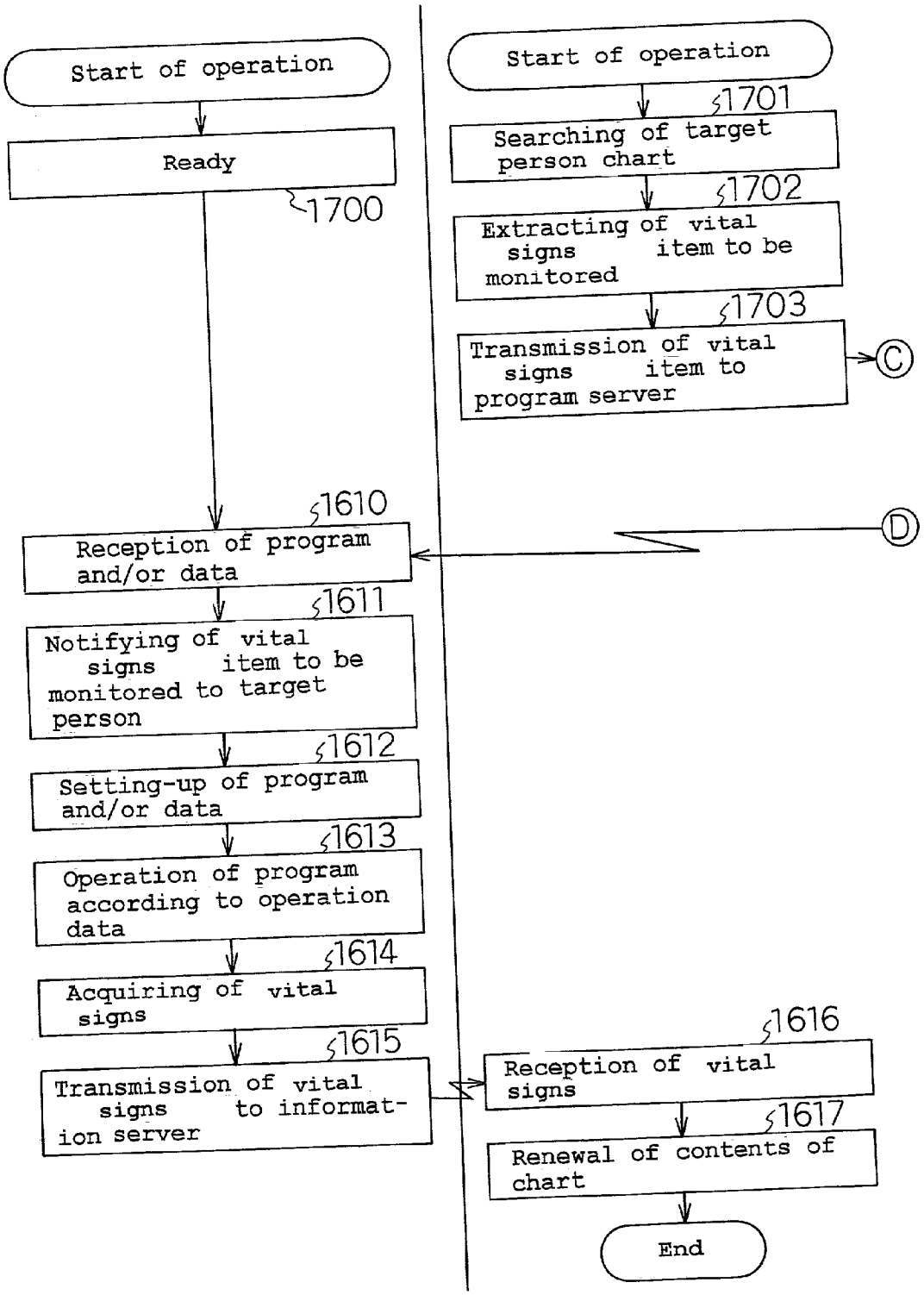

Start of operation
Ready
1700
Start of operation
1701
Searching of target person chart
1702
Extracting of vital signs item to be monitored
1703
Transmission of vital signs item to program server
C
D
1610
Reception of program and/or data
1611
Notifying of vital signs item to be monitored to target person
1612
Setting-up of program and/or data
1613
Operation of program according to operation data
1614
Acquiring of vital signs
1615
Transmission of vital signs to information server
1616
Reception of vital signs
1617
Renewal of contents of chart
End

Fig. 17-2

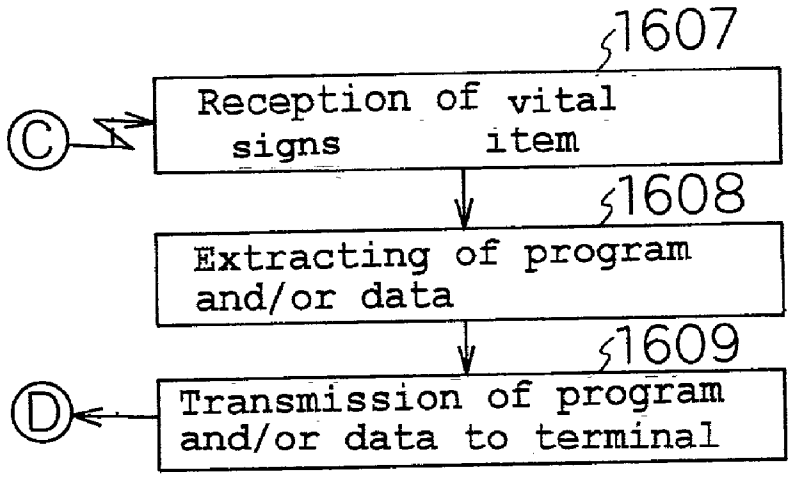
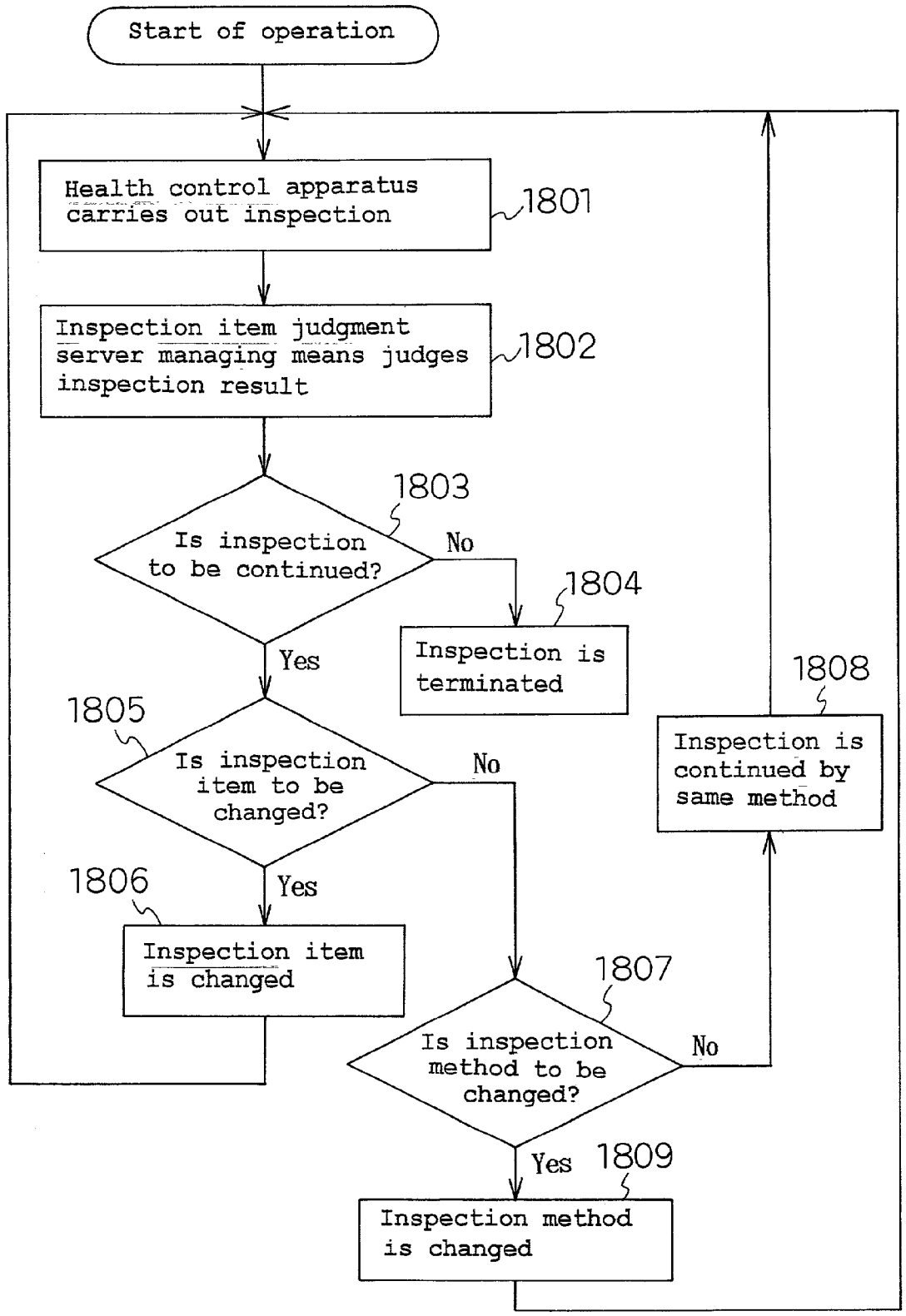

1607
Reception of vital signs item
C
1608
Extracting of program and/or data
1609
Transmission of program and/or data to terminal
D

Fig. 18


Start of operation
Health control apparatus carries out inspection
1801
Inspection item judgment server managing means judges inspection result
1802
1803
Is inspection to be continued?
No
1804
Inspection is terminated
Yes
1805
Is inspection item to be changed?
No
1808
Inspection is continued by same method
1806
Yes
Inspection item is changed
1807
Is inspection method to be changed?
No
Yes
1809
Inspection method is changed

VITAL SIGNS DETECTION SYSTEM, VITAL SIGNS DETECTION METHOD, VITAL SIGNS PROCESSING APPARATUS, AND HEALTH CONTROL METHOD

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a vital signs detection system and a vital signs detection method for acquiring and processing vital signs from an organism, and a health control method using the same.

[0003] 2. Related Art of the Invention

[0004] Exercise is effective for prevention against and treatment for adult diseases. That is, exercise strengthens the function of the heart, the lungs, and the muscles, resolves fatness, reduces the blood sugar level and the blood pressure, and increases the HDL cholesterol (good cholesterol) component. In particular, for diabetics who are recently increasing in number (95% of diabetes is of non-insulin-dependent diabetes mellitus (NIDDM) in Japan), it is reported that exercise is to be effective in: reduction in the blood pressure; improvement in various conditions of diabetes; prevention of arteriosclerosis; and prevention of aging.

[0005] For the purpose of prevention and treatment, recommended exercise is a whole-body exercise causing deep breathing, such as walking, jogging, rope skipping, in-pool walking, swimming, cycling, and aerobics. Recommended intensity of the exercise is 40% to 60% in a scale in which "the hardest" exercise (no harder exercise is possible) is rated at 100%. The intensity of the exercise is measured, for example, according to a subjective symptom (Borg's scale) as shown in Table 1.

TABLE 1

6	
7	Very, Very Light
8	
9	Very Light
10	
11	Fairly Light
12	
13	Somewhat Hard
14	
15	Hard
16	
17	Very Hard
18	
19	Very, Very Hard
20	

[0006] As shown in Table 1, a recommended exercise is that in the range of feeling "from Fairly Light to Somewhat Hard."

[0007] This measurement method depends on the feeling. Accordingly, the use of a judgment method based on the heart rate is more realistic and safer. A measure of heart rate at exercise is obtained by the following Blackburn's formula which gives the heart rate easily.

(heart rate)=(220(age))×K (Here, K indicates exercise intensity of 0K1.)

[0008] For example, in case of an exercise by a 40-year old patient at an intensity of 50%, the formula gives (220 40)×0.5=90. This indicates that an exercise causing a heart rate of 90 is recommended.

[0009] Such real-time recognition of the heart rate permits the recognition of the intensity of the exercise, and is important in order to take exercise within a range of exercise intensity avoiding over-exercise to one's body.

[0010] Further, in order to recognize the effect of an exercise as a concrete value, it is appropriate to measure the calorie consumption. Such real-time recognition of the heart rate and the calorie consumption is very important in exercise for the purpose of prevention against and treatment for adult diseases.

[0011] Even for healthy persons, dieting is attracting the attention, as indicated by the fact that the dieting is a popular theme in women's weeklies. Accordingly, the real-time recognition of calorie consumption in daily life encourages the continuation of dieting, and has other various advantages.

[0012] Accordingly, for the purpose of health control, apparatuses for measuring the heart rate and the calorie consumption of a user are used in medical scenes, offices, homes, and the like.

[0013] An exemplary apparatus for measuring the calorie consumption of a user calculates the calorie consumption on the basis of the heart rate. In some cases, such a consumption calorimeter further comprises a body motion detection apparatus and a body temperature detection apparatus in addition to a pulse wave detection apparatus, and thereby avoids variation due to psychological factors so as to obtain a more precise value of calorie consumption.

[0014] **FIG. 13** is a block diagram showing the configuration of a prior art consumption calorimeter for calculating calorie consumption on the basis of heart rate. As shown in the figure, fundamental components of this prior art consumption calorimeter are heart rate detecting means **11** and calorie consumption calculating means **12**. The heart rate detecting means **11** comprises pulse wave detecting means **13**, A/D converting means **14**, and a frequency processing means **15**. A heart rate detected by the heart rate detecting means **11** is substituted into an approximation formula, whereby the calorie consumption is obtained. Body temperature detecting means **16** and body motion detecting means **17** are also provided. On the basis of the outputs from these means, correlation relation storing means **18** selects an approximation formula used for the calculation of the calorie consumption, so as to improve the precision in the calculation of the calorie consumption. The calorie consumption calculating means **12** substitutes the heart rate into the approximation formula selected by the correlation relation storing means **18**, and there by calculates the calorie consumption. The value of calorie consumption is stored in time series in storing means **19**, and at the same time, displayed on notifying means **20** so as to be notified to a user in real time.

[0015] The body motion detecting means **17** determines whether the user is moving or not. When the user is found to be moving, an approximation formula for active states is used. Otherwise, an approximation formula for resting states is used. The body temperature detecting means **16** detects the body temperature. On the basis of this body temperature, the condition of fundamental metabolism is identified, or alternatively, the body temperature is used as a parameter in the determination of the activity state of the user. Such a

configuration permits a precise measurement (within the error of 5%) of the value of calorie consumption.

[0016] Such a consumption calorimeter can be implemented in a wearable form such as a watch shape, a necklace shape, a card shape, and an eyeglasses shape. In case of the watch shape, the heart rate and the calorie consumption are displayed on the LCD (Liquid Crystal Display), of the watch in real time. Further, displayed thereon are statistical data, such as accumulated calorie consumption and the degree of achievement, and graphs illustrating such data.

[0017] Nevertheless, such a prior art consumption calorimeter is dedicated to the detection of calorie consumption. Accordingly, the other vital signs cannot be treated. For example, a user who desires to measure the blood pressure in addition to the calorie consumption needs to attach a blood-pressure meter (composed of a section for sensing blood pressure information and a section for processing the data obtained by the sensing) independently in addition to the above-mentioned consumption calorimeter.

[0018] As such, with increasing number of the items to be monitored in the organism, measurement instruments (each composed of a section for sensing vital signs corresponding to the monitored item and a section for processing the data) need to be added correspondingly to the increased items.

[0019] Further, in case of a secondary use of the data obtained by the instruments, the data is, in some cases, transmitted to an external server for information processing. In this case, the increase in the number of the measurement instruments causes an increase also in the number of hardware pieces for data transfer which need to be provided in each measurement instrument. This results in an complexity in the configuration of the entire system, and also a reduction in workability.

[0020] As for a single measurement instrument such as the above-mentioned consumption calorimeter, there have been the following problems.

[0021] A first problem is the capability of displaying. In case of a wearable apparatus described above, the display area and the resolution in the display device are restricted. Accordingly, the amount of displayed data and the character size are in trade-off. That is, when small characters are used for display, a large amount of data can be displayed. Nevertheless, this is not appropriate for elderly persons and diabetics who have poor sight in many cases.

[0022] A second problem is the operation keys and the operability thereof. Since a wearable device is necessarily small and has a small surface area, the keys provided thereon need to be small, and the number of the keys is also restricted. Accordingly, two or more functions are assigned to a single key in most cases. This degrades the operability.

[0023] It is desirable that a device can be operated easily with a small number of keys. Nevertheless, in the prior art devices, real-time measurement data and statistical data derived therefrom have been displayed on a single display device. This has unavoidably caused a large number of key operations, and hence prevented simple key operation.

[0024] A third problem is a difficulty in application to users. It is laborious to receive an exercise menu in the form of paper or e-mail and thereby input one's own target values so as to determine the exercise menu of the final form. This can disturb the habit of exercise. Accordingly, it is desirable that an entire menu is automatically downloaded, displayed, and set on the health control apparatus.

SUMMARY OF THE INVENTION

[0025] The present invention has been devised with considering the above-mentioned problems. An object of the present invention is to provide: a vital signs detection system applicable to various purposes and various types of necessary data depending on the purpose; and a health control method using the same.

[0026] Another object of the present invention is to provide a vital signs detection system to acquire necessary information on the state of a user correspondingly to the change of the state.

[0027] The 1st invention of the present invention is a vital signs detection system comprising:

[0028] a terminal capable of being connected to detecting means of detecting vital signs;

[0029] a program server of storing a program and/or data to operate said detecting means; and

[0030] an information server of communicating with said terminal;

[0031] wherein:

[0032] when an operation switch of said detecting means is turned ON, said terminal transmits information including the type of said detecting means to said program server;

[0033] on receiving said information, said program server transmits a predetermined program and/or data corresponding to said information to said terminal according to said information;

[0034] said detecting means operates according to said predetermined program and/or data received by said terminal, and thereby detects vital signs; and

[0035] said terminal transmits the vital signs detected by said detecting means to said information server.

[0036] The 2nd invention of the present invention is a vital signs detection method utilizing:

[0037] a terminal capable of being connected to detecting means of detecting vital signs;

[0038] a program server of storing a program and/or data to make said detecting means operate; and

[0039] an information server of communicating with said terminal; and comprising:

[0040] the step in which when an operation switch of said detecting means is turned ON, said terminal transmits information including the type of said detecting means to said program server;

[0041] the step in which on receiving said information, said program server transmits a predetermined program and/or data corresponding to said information to said terminal;

[0042] the step in which said detecting means operates according to said predetermined program and/or data received by said terminal, and thereby detects vital signs; and

[0043] the step in which said terminal transmits the vital signs detected by said detecting means to said information server.

[0044] The 3rd invention of the present invention is a terminal capable of being connected to detecting means of detecting vital signs, wherein:

[0045] said terminal communicates with a program server of storing a program and/or data to make said detecting means operate, and with an information server for storing vital signs detected by said detecting means;

[0046] when an operation switch of said detecting means is turned ON, said terminal transmits information including the type of said detecting means to said program server;

[0047] on receiving said information, said program server transmits a predetermined program and/or data to said terminal according to said information; said detecting means operates according to said predetermined program and/or data received by said terminal, and thereby detects vital signs; and said terminal transmits the vital signs detected by said detecting means to said information server.

[0048] The 4th invention of the present invention is a program server for communicating with a terminal capable of being connected to detecting means of detecting vital signs, and for storing a program and/or data to make said detecting means to operate, wherein:

[0049] when an operation switch of said detecting means is turned ON and thereby said terminal transmits information including the type of said detecting means, said program server receives said information and then transmits a predetermined program and/or data corresponding to said information to said terminal according to said information;

[0050] said detecting means operates according to said predetermined program and/or data received by said terminal, and thereby detects vital signs; and

[0051] said terminal transmits the vital signs detected by said detecting means to said information server.

[0052] The 5th invention of the present invention is an information server of communicating with a terminal capable of being connected to detecting means of detecting vital signs, wherein:

[0053] said terminal communicates also with a program server for storing a program and/or data to make said detecting means operate;

[0054] when an operation switch of said detecting means is turned ON and thereby said terminal transmits information including the type of said detecting means to said program server,

[0055] said program server receives said information and then transmits a predetermined program and/or data corresponding to said information to said terminal;

[0056] said detecting means operates according to said predetermined program and/or data received by said terminal, and thereby detects vital signs; and

[0057] when said terminal transmits the vital signs detected by said detecting means, said information server receives said vital signs.

[0058] The 6th invention of the present invention is a vital signs processing apparatus comprising:

[0059] said vital signs detecting means of detecting vital signs; and

[0060] vital signs processing means of processing, storing, and displaying said vital signs detected by said vital signs detecting means; wherein:

[0061] said vital signs detecting means comprises at least:

[0062] buffering means of temporarily storing said detected vital signs; and

[0063] first communicating means of communicating with said vital signs processing means;

[0064] said vital signs processing means comprises at least:

[0066] second communicating means of communicating with said vital signs detecting means;

[0067] storing means of storing said vital signs;

[0068] processing means of processing said vital signs stored in said storing means according to a predetermined program and/or data; and

[0069] displaying means of displaying said vital signs stored in said storing means and/or output data of said processing means.

[0070] The 7th invention of the present invention is the vital signs processing apparatus according to 6th invention wherein said vital signs processing means further comprises third communicating means of communicating with an external server.

[0071] The 8th invention of the present invention is the vital signs processing apparatus according to 6th invention wherein:

[0072] said buffering means and said storing means comprise a removable medium which can be detached; and

[0073] said removable medium is transferred between said vital signs detecting means and said vital signs processing means, whereby the data stored in said removable medium is transferred.

[0074] The 9th invention of the present invention is the vital signs processing apparatus according to any of 6th-8th inventions, wherein:

[0075] said vital signs detecting means is composed of a pulse wave sensor for measuring the pulse wave of a user; and

[0076] said processing means comprises: frequency processing means of performing FFT (fast Fourier

transformation) processing onto the frequency of said pulse wave; heart rate measuring means of measuring heart rate from the output of said frequency processing means; and calorie consumption calculating means of calculating calorie consumption from said heart rate.

[0077] The 10th invention of the present invention is the vital signs processing apparatus according to 9th invention wherein:

[0078] said vital signs processing means further comprises FFT processing means of performing FFT processing onto said heart rate;

[0079] according to the result of said FFT processing, it is determined whether said user is exercising or not; and

[0080] when it is determined that said user is not exercising, and when said heart rate exceeds a predetermined set value, said calorie consumption calculating means does not use said measured heart rate, but calculates calorie consumption according to said user's resting heart rate stored previously.

[0081] The 11th invention of the present invention is the vital signs processing apparatus according to 9th invention further comprising inputting means of permitting a user to input: personal data including one's name, age, and sex; health control indices including daily, weekly, monthly, and final target values for calorie consumption; and exercise indices including upper and lower limits for heart rate at exercise, and exercise time.

[0082] The 12th invention of the present invention is the vital signs processing apparatus according to 11th invention wherein said health control indices and said exercise indices are displayed on said displaying means.

[0083] The 13th invention of the present invention is the vital signs processing apparatus according to 9th invention further comprising notifying means of warning said user when said heart rate falls outside the range between said upper and lower limits for heart rate having been input through said inputting means.

[0084] The 14th invention of the present invention is the vital signs processing apparatus according to 11th invention wherein:

[0085] said processing means performs: the accumulation of said calorie consumption; the calculation of the difference from said target value; the calculation of the degree of achievement to said target value; and the calculation of the expected time of achieving said target value at the current pace of calorie consumption; and then stores these data in a region different from that of said vital signs data, within said storing means; and

[0086] said displaying means displays: the time series of the change in said heart rate and said calorie consumption; said accumulated value of calorie consumption; and said expected time of achieving said target value.

[0087] The 15th invention of the present invention is the vital signs processing apparatus according to 6th invention wherein:

[0088] said vital signs detecting means is used as said detecting means connected to said terminal in 3rd invention; and

[0089] said vital signs processing means is used as said terminal in 3rd invention.

[0090] The 16th invention of the present invention is the vital signs processing apparatus according to 6th invention wherein said vital signs detecting means and said vital signs processing means are used as said detecting means connected to said terminal in 3rd invention.

[0091] The 17th invention of the present invention is a health control method wherein a vital signs processing apparatus according to any of claims 7, 5 or 16 is used, whereby the health of a user of said vital signs processing apparatus is controlled according to instructions from a health control instructor who is a server user of said information server or said server, wherein

[0092] said method comprises:

[0093] a first step in which said information server or said server generates a health control program including all or part of the exercise indices, the exercise menu, and the health control indices of said user of said health vital signs processing apparatus according to a user chart containing vital signs including the height, the weight, the body fat percentage, and the temperature of said user, and then transmits said program to said vital signs processing apparatus;

[0094] a second step in which said vital signs processing apparatus receives said health control program, and in which said user uses said vital signs processing apparatus in accordance with said health control program, and thereby acquires said user's vital signs;

[0095] a third step in which said information server or said server renews said health control program according to said acquired measurement data; and

[0096] a fourth step in which when said measurement data falls outside the range of the values set in said health control program, said vital signs processing apparatus transmits warning information for requesting attention to said information server or said server; and wherein:

[0097] on recognizing said warning information, said health control instructor determines and alters said exercise indices and/or said exercise menu in said health control program according to said warning information;

[0098] said information server or said server transmits said altered exercise indices and/or exercise menu to said vital signs processing apparatus; and

[0099] when said vital signs processing apparatus receives said altered exercise indices and/or exercise menu, said user takes exercise according to said exercise indices and/or exercise menu.

[0100] The 18th invention of the present invention is the health control method according to 17th invention wherein:

[0101] said vital signs processing apparatus transmits prompt information for requesting the renewal of said measurement data, to said user;

[0102] on recognizing said prompt information, said user determines and operates said vital signs processing apparatus according to said prompt information; and

[0103] said vital signs processing apparatus acquires new measurement data, and then transmits them to said information server or said server.

[0104] The 19th invention of the present invention is the health control method according to 17th invention wherein:

[0105] said information server or said server transmits prompt information for requesting the renewal of said acquired measurement data, to said user;

[0106] on recognizing said prompt information, said user of said vital signs processing apparatus determines and operates said information server or said server according said prompt information; and

[0107] on receiving new measurement data, said information server or said server generates a new health control program based on said data.

[0108] The 30th invention of the present invention is the health control method according to 18th or 19th invention wherein said prompt information is output when said measurement data is not renewed for a predetermined time or longer.

[0109] The 21st invention of the present invention is the health control method according to 18th invention wherein said prompt information includes the method of operation of said vital signs processing apparatus for said user to renew said measurement data.

[0110] The 22nd invention of the present invention is the health control method according to 19th invention wherein said prompt information includes the operation method of said information server or said server for said user of said vital sign processing apparatus.

[0111] The 23nd invention of the present invention is the health control method according to 17th invention wherein:

[0112] said information server or said server further comprises a user ID (identifier) table for storing user IDs for corresponding the user chart of each user to that user uniquely; and

[0113] said user ID is transmitted together with said health control program to said health control apparatus.

[0114] The 24th invention of the present invention is a program of operating a computer as all or part of said terminal capable of being connected to detecting means of detecting vital signs; said program server for storing a program and/or data for causing said detecting means to operate; and said information server for communicating with said terminal; in said vital signs detection system according to 1st invention.

[0115] The 25th invention of the present invention is a program of operating a computer as all or part of said terminal according to 3rd invention capable of being connected to detecting means of detecting vital signs.

[0116] The 26th invention of the present invention is a program of operating a computer as all or part of said program server according to 4th invention for communicating with said terminal capable of being connected to detecting means of detecting vital signs, and for storing a program and/or data for causing said detecting means to operate.

[0117] The 27th invention of the present invention is a program of operating a computer as all or part of said information server according to 5th invention for communicating with said terminal capable of being connected to detecting means of detecting vital signs.

[0118] The 28th invention of the present invention is a program of operating a computer as all or part of said processing means of said vital signs processing means of said vital signs processing apparatus according to 6th invention.

[0119] The 29th invention of the present invention is a program of operating a computer to carry out all or part of said first, second, third, and fourth steps in said health control method according to 17th invention.

[0120] The 30th invention of the present invention is data structure which can be used in a computer and comprises all or part of the data structure in said first, second, third, and fourth steps in said health control method according to 17th invention.

[0121] The 31st invention of the present invention is a vital signs detection system comprising:

[0122] a terminal having detecting means of detecting, vital signs corresponding to an inspection item;

[0123] a program server of storing a program and/or data to make said detecting means operate; and

[0124] an inspection item judgment server of communicating with said terminal and thereby judging said inspection item according to said vital signs; wherein:

[0125] when said terminal is started, said inspection item judgment server judges a predetermined inspection item according to said vital signs corresponding to said predetermined inspection item; and according to the result of said judgment, said inspection item judgment server makes said terminal download a predetermined program and/or data from said program server, and thereby makes said detecting means operate according to said predetermined program and/or data.

[0126] The 32nd invention of the present invention is a vital signs detection system comprising:

[0127] a terminal having detecting means of detecting, vital signs corresponding to an inspection item;

[0128] a program server of storing a program and/or data to make said detecting means to operate; and

[0129] an inspection item judgment server of communicating with said terminal and thereby judging said inspection item according to said vital signs; wherein:

[0130] when said detecting means detects said vital signs corresponding to a predetermined inspection item, said terminal transmits said vital signs to said inspection item judgment server;

[0131] on receiving said detected vital signs, said inspection item judgment server judges said predetermined inspection item according to said vital signs, and according to the result of said judgment, determines whether the operation of said detecting means is to be continued or not; and

[0132] when the result of said determination is the continuation of the operation of said detecting means, said inspection item judgment server makes said detecting means perform the same operation as previous, or alternatively, to download a predetermined program and/or data from said program server and thereby operate according to said predetermined program and/or data.

[0133] The 33rd invention of the present invention is the vital signs detection system according to 31st or 32nd invention wherein: said detecting means is connected to said terminal in an attachable and detachable manner; and in response to said download of said predetermined program and/or data, the type and/or the number of said detecting means connected to said terminal is changed.

[0134] The 34th invention of the present invention is the vital signs detection system according to 31st or 32nd inventions wherein said download of said predetermined program and/or data is carried out in order to change said inspection item to which said operation of said detecting means corresponds.

[0135] The 35th invention of the present invention is the vital signs detection system according to 31st or 32nd inventions wherein said download of said predetermined program and/or data is carried out in order to change the inspection method for the same inspection item to which said operation of said detecting means corresponds.

[0136] The 36th invention of the present invention is the vital signs detection system according to 31st or 32nd inventions wherein:

[0137] said judgment by said inspection item judgment server is carried out according to specific vital signs as said vital signs, which is in specific relevance to said organism of detection target of said detecting means;

[0138] said terminal is provided with an ID corresponding to said specific vital signs; and

[0139] said inspection item judgment server refers to said ID of said terminal, and thereby carries out said judgment according to said specific vital signs.

[0140] The 37th invention of the present invention is the vital signs detection system according to 36th invention wherein said ID is transmitted from said terminal to said inspection item judgment server, whereby said inspection item judgment server can refer to said ID.

[0141] The 38th invention of the present invention is the vital signs detection system according to 36h invention wherein said inspection item judgment server retains said ID in advance.

[0142] The 39th invention of the present invention is a terminal comprising detecting means of detecting, from an organism, vital signs corresponding to a predetermined inspection item, wherein

[0143] when at start-up, an inspection item judgment server for judging said inspection item according to said vital signs judges a predetermined inspection item according to said vital signs corresponding to said predetermined inspection item,

[0144] according to the result of said judgment, said terminal downloads a predetermined program and/or data from a program server for storing a program and/or data to make said detecting means operate, and thereby causes said detecting means to operate according to said predetermined program and/or data.

[0145] The 40th invention of the present invention is a terminal comprising detecting means of detecting, from an organism, vital signs corresponding to inspection item, wherein:

[0146] when said detecting means detects a vital signs corresponding to a predetermined inspection item, said terminal transmits said vital signs to an inspection item judgment server of communicating with said terminal and thereby judging said inspection item according to said vital signs;

[0147] on receiving said detected vital signs, said inspection item judgment server judges said predetermined inspection item according to said vital signs, and according to the result of said judgment, determines whether the operation of said detecting means is to be continued or not; and

[0148] when the result of said determination is the continuation of the operation of said detecting means, said inspection item judgment server makes said detecting means perform the same operation as previous, or alternatively, download a predetermined program and/or data from a program server for storing a program and/or data to make said detecting means operate, and thereby operate according to said predetermined program and/or data.

[0149] The 41st invention of the present invention is the terminal according to 39th or 40th inventions wherein: said detecting means is connected to said terminal in an attachable and detachable manner; and in response to said download of said predetermined program and/or data, the type and/or the number of said detecting means connected to said terminal is changed.

[0150] The 42nd invention of the present invention is the terminal according to 39th or 40th inventions wherein said download of said predetermined program and/or data is carried out in order to change said inspection item to which said operation of said detecting means corresponds.

[0151] The 43rd invention of the present invention is the terminal according to 39th or 40th inventions wherein said download of said predetermined program and/or data is carried out in order to change the inspection method for the same inspection item to which said operation of said detecting means corresponds.

[0152] The 44th invention of the present invention is a terminal according to 39th or 40th inventions wherein:

[0153] said terminal is provided with an ID which corresponds to specific vital signs as said vital signs, in specific relevance to said organism of detection target of said detecting means and is thereby used for said judgment by said inspection item judgment server; and

[0154] said inspection item judgment server refers to said ID of said terminal, and thereby carries out said judgment according to said specific vital signs.

[0155] The 45th invention of the present invention is a vital signs detection method comprising:

[0156] a step including a detecting step of detecting, from an organism, vital signs corresponding to an inspection item;

[0157] a program storing step of storing a program and/or data to make detecting step carry out; and

[0158] an inspection item judging step of judging said inspection item according to said vital signs detected by said detecting step; wherein:

[0159] when said detecting step is started, in said inspection item judging step, said predetermined inspection item is judged according to said vital signs corresponding to said predetermined inspection item; and according to the result of said judgment, a predetermined program and/or data stored in said program storing step is downloaded for said step including said detecting step; whereby in said detecting step, operation is carried out according to said predetermined program and/or data.

[0160] The 46th invention of the present invention is a vital signs detection method comprising:

[0161] a step including a detecting step of detecting, from an organism, vital signs corresponding to a predetermined inspection item;

[0162] a program storing step of storing a program and/or data make said detecting step carry out; and

[0163] an inspection item judging step of judging said inspection item according to said vital signs detected by said detecting step; wherein:

[0164] when said vital signs corresponding to said predetermined inspection item is detected in said detecting step, said vital signs is transmitted, in said step including said detecting step, to said inspection item judging step for processing;

[0165] in said inspection item judging step, said predetermined inspection item is judged according to said detected vital signs, and according to the result of said judgment, it is determined whether said detecting step is to be continued or not; and

[0166] when the result of said determination is the continuation of said detecting step, the same operation as previous is carried out in said detecting step, or alternatively, a predetermined program and/or data stored in said program storing step is downloaded and thereby operation is carried out according to said predetermined program and/or data.

[0167] The 47th invention of the present invention is a program of operating a computer as all or part of: said terminal having detecting means of detecting, from an organism, vital signs corresponding to a predetermined inspection item; said program server for storing a program and/or data to make said detecting means operate; and said inspection item judgment server for communicating with said terminal and thereby judging said inspection item according to said vital signs; in said vital signs detection system according to 31st invention.

[0168] The 48th invention of the present invention is a program of operating a computer as all or part of: said terminal having detecting means of detecting, from an organism, vital signs corresponding to a predetermined inspection item; said program server for storing a program and/or data to make said detecting means operate; and said inspection item judgment server for communicating with said terminal and thereby judging said inspection item according to said vital signs; in said vital signs detection system according to 32nd invention.

[0169] The 49th invention of the present invention is a computer-processable medium carrying a program of operating a computer as all or part of: said terminal capable of being connected to detecting means of detecting vital signs; said program server for storing a program and/or data to make said detecting means to operate; and said information server for communicating with said terminal; in said vital signs detection system according to 1st invention.

[0170] The 50th invention of the present invention is a computer-processable medium carrying a program of operating a computer as all or part of: said terminal having detecting means of detecting, from an organism, vital signs corresponding to a predetermined inspection item; said program server for storing a program and/or data of operating said detecting means operate; and said inspection item judgment server for communicating with said terminal and thereby judging said inspection item according to said vital signs; in said vital signs detection system according to 31st invention.

[0171] The 51st invention of the present invention is a computer-processable medium carrying a program of operating a computer as all or part of: said terminal having detecting means of detecting, from an organism, vital signs corresponding to a predetermined inspection item; said program server for storing a program and/or data for causing said detecting means to operate; and said inspection item judgment server for communicating with said terminal and thereby judging said inspection item according to said vital signs; in said vital signs detection system according to 32nd invention.

[0172] Another example of the present invention comprises: a sensing apparatus for measuring and outputting the vital signs of a user; and a data processing apparatus for processing, storing, and displaying the sensed data. These two apparatuses are connected to each other by communicating means. Said data processing apparatus can be connected to one or more sensing apparatuses. Each sensing apparatus comprises: sensing means of measuring the vital signs of each user; A/D converting means of converting the output signal of said sensing means into a digital signal; buffering means of temporarily storing the vital signs data output from said A/D converting means, in the first-in

first-out scheme; and first communicating means of sending out the vital signs data stored in said buffering means. Said data processing apparatus comprises: second communicating means of communicating with said first communicating means of said sensing apparatus; storing means of storing the data received by said second communicating means; processing means of processing the vital signs data stored in said storing means, correspondingly to an application; and displaying means of displaying the vital signs data stored in said storing means or the output data of said processing means.

[0173] In another example of the invention, said data processing apparatus comprises third communicating means of connecting to a network and thereby communicating with a server.

[0174] In another example of the invention, said sensing means of said sensing apparatus is composed of a pulse wave sensor for measuring the pulse wave of a user. Said processing means of said data processing apparatus comprises: frequency processing means of performing FFT processing onto the organism signs obtained by said sensing apparatus; heart rate measuring means of measuring the heart rate from the output of said frequency processing means; and calorie consumption calculating means of calculating the calorie consumption from the heart rate. With this configuration, the present invention serves as a consumption calorimeter.

[0175] In another example of the present invention of said consumption calorimeter, said data processing apparatus comprises FFT processing means of performing FFT processing onto the heart rate, and on the basis of the result, determines whether the user is exercising or not. When the heart rate is high even though the user is not exercising, it is determined that the high heart rate is temporarily caused by mental tension. In this case, the calorie consumption is calculated on the basis of a resting heart rate previously stored.

[0176] In another example of the invention, said consumption calorimeter comprises inputting means of permitting a user to input: personal data including one's name, age, and sex; health control indices including daily, weekly, monthly, and final target values for calorie consumption; and exercise indices including upper and lower limits for heart rate at exercise, and exercise time. In a health control method using this health control apparatus, a user inputs the personal data, the health control indices, and the exercise indices in advance through said inputting means. These data and indices are stored in said storing means. During the use of the health control apparatus, the intensity of exercise is determined on the basis of the health control indices and the exercise indices.

[0177] In another example of the present invention of said consumption calorimeter, the data processing apparatus comprises notifying means of warning the user when the heart rate output from said heart rate measuring means falls outside the range between the upper and lower limits for heart rate having been set by the above method.

[0178] In another example of the present invention of a method using said consumption calorimeter, said processing means of said data processing apparatus performs: the accumulation of the calorie consumption; the calculation of the difference from the target value; the calculation of the degree of achievement of the target value; and the calculation of the expected time of achieving the target value at the current pace of calorie consumption; and then stores these data in a region different from that of the vital signs data, within said storing means. Said displaying means displays: the time series of the change in the heart rate and the calorie consumption; the accumulated value of calorie consumption; and the expected time of achieving the target value; whereby health control is carried out on the basis of these data.

[0179] In another example of the present invention of said health control apparatus, said buffering means of said sensing apparatus and said storing means of said data processing apparatus are each composed of a removable medium which can be detached. Said first communication apparatus of said sensing apparatus and said second communication apparatus of said data processing apparatus are each composed of an interface for said removable medium. Said removable medium is transferred between said sensing apparatus and said data processing apparatus, whereby the data stored therein is transferred.

[0180] In another example of the present invention of said health control apparatus, said removable medium is composed of a nonvolatile semiconductor memory.

[0181] In another example of the present invention of said health control apparatus, said storing means of said data processing apparatus is composed of a removable medium which can be detached. Said third communication apparatus is composed of an interface for said removable medium. Said removable medium is transferred between said data processing apparatus and said server, whereby the data stored therein is transferred.

[0182] In another example of the present invention of said health control apparatus, said removable medium is composed of a nonvolatile semiconductor memory.

[0183] Another example of the present invention of said health control method is a method in which the health of a user of said health control apparatus is controlled on the basis of instructions from a health control instructor who is a server user. In this method, said health control instructor generates a health control program including the exercise indices, the exercise menu, and the health control indices of said user of said health control apparatus on the basis of the user chart containing vital signs including the height, the weight, the body fat percentage, and the temperature of said user. Said user uses said health control apparatus on the basis of said health control program, and renews said health control program on the basis of the measurement data obtained as a result of the use of said health control apparatus. When the measurement data falls outside the predicted range in said health control program, a warning button for requesting attention of said health control instructor is additionally displayed. When on the basis of the measurement data accompanied by said warning button, said health control instructor predicts that an abnormality or problem will occur in said user, said health control instructor changes the exercise indices and the exercise menu in said health control program, and then downloads these data to said terminal. On the basis of these data, said user determines the exercise level for the subsequent duration of a predetermined length.

[0184] In another example of the present invention of said health control method, when the data uploaded to said server is not renewed for a predetermined time or longer, said health control instructor transmits a message to said user and thereby requesting data renewal.

[0185] In another example of the present invention of said health control method, said message is an electronic text document automatically generated by said server, and automatically transmitted as an e-mail from said server to the e-mail address owned by said user of said health control apparatus.

[0186] In another example of the present invention of said health control method, said message is an electronic text document automatically generated by said server, and automatically transmitted from said server to a facsimile machine owned by said user of said health control apparatus.

[0187] In another example of the present invention of said health control method, said message is an HTML document containing a warning icon. Said terminal of said health control apparatus displays the received HTML document, and thereby notifies the warning to said user of said health control apparatus.

[0188] Another example of the present invention of said health control method is a method in which a user uploads his vital signs, and then downloads new exercise indices, exercise menu, and health control indices. In this method, the measurement data is transmitted by a health control apparatus, and then received by a server. When said health control apparatus is connected to said server, said server: receives the personal data of said user; assigns a user ID for corresponding said data to a user chart; transmits said user ID to said health control apparatus; and transmits display information containing an upload button along with said exercise indices, exercise menu, and health control indices. Said health control apparatus: receives and stores said user ID; receives and displays said display information; and when said upload button is selected, in response thereto, uploads the information of said measurement data including said user ID. Said server system combines said uploaded measurement data including said user ID with said user chart; thereby generates new exercise indices, exercise menu, and health control indices; and downloads these data to said health control apparatus. According to this configuration, said user selects said upload button, thereby uploads said measurement data to said server system, and thereby downloads and sets the next exercise indices and exercise menu.

[0189] In another example of the present invention of said health control method, said health control apparatus and said server system communicate with each other via the Internet.

[0190] In another example of the present invention of said health control method, said displaying includes the displaying of an HTML document provided by said server system.

[0191] In another example of the present invention of said health control method, said displaying includes the displaying of an XML document provided by said server system.

[0192] Another example of the present invention of said health control method is a method in which a health control apparatus uploads measurement data to a server system. In this method, a health control apparatus displays measurement data as well as a selection for the action to be taken to upload said measurement data. In response to the selection of said action, said health control apparatus transmits said measurement data to said server system. According to this method, said health control apparatus uploads the latest information to be used for the renewal of the exercise indices and the exercise menu.

[0193] In another example of the present invention of said health control method, said action is a single action.

[0194] In another example of the present invention of said health control method, said single action is a clicking at an icon indicating said displayed information, using a mouse.

[0195] In another example of the present invention of said health control method, said single action is a touching at an icon, or the vicinity thereof, indicating said displayed information on the display device, using a pen device or a finger.

[0196] Another example of the present invention of said health control method is a method for uploading the measurement data of a user and then downloading new exercise indices, exercise menu, and health control indices. In this method, the exercise indices, exercise menu, and health control indices are generated and transmitted by a server, and then received by a health control apparatus. Said server generates and displays display information containing a user ID, the latest measurement data, and the date and time of renewal. When the date and time of renewal is outside a predetermined range, said server displays an update button in addition to said display information. When said update button is selected, said server communicates with a health control apparatus specified by the user ID corresponding to said update button, and thereby uploads the latest measurement data stored therein, into said server. When said uploaded measurement data falls within a predetermined range defined in the health control program used by the user, said server automatically renews the exercise indices, the exercise menu, and the health control indices for the subsequent duration of a predetermined length, and then downloads these data to said health control apparatus. According to this method, the health control instructor of the user updates the user's measurement data stored in said server, and thereby generates and downloads the health instruction data for the subsequent duration of a predetermined length.

[0197] In another example of the present invention of said health control method, when the date and time of renewal of the updated measurement data is still outside the predetermined range, said server transmits a warning message to the user of said health control apparatus.

[0198] Another example of the present invention of said health control method is a method in which a server system renews the measurement data of a user. In this method, a server system displays the latest measurement data as well the date and time of renewal of the measurement data. When the date and time of renewal is outside a predetermined range, said server displays a selection for the action to be taken to upload the measurement data. In response to the selection of said action, said server system receives said measurement data from said health control apparatus. According to this method, said measurement data on said server system is updated.

[0199] In another example of the present invention of said health control method, said action is a single action.

[0200] In another example of the present invention of said health control method, said single action is a clicking at an icon indicating said displayed information, using a mouse.

[0201] In another example of the present invention of said health control method, said single action is a touching at an icon, or the vicinity thereof, indicating said displayed information on the display device, using a pen device or a finger.

[0202] In another example of the present invention of said health control method, said health control apparatus and said server system communicate with each other via the Internet.

[0203] In another example of the present invention of said health control method, said displaying in said server system includes the displaying of an HTML document.

[0204] In another example of the present invention of said health control method, said update button in said display is corresponded to the URL of the health control apparatus of a target user.

[0205] In another example of the present invention of said health control method, said message is an electronic text document automatically generated by said server, and automatically transmitted as an e-mail from said server to the e-mail address owned by said user of said health control apparatus.

[0206] In another example of the present invention of said health control method, said message is an electronic text document automatically generated by said server, and automatically transmitted from said server to a facsimile machine owned by said user of said health control apparatus.

[0207] In another example of the present invention of said health control method, said message is an HTML document containing a warning icon. Said terminal of said health control apparatus displays the received HTML document, and thereby notifies the warning to said user of said health control apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

[0208] **FIG. 1** is a block diagram showing a health control apparatus according to Embodiment 1 of the invention.

[0209] **FIG. 2** is a block diagram showing an example of the mapping in storing means of a health control apparatus.

[0210] **FIG. 3** is a flowchart showing the algorithm in a health control apparatus.

[0211] **FIG. 4** is a block diagram showing another exemplary configuration of a health control apparatus according to Embodiment 1 of the invention.

[0212] **FIG. 5** is a block diagram showing a health control apparatus according to Embodiment 2 of the invention.

[0213] **FIG. 6** is a block diagram showing another exemplary configuration of a health control apparatus according to Embodiment 2 of the invention.

[0214] **FIG. 7** is a block diagram showing further another exemplary configuration of a health control apparatus according to Embodiment 2 of the invention.

[0215] **FIG. 8** is a block diagram showing the internal configuration of calorie consumption calculating means **143** of a health control apparatus according to Embodiment 2 of the invention.

[0216] **FIG. 9** is a block diagram showing an example of a health control method according to Embodiment 3 of the invention.

[0217] **FIG. 10** is a flowchart showing the algorithm in the example of a health control method shown in **FIG. 9**.

[0218] **FIG. 11** is a diagram showing the operation that a user uploads measurement data in a health control method according to Embodiment 3 of the invention.

[0219] **FIG. 12** is a diagram showing the operation that an instructor uploads measurement data in a health control method according to Embodiment 3 of the invention.

[0220] **FIG. 13** is a block diagram showing the configuration of a prior art consumption calorimeter.

[0221] **FIG. 14** is a configuration diagram of a vital signs detection system according to Embodiment 4 of the invention.

[0222] **FIG. 15** is a configuration diagram of a vital signs detection system according to Embodiments 5 and 6 of the invention.

[0223] **FIG. 16** is a flowchart showing the operation of a vital signs detection system according to Embodiment 5 of the invention.

[0224] **FIG. 17** is a flowchart showing another example of the operation of a vital signs detection system according to Embodiment 5 of the invention.

[0225] **FIG. 18** is a flowchart illustrating the operation of a vital signs detection system according to Embodiment 6 of the invention.

[0226] Description of the Reference Numerals

[0227] **102-104** Sensing apparatus

[0228] **105-107** Sensing means

[0229] **108-110** A/D converting means

[0230] **111-113** Buffering means

[0231] **114-116** Communicating means

[0232] **121** Data processing apparatus

[0233] Communicating means

[0234] Data processing means

[0235] Displaying means

[0236] Storing means

[0237] Information server

[0238] Program server

PREFERRED EMBODIMENTS OF THE INVENTION

[0239] The embodiments of the present invention are described below with reference to the drawings.

[0240] (Embodiment 1)

[0241] **FIG. 1** is a block diagram showing a health control apparatus according to Embodiment 1 of the invention. As shown in the figure, the health control apparatus **101** comprises one or more sensing apparatuses and a data processing apparatus. Illustrated in **FIG. 1** is an exemplary health

control apparatus comprising three sensing apparatuses **102-104** and a data processing apparatus **121**.

[**0242**] Each sensing apparatus **102-104** comprises: each sensing means **105-107** of detecting (sensing) vital signs; each A/D converting means **108-110** of converting the detected an analog signal into a digital signal; each buffering means **111-113** of temporarily storing the vital data which is digital-converted vital signs; and each communicating means **114-116**. The data processing apparatus **121** comprises: communicating means **122**; data processing means **123** of processing the data of vital data and the like; displaying means **124** of displaying the data of vital data and the like; and storing means **125** of storing the data of vital data and the like. In the above-mentioned configuration, the health control apparatus **101** is an example of a vital signs processing apparatus according to the invention. Each sensing apparatus **102-104** is an example of vital signs detecting means according to the present invention. The data processing apparatus **121** is an example of vital signs processing means according to the present invention. These correspondences are the same also in the embodiments described below.

[**0243**] The communicating means **114-116** of the sensing apparatuses **102-104** can communicate with the communicating means **122** of the data processing apparatus **121**. According to the specification, the communicating means **114-116** cannot communicate with each other, or alternatively, these communicating means perform solely a relaying operation of transferring the data transmitted from an adjacent sensing apparatus, intact to the communicating means of another sensing apparatus or the data processing apparatus. These communicating means do not write the received data into the buffering means **111-113**.

[**0244**] The data processing means **123** is composed of either dedicated hardware or a programmable device provided with a CPU, and thereby processes vital signs and the like stored in the storing means **125**. In case that the data processing means is composed of a programmable device, the function of the data processing means **123** is implemented by software which is stored in the storing means **125**.

[**0245**] The storing means **125** is a device capable of data reading and writing. As shown in **FIG. 2, a** storage region **400** of the storing means **125** is divided into: a region **401** for storing the vital data in time series; a region **402** for storing the program for the data processing means; and a region **403** for storing the parameters and the initial setting data necessary for the execution of the data processing means. The vital data region **401** is further divided into: a measurement data region **401***a* for storing the data measured by the sensing apparatuses **102-104**; and a processing data region **401***b* for storing the processing result from the data processing means **123**.

[**0246**] **FIG. 3** is a flowchart explaining the operation of the health control apparatus according to the present embodiment.

[**0247**] The operation of the health control apparatus according to the present embodiment is described below with reference to **FIG. 3**.

[**0248**] Each sensing apparatus **102-104** repeats the following operation.

[**0249**] (**S201**) Each sensing means **105-107** detects (senses) the vital signs of a user. (**S202**) Each A/D converting means **108-110** converts the vital signs obtained by each sensing means **105-107** into digital vital data. (**S203**) Each buffering means **111-113** stores the vital data in time series in first-in first-out scheme. (**S204**) Each communicating means **114-116** reads out the vital data from each buffering means **111-113**, and then transmits the data to the data processing apparatus **121**.

[**0250**] During the above-mentioned operation, the sensing of each sensing means **105-107** in (**S201**) may be invoked by a demand from the data processing apparatus **121** (on-demand type). Alternatively, the sensing may be carried out periodically with a period predetermined by the data processing apparatus **121** (periodical execution type). Further, the sensing may be of continuous measurement type. These types are selectable depending on the item to be measured. As described later, the measurement of pulse wave is carried out according to the continuous measurement type, while the measurement of body temperature is carried out according to the periodical execution type or the on-demand type. Similarly, in (**S204**), the data transmission of each communicating means **114-116** may be carried out in response to a data transmission request from the data processing apparatus **121**, or alternatively, may be carried out spontaneously and periodically. Alternatively, the transmission may be carried out continuously as long as vital data exists in each buffering means **111-113**. In any way, the sensing operation in (**S201**) and the transmission operation in (**S204**) do not need to be carried out in synchronization with each other, and may be carried out completely asynchronously.

[**0251**] Described below is the operation of the data processing apparatus **121**.

[**0252**] (**S205**) The communicating means **122** receives the vital data from each sensing apparatus **102-104**. (**S206**) The communicating means **122** writes the received vital data into the storing means **125**. (**S207**) The data processing means **123** processes the vital data stored in the storing means **125**, and then stores the processing result into the processing data region **401***b* within the region **401** for storing the vital data within the storing means **125**. (**S208**) The processing result is read out and displayed on the displaying means **120**.

[**0253**] Each of the three sensing apparatuses **102-104** in the description of the present embodiment may measure an item (for example, body temperature, blood pressure, blood sugar level, and the like) different from that of the other sensing apparatuses. Alternatively, these sensing apparatuses may measure the same item.

[**0254**] **FIG. 4** is a block diagram showing another exemplary configuration of a health control apparatus according to the present embodiment. The health control apparatus shown in **FIG. 4** further comprises, in addition to the configuration shown in **FIG. 1**, communicating means **126** for connecting the data processing apparatus **121** to a network and thereby communicating with an external server **127**.

[**0255**] The communicating means **126** implements the communication with the server **127** by wire or wireless. The communicating means **126** permits: the upload of the data stored in the storing means **125**, to the server **127**; and the download of the parameters or even the program itself used for the operation of the data processing means **123**, from the server **127**.

[0256] According to this configuration, the vital data acquired by the health control apparatus is stored in the external server **127**. This permits the long-term management of the health condition of the user of the health control apparatus. In case that the user utilizing or managing the server **127** is a doctor/health control service provider providing doctor/health control services, when the programs and/or parameters necessary for the health control are stored in the server **127** and then downloaded to the data processing apparatus **121** as described above, the health control instruction for the user is carried out more easily.

[0257] In **FIG. 1**, each sensing apparatus **102-104** and the data processing apparatus **121** exchanges the data by wire or wireless communication through communicating means **114-116, 122**. Further, in another exemplary configuration of the health control apparatus, each communicating means **114-116, 122** maybe composed of an interface for a removable medium, and each of the buffering means **111-113** and the storing means **125** may be composed of the removable medium.

[0258] In this configuration, the user attaches the sensing apparatus to his/her body for a predetermined time, and thereby stores the vital signs in the removable medium. The length of the time is determined depending on the type of the measurement item, within the maximum value calculated by the formula: (the capacity of the removable medium)/(the amount of data per unit time). After the predetermined time, the user removes the removable medium from the sensing apparatus, and then inserts the removable medium into the data processing apparatus. Then, the data processing apparatus reads the vital data from the removable medium, and then performs necessary processing onto the organism data.

[0259] In the configuration shown in **FIG. 4**, the storing means **125** may be a removable medium, while the communicating means **126** may be interface means for the removable medium. In this configuration, when the user uploads the data stored in the removable medium to the server, the user removes the removable medium, and then inserts the removable medium into the read-out apparatus. The read-out apparatus may be connected to the server directly, or alternatively, via a network. The server can write the personal data, the health control indices, and the exercise indices into the removable medium, and thereby set these data into the health control apparatus.

[0260] The type of the removable medium may be selected depending on the item to be measured, but a nonvolatile semiconductor memory is generally the most appropriate medium.

[0261] (Embodiment 2)

[0262] **FIG. 5** is a block diagram showing a consumption calorimeter according to Embodiment 2 of the invention. The consumption calorimeter shown in **FIG. 5** is an exemplary modification of the health control apparatus according to Embodiment 1.

[0263] In the consumption calorimeter according to the present embodiment, the data processing means **123** comprises frequency processing means **141**, heart rate measuring means **142**, and calorie consumption calculating means **143**. The sensing means **105** of the sensing apparatus **102** is composed of a pulse wave sensor for detecting the pulse wave. In **FIG. 5, a** single sensing apparatus is illustrated, however, two or more sensing apparatuses may be included in the system. In this case that two or more sensing apparatuses are attached, even when the data cannot be received from one sensing apparatus, the calorie consumption can be calculated from the data from the other sensing apparatuses. Alternatively, when the pulse wave data from these sensing apparatuses are averaged out, the reliability in the calculated calorie consumption is improved.

[0264] Next, the data processing means **123** comprises frequency processing means **141**, heart rate measuring means **142**, and calorie consumption calculating means **143**. The frequency processing means **141** performs FFT (fast Fourier transformation) processing onto the pulse wave data acquired by the sensing apparatus. The heart rate measuring means **142** obtains the heart rate from the processing result. On the basis of the heart rate, the calorie consumption calculating means **143** calculates the calorie consumption in each unit time. Similarly to Embodiment 1, the function of the frequency processing means **141**, the heart rate measuring means **142**, and the calorie consumption calculating means **143** may be implemented by dedicated hardware, or alternatively, by a program (software) executed on a programmable device having a CPU core. In case that the software is used, the storage regions for program, stack, and variables are prepared in the storing means **125**.

[0265] Described below is the operation of the consumption calorimeter having the above-mentioned configuration according to the present embodiment.

[0266] In the sensing apparatus **102**, the sensing means **105** composed of a pulse wave sensor detects the pulse wave of the user. The pulse wave is A/D-converted by the A/D converting means **108**. Then, the pulse wave data of digital nature is transmitted to the data processing apparatus **121**. The communicating means **122** receives the pulse wave data, and then stores the data in time series into the storing means **125**. In the data processing means **123**, the frequency processing means **141** performs FFT processing onto the pulse wave data stored in the storing means **125**. The heart rate measuring means **142** obtains the heart rate from the processing result. On the basis of the heart rate, the calorie consumption calculating means **143** calculates the calorie consumption in each unit time. The calculated calorie consumption is stored in a region different from that storing the pulse wave data within the storing means **125**, and then ready for being displayed on displaying means **124**.

[0267] Regarding the above-mentioned operation, it has been reported that the calorie consumption and the heart rate are highly correlated, and that the calorie consumption can be calculated approximately from the heart rate. Accordingly, the heart rate is substituted into a predetermined approximation formula, whereby the calorie consumption is calculated. As such, in the operation of the data processing means **123**, the calorie consumption is calculated on the basis of the above-mentioned correlation.

[0268] In an example, the calorie consumption is calculated according to the following formula.

calorie consumption (kcal)=heart rate at exercise (pulse/min)×time (min)×constant a

[0269] Here, the constant a is obtained by measuring the constant running speed at 150 m/min and the heart rate and by utilizing the following formula.

constant a=0.193×0.005×running speed (m/min)×body weight (kg)/heart rate (pulse/min)

[0270] In the data processing means **123**, a measured heart rate is substituted into the above-mentioned formula for calorie consumption, whereby the calorie consumption is obtained.

[0271] In the above-mentioned operation, the heart rate may be obtained from the result of the FFT processing onto the pulse wave data as described above. In contrast to this, the peak interval of the pulse wave in the pulse wave data may be obtained, whereby the heart rate is obtained from the inverse thereof.

[0272] Using the output of the FFT processing, variation due to psychological factors can be avoided. This permits a more precise calculated value of calorie consumption.

[0273] **FIG. 6** is a block diagram showing another configuration of a consumption calorimeter according to the present embodiment. The consumption calorimeter shown in **FIG. 6** further comprises, in addition to the configuration shown in **FIG. 5**, inputting means **128** for permitting the user to input the data. The inputting means **128** may be composed of: a pointing device, such as a keyboard, a mouse, and a tablet; or a voice inputting apparatus; generally used in personal computers.

[0274] Using the inputting means **128**, the user inputs the following data. (1) Personal data . . . the user's personal information, such as the name, the sex, and the birth date. (2) Health control indices . . . information on the calorie consumption values per various predetermined unit times, such as daily, weekly, monthly, and final target values for calorie consumption. (3) Exercise indices . . . record information, such as upper and lower limits for the user's heart rate at exercise and exercise time. And the like.

[0275] These data are stored in the storing means **125**. When the user takes exercise using the consumption calorimeter, the health control indices and the exercise indices are displayed on the display apparatus **124**, whereby the intensity and the time of the exercise are determined with considering these indices.

[0276] The inputting means **128** may be detachable from the health control apparatus **101** serving as the consumption calorimeter. That is, the inputting means can be connected to the data processing apparatus of the consumption calorimeter only when the data input is necessary. After the data input, the inputting means can be removed. This configuration does not degrade the portability of the main body of the consumption calorimeter.

[0277] **FIG. 7** is a block diagram showing further another configuration of a consumption calorimeter according to the present embodiment. The consumption calorimeter shown in **FIG. 7** further comprises, in addition to the configuration shown in **FIG. 6**, notifying means **129** of notifying information to the user.

[0278] The operation of such a consumption calorimeter is as follows. At each measurement of the heart rate, the heart rate measuring means **142** compares the measured heart rate with the upper and lower limits for the heart rate being input through the inputting means **128**. When the measured heart rate falls outside the range between the upper and lower limits being input, the heart rate measuring means **142** issues a request for displaying the situation, to the displaying means **124**, and at the same time, sends a signal to the notifying means **129**. In response to the signal, the notifying means **129** warns the user. The medium of warning information used for warning may be a voice, vibration, light, and any other thing as long as it causes the user to watch the display apparatus **124** of the consumption calorimeter. That is, the notifying means **129** may be implemented by a lamp, an LED, a speaker, a piezoelectric buzzer, a liquid crystal display, a vibrator, and the like.

[0279] Receiving the warning information from the notifying means **129**, the user can determine the condition of one's own body, and accordingly decreases or increases the exercise intensity. This avoids over-exercise and hence a damage to the body. Thus, the use of the consumption calorimeter ensures the safety in exercise continuously.

[0280] **FIG. 8** is a block diagram showing the internal configuration of the calorie consumption calculating means **143** of the consumption calorimeter which is an example of a health control apparatus according to the present embodiment. In **FIG. 8**, the calorie consumption calculating means **143** comprises: a calculation section **151** for calculating calorie consumption; an accumulation section **152** for accumulating the calculated calorie consumption; a subtraction section **153** for subtracting the accumulated value from a target value; and an achievement time calculation section **154** for calculating the time for achieving the target value at the current pace of calorie consumption.

[0281] The operation is described below. The calculation section **151** reads the heart rate, and then calculates the calorie consumption per unit time according to the formula based on the above-mentioned correlation. The calorie consumption value is written into the processing data region **401*b*** within the storing means **125**.

[0282] The accumulation section **152** reads the accumulated value and the calorie consumption value from the storing means **125**, adds these values to each other, and then writes the obtained sum as the new accumulated value into the processing data region **401*b*** within the storing means **125**. At this time, the obtained accumulated value is not overwritten but stored in time series.

[0283] The subtraction section **153** reads the accumulated value (the sum between the preceding accumulated value in the time series and the newly obtained calorie consumption value) and the target value, and then calculates the difference between these values. The difference is written as the remained calorie consumption value into the storing means **125**.

[0284] Finally, the achievement time calculation section **154** divides the remained calorie consumption value obtained by the subtraction section **153**, by the calorie consumption value per unit time, and thereby obtains the time necessary for consuming the remained calorie consumption.

[0285] In the above-mentioned operation, these data are read out from the storing means **125** and thereby displayed on the displaying means **124** always even during the calculation. Accordingly, the user can recognize these data during the exercise in real time through the displaying means **124**. This allows the user to recognize the time of exercise to be continued and the exercise intensity. This encourages the

user to continue the exercise. Further, this gives an indicator for an appropriate exercise intensity, and accordingly avoids over-exercise. Thus, the use of the consumption calorimeter ensures the safety in the exercise.

[0286] (Embodiment 3)

[0287] **FIG. 9** is a diagram explaining a health control method using a vital signs detection apparatus according to Embodiment 3 of the present invention. The example used here of the vital signs detection apparatus of the present invention is the health control apparatus according to Embodiment 1. However, for simplicity, the part of a data processing apparatus is solely illustrated, and the part of a sensing apparatus is omitted. A user **301** is, for example, a patient in hospital or under treatment, and uses a health control apparatus **101**.

[0288] The health control apparatus **101** is connected to a server **127** via a network such as the Internet. On the server **127** side, there is a health control instructor **302** (referred to as an instructor, hereafter) such as a doctor who instructs the health control of the user **301**.

[0289] The instructor **302** has a user chart **304** which can be processed as accumulated data in the server **127**. Described in the user chart is vital signs, such as the case history (including the present condition), the height, the weight, the body fat percentage, the temperature, and the like of the user.

[0290] On the basis of the user chart **304** and the measurement data **305** which is accumulated in the server **127**, the server **127** automatically generates the user's health control program **303** which is accumulated in the server **127**. However, this is for the case that there is no problem or abnormality in the measurement data. When an abnormality is detected in the measurement data, the instructor **302** manually modifies the health control program.

[0291] The health control program **303** is composed of exercise indices, exercise menu, and health control indices. The user **301** takes exercise according to the exercise menu specified there. The intensity and the time to be used in the exercise are specified in the exercise indices. The values specified in the health control indices are used as target values. The health control program **303** contains the items to be carried out in a cycle of a short time (for example, a week or 10 days). This program is a subset extracted from a program which has been specified for a long term, such as one year, by the instructor at the beginning of the health control. Accordingly, when the measurement data in the preceding cycle falls within a predicted range, the items to be carried out in the next cycle are simply extracted.

[0292] The user **301** downloads the health control program **303** into the health control apparatus **101**. With referring to the program through the displaying means **124**, the user takes exercise according to the exercise menu and the exercise indices. During the exercise, the health control apparatus **101** acquires the vital signs from the user **301**, and thereby stores the data as the measurement data temporarily in the storing means **125**.

[0293] After the exercise, the user **301** uploads the measurement data through the communicating means **122** to the server **127**.

[0294] The above-mentioned operation is repeated, and the execution cycles of the health control program are repeated, whereby the health control of the user is carried out.

[0295] **FIG. 10** is a flowchart showing the health control method according to the present embodiment. The algorithm is described below with reference to **FIG. 10**.

[0296] (S331) The instructor **302** refers to the user chart **304**, and thereby determines a health control program **303** based on of the current condition.

[0297] (S332) A short-term program used for a short term is extracted from the health control program. At this time, when the measurement data is accompanied with the display of a warning button, the instructor **302** changes the instruction in order to reduce the exercise load, for example, by reducing the amount of exercise, reducing the intensity of exercise, or shortening the time of exercise.

[0298] (S333) The health control apparatus **101** downloads the above-mentioned health control program **303** from the server **127** via the network.

[0299] (S334) The user **301** takes exercise according to the health control program **303** displayed on the displaying means **124** of the health control apparatus **101**. During the exercise, the health control apparatus **101** measures the vital signs of the user **301**, and thereby obtains the measurement data.

[0300] (S335) The health control apparatus **101** uploads the measurement data to the server **127**.

[0301] (S336) The server **127** renews the measurement data **305** on the basis of the measurement data uploaded from the health control apparatus **101**.

[0302] (S337) The server **127** determines whether the measured value obtained from the measurement data falls within the range predicted by the health control program or not. Here, the server **127** comprises determining means of determining this, even though it is not shown in the figure.

[0303] (S338) When the measured value falls outside the range predicted by the health control program, the measurement data is displayed with being accompanied with the display of a warning button on the display of the server **127**. When the value falls within the range, no warning button is displayed.

[0304] With repeating the above-mentioned steps, the health control program **303** is renewed, and the health control of the user **301** is carried out.

[0305] In normal cases that no problem occurs in the measurement data, the health control program is renewed automatically. In case that there is a problem, a determination by the instructor is necessary. In this case, the server displays a warning button for warning the user, together with the measurement data.

[0306] According to the present embodiment, the instructor **302** on the server **127** side can easily determine whether the measurement data uploaded from the health control apparatus **101** of the user **301** falls within the range of the predicted achievement by the currently used health control program or not. Thus, the instructor **302** can determine either

that the use of the current health control program is to be continued, or that a new health control program is to be prepared.

[0307] Further, when the measurement data is displayed on the server **127** side, and when the measurement data has the date and time before a predetermined value, a message is transmitted to the health control apparatus **101** so as to request the user **301** to continue the execution of the health control program.

[0308] The message transmitted to the health control apparatus **101** may be an electronic text document. When the server **127** and the health control apparatus **101** are connected to each other via the Internet, and when an e-mail address for the user **301** is assigned to the communicating means **125** of the health control apparatus **101**, the message can be transmitted as an e-mail to the e-mail address of the user **301** so as to request the user to continue the execution of the health control program.

[0309] Instead of the electronic text document, an HTML document may be used as the message, whereby the message is displayed on the displaying means of the health control apparatus of the user so as to request the user to continue the execution of the health control program.

[0310] In another example, without using the health control apparatus **101** but with using another method, the server **127** may request the user **301** to continue the execution of the health control program. For example, a terminal capable of processing e-mails, such as a personal computer and a portable phone of the user, may be used. Further, the electronic text document may be transmitted to a facsimile machine owned by the user. In this case, even when the user does not have the habit of frequently checking the reception of e-mails, extra delay is avoided in the notification to the user.

[0311] **FIG. 11** is a diagram showing a health control method according to the present embodiment, in which the user **301** actively uploads the measurement data to the server **127**, then downloads a health control program for the next cycle based on the result of the measurement data, from the server **127**, and thereby sets the program to the health control apparatus **101**. The difference from the example shown in **FIG. 9** is that the server **127** comprises a user ID table **320** for storing the user ID assigned to the user **301**.

[0312] In this configuration, when the health control apparatus **101** is initially connected to the server **127**, the server **127** assigns a user ID and registers the user ID to the user ID table **320**. In the server **127**, the user ID is used for corresponding all data of the user **301** to this user.

[0313] The server **127** downloads, to the health control apparatus **101**, display information containing: a generated health control program; the user ID; and an update button **322** for displaying the operation to be carried out by the user in order to upload the measurement data.

[0314] At this time in the operation of the server **127**, the health control apparatus **101** does not yet start measurement. Then, the health control apparatus **101** repeats the following steps.

[0315] The health control apparatus **101** receives the display information, and then stores the health control program and the user ID together with the personal data **321** into the storing means **122**. The displaying means **124** displays the display information containing the update button **322**. Then, the user **301** takes exercise on the basis of the exercise menu, the exercise indices, and the health control indices displayed on the displaying means **124**, and thereby acquires measurement data.

[0316] After the exercise, the user operates the update button **322**. As a result of this operation, the measurement data and the user ID are automatically uploaded to the server **127**.

[0317] In response to the upload of the measurement data, the server **127** renews the contents of the measurement data **305**. On the basis of this data and the user chart **304**, the server **127** renews the health control program **303**, and then prepares a health control program to be used by the user in the next duration.

[0318] In this preparation of the health control program, for example, a long-term program previously prepared is adjusted, for example, such that the exercise intensity is weakened or that the exercise time is expanded depending on the measurement data. And then, a health control program for the next duration is extracted. The prepared health control program is downloaded as display information containing the user ID and the update button **322**, and then displayed on the health control apparatus of the user.

[0319] In the present embodiment, in response to the operation of the update button on the displaying means **124** by the user **301**, the inputting means **128** goes ON. The user uploads the measurement data, and then obtains the health control program for the next duration. Accordingly, this embodiment is suitable for the case that a user **301** actively carries out health control.

[0320] The display information downloaded from the server **127** may be in HTML format, or alternatively, in XML format.

[0321] The display by the update button **322** is that using a standard input device such as a mouse and a keyboard. Conveniently and preferably to the user **301**, this display is composed of a single action such as a clicking of an icon.

[0322] When the inputting means **128** is composed of a touch panel integrated with the displaying means **124**, the input operation may be carried out by touching a specific region in the displaying means **124** by a finger, a pen, or the like. Such a method is visually understandable, and hence easily accepted by various persons.

[0323] **FIG. 12** is a diagram showing a health control method according to the present embodiment, in which the instructor **302** actively uploads the measurement data to the server **127**, and then downloads a new health control program based on the result of the measurement data, to the health control apparatus. Similarly to the case of **FIG. 11**, the difference from the example shown in **FIG. 9** is that the server **127** comprises a user ID table for storing the user ID assigned to the user **301**.

[0324] In this configuration, the server **127** generates display data containing the user ID, the latest measurement data **305**, and the date and time of renewal thereof, and then displays the data on a display not shown. When the date and time of renewal has been elapsed for a predetermined time or longer, the server determines that the execution of the

health control program is delayed, and thereby adds an update button **323** in the display.

[**0325**] The instructor **302** watches the display data on the display. When an update button **323** is displayed, the instructor operates the button, and thereby renews the measurement data from the health control apparatus **101** corresponding to the user ID corresponding to the update button **323** added in the display.

[**0326**] In response to this renewal operation, when measurement data having the date and time of renewal within the predetermined duration is obtained, the health control program **303** is renewed on the basis of the measurement data, whereby a new health control program for the next duration is generated and downloaded to the health control apparatus **101** corresponding to the user ID.

[**0327**] According to a series of the above-mentioned operations, the measurement data is renewed on the basis of the initiative of the instructor **302**. This permits the management of the state of the health control programs of all users **301** of the health control apparatuses **101** connected to the server **127**.

[**0328**] Despite the renewal operation, when measurement data having the date and time of renewal within the predetermined duration is not obtained, a warning message can be sent to the user. The message transmitted to the health control apparatus **101** is, for example, an electronic text document. When the server **127** and the health control apparatus **101** are connected to each other via the Internet, and when an e-mail address for the user **301** is assigned to the communicating means **125** of the health control apparatus **101**, the message can be transmitted as an e-mail to the e-mail address of the user **301** so as to request the user to continue the execution of the health control program.

[**0329**] Instead of the electronic text document, an HTML document may be used as the message, whereby the message is displayed on the displaying means of the health control apparatus of the user so as to request the user to continue the execution of the health control program.

[**0330**] In another example, without using the health control apparatus **101** but with using another method, the server **127** may request the user **301** to continue the execution of the health control program. For example, a terminal capable of processing e-mails, such as a personal computer and a portable phone of the user, may be used. Further, the electronic text document may be transmitted to a facsimile machine owned by the user. In this case, even when the user does not have the habit of frequently checking the reception of e-mails, extra delay is avoided in the notification to the user. The message may be an electronic text document in the form transmitted as an e-mail to the mail address of the user, or alternatively, in the form transmitted to the facsimile machine owned by the user. Further, the message may be an HTML document in the form displayed on the displaying means of the health control apparatus.

[**0331**] The display by the update button **323** is that using a standard input device such as a mouse and a keyboard. Conveniently and preferably to the instructor **302**, this display is composed of a single action such as a clicking of an icon.

[**0332**] When the input device is composed of a touch panel integrated with the display, the input operation may be carried out by touching a specific region on the display by a finger, a pen, or the like. Such a method is visually understandable, and hence easily accepted by various persons.

[**0333**] The display information displayed in the server **127** may be in HTML format. Further, the user ID may be corresponded to the URL of the health control. In this case, by clicking the user ID, a connection is established to the health control apparatus **101** of the user **301**, whereby the measurement data is uploaded.

[**0334**] (Embodiment 4)

[**0335**] **FIG. 14** is a configuration diagram of a vital signs detection system according to Embodiment 4 of the invention. In the figure, like or corresponding parts to **FIG. 4** are designated by like numerals, and the description is omitted. An information server **130** is means of acquiring vital signs from the health control apparatus **101**. A program server **140** is means of communicating with the data processing apparatus **121** of the health control apparatus **101** and thereby uploading a program and/or data to the data processing means **123** or the sensing means **105**.

[**0336**] Described below is the operation of the vital signs detection system having the above-mentioned configuration according to Embodiment 4 of the invention. At the same time, described below is a vital signs detection method according to the invention.

[**0337**] In the present embodiment, the health control apparatus **101** operates similarly to Embodiments 1 and 2. In this embodiment, both or any of a program and data necessary for the operation of the sensing means **105-107** in the sensing apparatuses **102-104** are stored in the program server **140**, whereby a program or the like necessary for each operation of the health control apparatus **101** is downloaded from the program server **140** to the storing means **125** of the data processing apparatus **121**.

[**0338**] The communicating means **126** receives a command from the information server **130**, whereby the data processing apparatus **121** and then the sensing apparatuses **102-104** are invoked. The data processing apparatus **121** acquires information on the types of the sensing apparatuses **102-104** via the communicating means **122**, and then transmits the information through the communicating means **126** to the program server **140**. In this embodiment, the sensing apparatuses **102-104** are composed of a consumption calorimeter, a perspirometer, and a tonometer, respectively.

[**0339**] On receiving the information on the type of each sensing means from the data processing apparatus **121**, the program server **140** downloads a corresponding program and/or data into the health control apparatus **101**.

[**0340**] On receiving the program and/or data, the health control apparatus **101** sets up the program and/or data into the sensing apparatuses **102-104**. After the setup, the health control apparatus **101** operates similarly to Embodiment 1. At this time, an identical sensing apparatus may be used in different applications depending on the program and/or data. For example, the sensing apparatus **102** currently serving as a consumption calorimeter may be used as a tonometer when invoked next time.

[**0341**] As such, in the vital signs detection system according to the present embodiment, a program and/or data are

downloaded from the program server **140** at each operation, whereby the health control apparatus **101** performs sensing operation on the basis of the program and/or data. This reduces the load onto the memory of the health control apparatus **101**. Further, the operation is carried out on the basis of the latest program and/or data obtained from the program server **140**. This permits a precise vital signs detection.

[**0342**] In this embodiment, the health control method according to Embodiment 3 may be implemented using the vital signs detection system according to the invention. In this case, the information server **130** is managed by the instructor **302**. Further, the information server **130** may perform also the function of the server **127** as described above.

[**0343**] In this embodiment, the data processing apparatus **121** of the health control apparatus **101** is an example of a terminal according to the present invention. Each sensing apparatus **102-104** is an example of detecting means according to the present invention. However, present invention is not restricted to this. The entirety of the health control apparatus **101** including the sensing apparatuses **102-104** and the data processing apparatus **121** may be considered as an example of detecting means according to the present invention. Further, another terminal for communicating independently with the health control apparatus **101**, the information server **130**, and the program server **140** may be provided as a terminal according to the present invention. In this case, the programs and/or data of the data processing means **123** and the displaying means **124** in the data processing apparatus **121** can be stored in the program server **140**. This reduces the load onto the health control apparatus **101**. Further, distributable data within the health control program can be stored in the program server **140**, and this reduces the load onto the information server **130**.

[**0344**] (Embodiment 5)

[**0345**] **FIG. 15** is a configuration diagram of a vital signs detection system according to Embodiment 5 of the invention. In the figure, the vital signs detection system comprises a health control apparatus **500**, a program server **700**, and an inspection item judgment server **600**.

[**0346**] The health control apparatus **500** comprises one or more sensing apparatuses and a data processing apparatus. Illustrated in the figure is an exemplary health control apparatus comprising three sensing apparatuses **510***a*-**510***c* and a data processing apparatus **520**.

[**0347**] Each sensing apparatus **510***a*-**510***c* comprises: each sensing means **511***a*-**511***c* of detecting (sensing) vital signs from an organism; each A/D converting means **512***a*-**512***c* of converting the detected vital signs into a digital signal; each buffering means **513***a*-**513***c* of temporarily storing the vital data which is digital-converted vital signs; and each communicating means **514***a*-**514***c* of communicating with the data processing apparatus **520** and transferring the detected vital data thereto.

[**0348**] The data processing apparatus **520** comprises: communicating means A **521** of communicating with the sensing apparatuses **510***a*-**510***c*; data processing means **522** of processing the data of vital data and the like and thereby generating an inspection result; displaying means **523** of displaying the data of vital data and the like; storing means **526** of storing the data of vital data and the like; communicating means B **524** of communicating with the inspection item judgment server **600** and the program server **700** via a network; and managing means **525** of managing the operation of the entirety of the health control apparatus **500** including all the above-mentioned means and the sensing apparatuses **510***a*-**510***c*.

[**0349**] The communicating means **514***a*-**514***c* of the sensing apparatuses **510***a*-**510***c* can communicate with the communicating means A **521** of the data processing apparatus **520**. According to the specification, the communicating means **514***a*-**514***c* cannot communicate with each other, or alternatively, these communicating means perform solely a relaying operation of transferring the data transmitted from another sensing apparatus connected to the same data processing apparatus, intact to the communicating means of another sensing apparatus or the data processing apparatus.

[**0350**] The data processing means **522** is composed of either dedicated hardware or a programmable device provided with a CPU, and thereby processes the data of vital signs and the like stored in the storing means **526**. In case that the data processing apparatus **520** is composed of a programmable device, the function of the data processing means **522** is implemented by software which is stored in the storing means **526**.

[**0351**] The managing means **525** manages the operation of all the above-mentioned means as well as the IDs each assigned to an organism of management target of the health control apparatus **500**. The ID is used for identifying each target vital of the health control apparatus **500**, and stored in the storing means **526**.

[**0352**] The inspection item judgment server **600** comprises: communicating means **610** of obtaining information from the health control apparatus **500** via the network and communicating with the program server **700**; a vitaldatabase **620** for storing information on the organisms of management target of the health control apparatus **500**; and inspection item judgment server managing means **630** of processing the information obtained from the health control apparatus **500** and the information in the vital database **620** and thereby generating commands to the program server **700** and of managing the operation of the entirety of the inspection item judgment server **600** including the communicating means **610** and the vital database **620**.

[**0353**] The program server **700** comprises: communicating means **710** of communicating with the inspection item judgment server **600** and the health control apparatus **500** and thereby exchanging the data; a program server main body **720** for storing the programs and data used for the operation of the sensing apparatuses **510***a*-**510***c* and the data processing apparatus **520**; and program server managing means **730** of managing the operation of the entirety of the program server **700** including the communicating means **710** and the program server main body **720**.

[**0354**] In this embodiment, the health control apparatus **500** including the data processing apparatus **520** is an example of a terminal according to the present invention. Each sensing apparatus **510***a*-**510***c* is an example of detecting means according to the present invention. The program server **700** is an example of a program server according to the present invention. The inspection item judgment server

600 is an example of an inspection item judgment server according to the present invention.

[**0355**] In the following description, the target vital of the health control apparatus **500** according to the present invention is a human being, that is, a person. Then, the health condition of the target person is controlled. In the vital database **620**, information on the health condition of a human body including the information obtained by the health control apparatus **500** is stored in the form of a chart (referred to as "a target person chart," hereafter).

[**0356**] The storing means **526** in the data processing apparatus **520** of the health control apparatus **500** stores IDs (each referred to as "a target person ID," hereafter) for identifying specific target persons. The target person IDs are managed by the managing means **525**. Each target person ID is corresponded uniquely to each target person chart. In other words, the target person charts within the vital database **620** are classified and managed on the basis of the target person IDs.

[**0357**] In the following description, the sensing apparatus **510***a* is dedicated to detect the blood pressure of a target person. The sensing apparatus **510***b* is dedicated to detect the pulse wave of the target person. The sensing apparatus **510***c* is dedicated to detect the in-blood oxygen concentration of the target person.

[**0358**] Described below is the operation of the vital signs detection system having the above-mentioned configuration according to Embodiment 5 of the invention. At the same time, a vital signs detection method according to the present invention and the operation of a terminal according to the present invention are described below with reference to the flowchart shown in **FIG. 16**.

[**0359**] The health control apparatus **500** is powered ON and thereby begins to operate (Step **1601**). In the data processing apparatus **520**, the managing means **525** reads the target person ID from the storing means **526**, and then the communicating means B **524** transmits the ID to the inspection item judgment server **600** via the network (Step **1602**).

[**0360**] In the inspection item judgment server **600**, the communicating means **610** receives the target person ID (Step **1603**). Then, the inspection item judgment server managing means **630** searches the vital database **620**, and thereby selects a target person chart corresponding to the received target person ID (Step **1604**). Then, the inspection item judgment server managing means **630** determines whether any item needs inspection, or not, among the items of the target person's health condition in the target person chart. In case of necessity, the item is selected as an inspection item (Step **1605**). For example, when the target person chart has an item "blood pressure," and when the blood pressure of the target person in the past one week falls outside a predetermined range of healthy condition, or alternatively when the value falls within the range but near the boundary, this item is set to be an inspection item.

[**0361**] The selected inspection item is transmitted from the communicating means B **524**, through the network, to the program server **700** (Step **1606**). At this time, the target person ID is transmitted together with the inspection item.

[**0362**] In the program server **700**, the communicating means **710** receives the target person ID and the inspection item (Step **1607**). Then, the program server managing means **730** searches the program server main body **720**, and thereby extracts a program or data corresponding to the inspection item (Step **1608**). Then, the communicating means **710** transmits: the information containing the selected inspection item; and the extracted program; to the health control apparatus **500** (Step **1609**). At this time, the address for transmission includes the previously received target person ID.

[**0363**] The health control apparatus **500** receives: the information containing the selected inspection item; and the extracted program; from the program server **700** (Step **1610**). The managing means **525** refers to the target person ID received together with the program, and thereby checks whether the ID is the same as that previously transmitted to the inspection item judgment server **600** or not. When the received target person ID is different from that transmitted, the program is, for example, abandoned so as not to be used from now on in the health control apparatus **500**.

[**0364**] When the received target person ID is the same as that transmitted, the managing means **525** displays the inspection item on the displaying means **523**, thereby notifies the item to the target person (Step **1611**).

[**0365**] Then, depending on the contents of the program, the managing means **525** sets up the program into the appropriate one among the sensing apparatuses **510***a*-**510***c* and the data processing means **522** (Step **1612**). For example, according to the above-mentioned example of inspection item, when the sensing apparatuses **510***a*-**510***c* are in the initial state and not yet set up for detection operation, a program for causing the sensing apparatus **510***a* composed of a tonometer to operate is set up therein, while a program for causing the data processing means **522** to process the vital data from the sensing apparatus **510***a* as the blood pressure is set up therein.

[**0366**] Among the predetermined sensing apparatuses **510***a*-**510***c*, any one into which a program is set up operates and acquires the vital data of the target person. The data is processed in the data processing apparatus **520**, whereby vital signs is obtained (Step **1614**). When the inspection item is the blood pressure, the sensing apparatus **510***a* serving as a tonometer measures the blood pressure of the target person. The result goes through the A/D converting means **512***a*, the buffering means **513***a*, the communicating means **514***a*, and is received by the communicating means A **521** of the data processing means **522**, whereby the managing means **525** receives this blood pressure value as the vital sign.

[**0367**] The obtained vital signs is transmitted from the communicating means B **524**, through the network, to the inspection item judgment server **600** (Step **1615**). At the same time, the target person ID is transmitted.

[**0368**] The inspection item judgment server **600** receives the vital signs (Step **1616**). Using the received vital signs, the inspection item judgment server **600** renews the contents of the target person chart corresponding to the target person ID within the vital database **620** (Step **1617**), and completes the operation.

[**0369**] Another example of operation according to the present embodiment is described below with reference to the flowchart shown in **FIG. 17**.

[0370] The health control apparatus **500** is powered ON and thereby begins to operate. In the data processing apparatus **520**, an operation is taken so that the managing means **525** becomes ready and that the communicating means B **524** becomes ready for receiving data via the network (Step **1700**).

[0371] When the inspection item judgment server **600** is powered ON and thereby begins to operate, the inspection item judgment server managing means **630** searches the vital database **620**, and thereby selects a target person chart corresponding to a previously selected target person ID (Step **1701**). The selecting of target person ID may be carried out by inputting from the outside at start-up of the inspection item judgment server **600**. Alternatively, the target person ID may be that selected at previous operation. Further, the entirety of the vital database **620** may be searched, whereby vital signs which needs inspection, or an inspection item corresponding thereto, is extracted. Thus, the target person ID is obtained.

[0372] Then, the inspection item judgment server managing means **630** determines whether any item needs inspection, or not, among the items of the target person's health condition in the target person chart. In case of necessity, the item is selected as an inspection item (Step **1702**). For example, when the target person chart has an item "blood pressure," and when the blood pressure of the target person in the past one year falls outside the range of healthy condition defined from the medical point of view, for example, on the basis of the average blood pressure of normal persons, or alternatively when the value falls within the range but near the boundary, this item is set to be an inspection item.

[0373] The selected inspection item is transmitted from the communicating means B **524**, through the network, to the program server **700** (Step **1703**). At this time, the target person ID is transmitted together with the inspection item.

[0374] Then, similarly to the exemplary operation shown in **FIG. 16**, the program server **700** carries out the operation of Steps **1607-1609**. The health control apparatus **500** carries out the operation of Steps **1610-1615**. The inspection item judgment server **600** carries out the operation of Steps **1616-1617**.

[0375] As such, in the vital signs detection system according to the present embodiment, at the start-up of the health control apparatus **500** or the inspection item judgment server **600**, a program and/or data suitable for the inspection is downloaded from the program server **700** depending on the health condition of the organism of management target of the health control apparatus **500**. On the basis of these program and/or data, the health control apparatus **500** performs sensing operation onto the organism. That is, an identical health control apparatus can perform a different type of inspection in each time of inspection. This avoids the necessity of preparing various inspection apparatuses in advance, and hence simplifies the inspection.

[0376] (Embodiment 6)

[0377] In the vital signs detection system according to the present embodiment, a health control apparatus continuously detects the vital signs of an organism. When a variation occurs in the detected data, the inspection item or the inspection method for the organism can be changed depending on the variation.

[0378] The configuration of the vital signs detection system according to the present embodiment is similar to that in Embodiment 5. Accordingly, description is carried out with reference to **FIG. 15**, and detailed description is omitted.

[0379] Similarly to Embodiment 5, in the present embodiment, the health control apparatus **500** controls the health condition of a target person which is a target organism in the invention. In the vital database **620**, information on the health condition of a human body including the information obtained by the health control apparatus **500** is stored in the form of a chart (referred to as "a target person chart," hereafter). Each target person chart is corresponded uniquely to each ID (referred to as "a target person ID," hereafter) which is stored in the storing means **526** in the data processing apparatus **520** of the health control apparatus **500** and is managed by the managing means **525**. In other words, the target person charts within the vital database **620** are classified and managed on the basis of the target person IDs.

[0380] The sensing apparatus **510***a* is dedicated to detect the blood pressure of a target person. The sensing apparatus **510***b* is dedicated to detect the pulse wave of the target person. The sensing apparatus **510***c* is dedicated to detect the in-blood oxygen concentration of the target person.

[0381] Described below is the operation of the vital signs detection system having the above-mentioned configuration according to Embodiment 6 of the present invention. At the same time, a vital signs detection method according to the present invention and the operation of a terminal according to the present invention are described below with reference to the flowchart shown in **FIG. 18**. As for the detailed operation of each means in the health control apparatus **500**, the inspection item judgment server **600**, and the program server **700**, similar points to those in Embodiment 5 are omitted, and differences are solely described.

[0382] The health control apparatus **500** performs inspection to obtain the blood pressure value as vital signs, and then transmits the data to the inspection item judgment server **600** (Step **1801**). The inspection item judgment server **600** receives the vital signs. Using the received vital signs, the inspection item judgment server **600** renews the contents of the target person chart corresponding to the target person ID within the vital database **620**. At the same time, on the basis of the inspection result of the vital signs, the inspection item judgment server managing means **630** begins to determine how to proceed the subsequent operation (Step **1802**).

[0383] In the determination, it is first determined whether the inspection is to be continued or not (Step **1803**). When the inspection is determined not to be continued, the inspection item judgment server **600** notifies the termination of the operation to the health control apparatus **500**. On receiving the notification, the health control apparatus **500** terminates the operation of the sensing apparatus **510***a*. On recognizing the termination of the operation of the health control apparatus **500**, the inspection item judgment server **600** terminates the operation thereof.

[0384] In contrast, when the inspection is determined to be continued, the inspection item judgment server managing means **630** determines whether the inspection item is to be changed or not (Step **1804**).

[0385] When the inspection item is to be changed, the inspection item judgment server **600** changes the inspection item, and then transmits the changed inspection item to the program server **700**. On receiving the changed inspection item, the program server **700** extracts a program and/or data corresponding to the inspection item, and then transmits the program and/or data together with the information containing the changed inspection item, to the health control apparatus **500**. The health control apparatus **500** receives the information containing changed inspection item and the program transmitted from the program server **700**. Depending on the contents of the program, the health control apparatus **500** renews the program in a relevant apparatus or means among the sensing apparatuses **510***a*-**510***c* and the data processing means **522** when another program is already set up. When no program is set up yet, the health control apparatus **500** sets up the new program (Step **1806**).

[0386] On completion of the setup, the health control apparatus **500** begins to operate and perform inspection according to the new program, and then transmits newly obtained vital signs to the inspection item judgment server **600**. That is, the entirety of the vital signs detection system repeats the operation of Step **1801** and the subsequent steps.

[0387] In contrast, when the inspection item is not to be changed, the inspection item judgment server managing means **630** determines that the acquisition of the vital signs of the same inspection item as previous is to be continued. Then, the inspection item judgment server managing means **630** determines whether the inspection method is to be changed into another inspection item or not (Step **1807**).

[0388] When the inspection method is determined not to need a change, the inspection item judgment server **600** determines to continue the operation onto the same inspection item by the same inspection method as those determined in Step **1802**, and then notifies the continuation of operation to the health control apparatus **500** (Step **1808**). On receiving the notification, the health control apparatus **500** continues the operation of the sensing apparatus **510***a*, thereby begins inspection, and then transmits the newly obtained vital signs to the inspection item judgment server **600**. The entirety of the vital signs detection system repeats the operation of Step **1801** and the subsequent steps.

[0389] In contrast, when the inspection method is to be changed, the inspection item judgment server **600** changes the inspection method, and then transmits the changed inspection method to the program server **700**. On receiving the changed inspection method, the program server **700** extracts a program and/or data corresponding to the inspection method, and then transmits the program and/or data together with the information containing the changed inspection method, to the health control apparatus **500**. The health control apparatus **500** receives the information containing changed inspection method and the program transmitted from the program server **700**. Depending on the contents of the program, the health control apparatus **500** renews the program in a relevant apparatus or means among the sensing apparatuses **510***a*-**510***c* and the data processing means **522** when another program is already set up. When no program is set up yet, the health control apparatus **500** sets up the new program (Step **1809**).

[0390] On completion of the setup, the health control apparatus **500** begins to operate and perform inspection according to the new program, and then transmits newly obtained vital signs to the inspection item judgment server **600**. That is, the entirety of the vital signs detection system repeats the operation of Step **1801** and the subsequent steps.

[0391] Described below are examples of the change of the inspection item in the above-mentioned Step **1806**.

[0392] A first example of the change of the inspection item is as follows. At the start-up of the health control apparatus **500**, the sensing apparatus **510***a* among the sensing apparatuses **510***a*-**510***c* works as a waveform detector for detecting the waveform of the heart beat as a pulse wave, while the managing means **525** transmits the waveform itself as the vital signs to the inspection item judgment server **600**.

[0393] Then, in an abnormal case in which the detected waveform has a pattern different from that of normal persons previously stored, the inspection item judgment server **600** provided with optional inspection items used for detecting the cause selects an option according to a predetermined order or on the basis of the other vital signs described in the target person chart.

[0394] When the heart rate is selected as a new inspection item and then transmitted to the program server **700**, the program server **700** extracts a program for causing the data processing means **522** of the health control apparatus **500** to extract solely the peaks from the waveform detected by the sensing apparatus and thereby process the peaks into the heart rate, and thereby transmits the program to the health control apparatus **500**.

[0395] The health control apparatus **500** sets up this program into the data processing means **522**, and thereby changes the inspection item from the detection of the heart beat waveform into the detection of the heart rate. Then, the transmission of the vital signs is continued.

[0396] A second example of the change of the inspection item is described below. At the start-up of the health control apparatus **500**, the sensing apparatus **510***a* among the sensing apparatuses **510***a*-**510***c* works, and the vital signs detected by the health control apparatus **500** is the blood pressure value.

[0397] Then, for example, when the blood pressure value falls outside the range of normal persons, the inspection item judgment server **600** provided with optional inspection items used for detecting the cause selects an option according to a predetermined order or on the basis of the other vital signs described in the target person chart.

[0398] When the oxygen consumption by cardiac muscles, that is, so-called double product, is selected as a new inspection item and then transmitted to the program server **700**, the program server **700** extracts a program and data for causing the data processing means **522** of the health control apparatus **500** to calculate the double product as the vital signs. The double product is the product of the heart rate and the blood pressure value. Accordingly, in addition to the program currently used for the detection of the blood pressure value by the sensing apparatus **510***a*, a program for causing another sensing apparatus to detect the heart rate and a program used for the calculation of the double product from the heart rate and the blood pressure value are extracted and transmitted to the health control apparatus **500**.

[0399] The health control apparatus **500** sets up the program used for the detection of the heart rate, into the sensing apparatus **510***b*, and then sets up the program used for the calculation of the double product, into the data processing means **522**. Accordingly, in the health control apparatus **500**, the sensing apparatus **510***b* also operates in addition to the sensing apparatus **510***a*. Further, the inspection item is changed from the detection of the blood pressure value into the detection of the double product. Then, the transmission of the vital signs is continued.

[0400] A third example of the change of the inspection item is described below. When an inspection result similar to that in the second example is obtained, and thereby the double product is to be detected, but when the health control apparatus **500** comprises only one sensing apparatus **510***a* for detecting solely the blood pressure value, the program server **700** extracts a program and data for causing the data processing means **522** of the health control apparatus **500** to calculate the double product as the vital signs, and then transmits the program and data to the health control apparatus **500**. At the same time, the program server **700** transmits: information on a sensing apparatus necessary in addition to the sensing apparatus **510***a*; and an operation command for causing the sensing apparatus to serve as a part of the health control apparatus **500**, for example, so as to be capable of communicating with the data processing apparatus **520**; to the health control apparatus **500**.

[0401] On receiving the program, the health control apparatus **500** stores the program temporarily into the storing means **526** in the data processing apparatus **520**. On receiving the operation command, the displaying means **523** displays the command, and thereby notifies and requests the target person or an immediate operator of the health control apparatus **500** to prepare the sensing apparatus necessary in addition to the sensing apparatus **510***a*.

[0402] On recognizing the operation command on the displaying means, the target person or the operator additionally prepares a sensing apparatus capable of detecting the heart rate, and then sets up the apparatus so as to operate as a part of the health control apparatus **500**.

[0403] After the set-up, the program necessary for the operation of the new sensing apparatus **510***b* which has previously been stored in the storing means **526** is set up into the sensing apparatus. Accordingly, in the health control apparatus **500**, the sensing apparatus **510***b* for detecting the heart rate also operates in addition to the sensing apparatus **510***a*. Further, the inspection item is changed from the detection of the blood pressure value into the detection of the double product. Then, the transmission of the vital signs is continued.

[0404] In the first example of the change, description has been made for the case that the inspection item is changed using the same one sensing apparatus. However, a plurality of the same sensing apparatuses may be used.

[0405] In the second example of the change, description has been made for the case that the inspection item is changed by changing the number of utilized sensing apparatuses from a single sensing apparatus into two sensing apparatuses. However, the inspection item may be changed by changing from a plurality of sensing apparatuses into a single sensing apparatus, or alternatively, from a plurality into another plurality.

[0406] In the third example of the change, description has been made for the case that the inspection item is changed by changing the configuration of the health control apparatus from a health control apparatus comprising a single sensing apparatus into a health control apparatus comprising a plurality of sensing apparatuses. However, the inspection item may be changed by changing the configuration of the health control apparatus from a health control apparatus comprising an arbitrary number of sensing apparatus into a health control apparatus comprising another arbitrary number of sensing apparatuses.

[0407] Further, the inspection item may be changed by a combination of all or part of the first through the third example of the change.

[0408] Described below is an example of the change of the inspection method in the above-mentioned Step **1809**.

[0409] At the start-up of the health control apparatus **500**, the body temperature is measured as the vital signs, and transmitted as the inspection item to the inspection item judgment server **600**. The sensing apparatus **510***a* among the sensing apparatuses **510***a*-**510***c* measures the variation in the body temperature by detecting the variation in the electric current. The data processing means **522** recognizes the temperature of the target person when the variation is in equilibrium.

[0410] Then, in an abnormal case in which the body temperature exceeds a predetermined threshold value for the temperature of normal persons, the inspection item judgment server **600** provided with optional inspection items used for detecting the cause selects an option according to a predetermined order or on the basis of the other vital signs described in the target person chart. However, when there is no reason to use another optional inspection item, the inspection item judgment server changes the inspection method. Also in this case, the inspection item judgment server provided with optional inspection method used for detecting the cause selects an option according to a predetermined order or on the basis of the other vital signs described in the target person chart.

[0411] The variation in the body temperature has been detected as the variation in the electric current. However, in the new inspection method, the temperature of the target person is obtained on the basis of the change rate of the change. This inspection method is transmitted to the program server **700**. Then, the program server **700** extracts a program for causing the data processing means **522** of the health control apparatus **500** to measure the body temperature on the basis of the above-mentioned time rate of the change in the electric current, and thereby transmits the program to the health control apparatus **500**.

[0412] The health control apparatus **500** sets up this program into the data processing means **522**, and thereby changes the processing method but maintains the same detection item as previous in the sensing apparatus **510***a*. Then, the transmission of the vital signs is continued.

[0413] In the above-mentioned example of the change of the inspection method, description has been made for the case that the operation and the configuration of the sensing apparatus are not changed, but that the program for the data processing means **522** is changed. However, similar to the examples of the change of the inspection item, the inspection

method may be changed by changing the configuration, the number, and the program of the sensing apparatus or apparatuses, or alternatively, by changing the program of the data processing means.

[0414] The above-mentioned description has been made for the case that the program for causing each sensing apparatus to operate is dedicated to a specific application, and that the inspection item or the inspection method is changed by changing the setup of the data processing program in the data processing apparatus. However, the setup of the program of the sensing apparatus may be changed. For example, in the above-mentioned example, the sensing apparatus **510***a* has measured the blood pressure. However, depending on the data or setup downloaded from the program server **700**, the sensing apparatus may measure another inspection item such as in-blood oxygen concentration and blood sugar level. That is, in the invention, as long as the inspection item and/or the inspection method are changeable, a program and/or data may be downloaded and set up into any of the sensing apparatus and the data processing apparatus.

[0415] The above-mentioned description has been made for the case that the inspection item is first changed, and that the inspection method is then changed. However, the inspection method may be first changed, and then the inspection item may be changed.

[0416] As such, in the vital signs detection system according to the present embodiment, during the inspection of a vital by the vital signs detection system, a program and/or data suitable for the inspection is downloaded from the program server **700** depending on the health condition of the organism of management target of the health control apparatus **500**. On the basis of these program and/or data, the health control apparatus **500** performs sensing operation onto the organism. That is, an identical health control apparatus can perform a different type of inspection in each time of inspection. This permits automatic and continuous management of the condition of an organism.

[0417] In Embodiments 5 and 6, the organism of target person and the like may be a person, an animal such as a domestic animal and a pet, or alternatively, a plant such as a crop and a garden plant.

[0418] In Embodiments 5 and 6, the information in the vital database has been managed using the target person Ids, and the terminal of the present invention detects a specific vital signs of the present invention as a vital signs of the present invention. However, the authentication based on the ID may be omitted, whereby vital signs may be detected from a plurality of organisms and an identical health control apparatus may be used in the management of the plurality of organisms requesting similar information.

[0419] The displaying means **523** ID may be omitted.

[0420] In Embodiments 5 and 6, the health control method according to Embodiment 3 maybe implemented using the vital signs detection system according to the invention. In this case, the inspection item judgment server **600** is managed by the instructor **302**. Further, the inspection item judgment server **600** may perform also the function of the server **127** as described above.

[0421] The entirety of the health control apparatus **500** including the sensing apparatuses **510***a*-**510***c* and the data processing apparatus **520** may be considered as an example of detecting means according to the invention. Further, another terminal for communicating independently with the health control apparatus **500**, the inspection item judgment server **600**, and the program server **700** maybe provided as a terminal according to the present invention. In this case, the programs and/or data of the data processing means **522** and the displaying means **523** in the data processing apparatus **520** can be stored in the program server **700**. This reduces the load of the storing means of the health control apparatus **500**. Further, distributable data within the vital database can be stored in the program server **700**, and this reduces the load onto the inspection item judgment server **600**.

[0422] In Embodiments 1-3, each sensing apparatus **102**-**104** corresponds to vital signs detecting means according to the present invention. Each buffering means **111**-**113** corresponds to buffering means according to the present invention. Each communicating means **114**-**116** corresponds to first communicating means according to the present invention. The data processing apparatus **121** corresponds to vital signs processing means according to the present invention. The communicating means **122** corresponds to second communicating means according to the present invention. The communicating means **126** corresponds to third communicating means according to the present invention. The storing means **125** corresponds to storing means according to the present invention. The data processing means **123** corresponds to processing means according to the present invention. The displaying means **124** corresponds to displaying means according to the present invention.

[0423] The above-mentioned description has been made for the case of a health control apparatus and a vital signs detection system according to the present invention. However, each of a health control apparatus and a vital signs detection system according to the present invention may be a program which causes a computer to serve as all or part of: said terminal capable of being connected to detecting means of detecting vital signs; said program server for storing a program and/or data for causing said detecting means to operate; and said information server for communicating with said terminal; in said vital signs detection system according to the invention; and which works in cooperation with the computer.

[0424] A terminal according to the present invention may be a program which makes a computer operate as all or part of said terminal capable of being connected to detecting means of detecting vital signs and which works in cooperation with the computer.

[0425] A program server according to the present invention may be a program which makes a computer operate as all or part of said program server for storing a program and/or data for causing said detecting means capable of being connected to detecting means of detecting vital signs to operate and which works in cooperation with the computer.

[0426] An information server according to the present invention may be a program which makes a computer operate as all or part of said information server for communicating with said terminal capable of being connected to detecting means of detecting vital signs and which works in cooperation with the computer.

[0427] The present invention may be a program which makes a computer operate as all or part of said processing means of said vital signs processing means of said vital signs processing apparatus according to the invention and which works in cooperation with the computer.

[0428] The present invention may be a program which causes a computer to serve as all or part of said first, second, third, and fourth steps in said health control method according to the present invention and which works in cooperation with the computer.

[0429] The present invention may be data structure used in all or part of said first, second, third, and fourth steps in said health control method according to the present invention, in cooperation with a computer.

[0430] The present invention may be a program which causes a computer to serve as all or part of: said terminal having detecting means of detecting, from an organism, vital signs corresponding to a predetermined inspection item; said program server for storing a program and/or data for causing said detecting means to operate; and said inspection item judgment server for communicating with said terminal and thereby judging said inspection item on the basis of said vital signs; in said vital signs detection system according to the present invention; and which works in cooperation with the computer.

[0431] The present invention may be a computer-readable medium carrying a program causing a computer to serve as all or part of: said terminal capable of being connected to detecting means of detecting vital signs; said program server for storing a program and/or data for causing said detecting means to operate; and said information server for communicating with said terminal; in said vital signs detection system according to the present invention; wherein said read-out program works in cooperation with said computer.

[0432] The present invention may be a computer-readable medium carrying a program causing a computer to serve as all or part of: said terminal having detecting means of detecting, from an organism, vital signs corresponding to a predetermined inspection item; said program server for storing a program and/or data for causing said detecting means to operate; and said inspection item judgment server for communicating with said terminal and thereby judging said inspection item on the basis of said vital signs; in said vital signs detection system according to the present invention; wherein said read-out program works in cooperation with said computer.

[0433] Part of the means (or apparatuses, devices, circuits, sections, and the like) according the present invention and part of the steps (or processes, operations, effects, and the like) according the present invention indicate: a piece or pieces of means among a plurality of pieces of said means and a step or steps among a plurality of said steps; or alternatively, part of function in a piece of means and part of operation in a step, respectively.

[0434] Part of the apparatuses (or devices, circuits, sections, and the like) according the present invention indicates: an apparatus or apparatuses among a plurality of apparatuses; part of means (or devices, circuits, sections, and the like) in an apparatus; or alternatively, part of function in a piece of means.

[0435] The scope of the present invention includes also a computer-readable recording medium in which a program according to the present invention is recorded.

[0436] A mode of use of a program according to the present invention may be that the program is recorded in a computer-readable recording medium and works in cooperation with a computer.

[0437] A mode of use of a program according to the present invention may be that the program is transmitted through a transmitting medium, read out by a computer, and works in cooperation with the computer.

[0438] Data structure according to the present invention includes a database, a data format, a data table, a data list, and a data type.

[0439] The scope of recording media according to the present invention includes a ROM and the like, while the scope of transmitting media according to the present invention includes a transmitting medium such as the Internet, as well as light, radio waves, acoustic waves, and the like.

[0440] As described above, a configuration according to the present invention may be implemented by software or by hardware.

[0441] The embodiments of the present invention have the following effects.

[0442] According to an embodiment of the present invention, a health control apparatus can be constituted of one or more sensing apparatuses and a data processing apparatus. Even in case of a plurality of measurement items, the data processing apparatus can perform a common processing (data storing, data processing, communication with a server, and the like). Accordingly, the present invention is more efficient than a case that a plurality of measurement instruments are provided independently. Further, a single data processing apparatus can manage the vital signs. Accordingly, a processing relating to various data can be carried out easily.

[0443] The data processing apparatus and the sensing apparatus are separated from each other. Accordingly, the data processing apparatus can be designed into an appropriate size by selecting the displaying means and the inputting means depending on the condition of a user and the application. On the other hand, the sensing apparatus solely performs the acquisition and the transmission of vital signs. This simplifies downsizing and weight reduction.

[0444] In case that the processing means of a data processing apparatus is composed of a programmable device having a CPU core, a process program for implementing the function can be downloaded from a server. This permits flexible customization of the health control apparatus.

[0445] A data processing means of data processing apparatus comprising frequency processing means, heart rate managing means, and calorie consumption calculating means can serve as a consumption calorimeter. The consumption calorimeter having this configuration can be connected to two or more sensing apparatuses. Accordingly, even when data cannot be acquired by one sensing apparatus, the calorie consumption can be calculated from the data obtained from another sensing apparatuses. Alternatively, when abnormal data are abandoned among the pulse wave

data from these two or more sensing apparatuses, the reliability in the calculated calorie consumption is improved.

[0446] During the execution of the health control program of a user, measurement data outside a predicted range can be detected, whereby a warning button is additionally displayed for a health control instructor. This permits the requesting of modification and/or change of the program. When an instructor instructs the health control of many users, measurement results having a problem can be automatically extracted and treated.

[0447] A user can actively carry out the control cycle of the health control program. That is, the user carries out the operation indicated by an upload button displayed together with the measurement data, and thereby uploads the measurement data to the server and downloads a health control program for the next cycle. The user can actively upload the execution result, renew the measurement data in the server, and download a new health control program.

[0448] This upload operation is a single action. This single action causes the upload of the measurement data and the renewal of the health control program. Accordingly, this does not disturb the habit of the user continuing the program.

[0449] An instructor can actively carry out the control cycle of the health control program. That is, when the time stamp of measurement data is before a predetermined date and time, display data containing an upload button is generated and displayed on the server. When the operation indicated by the upload button is carried out, the measurement data in the health control apparatus of the user is acquired, and then a new health control program is written. Thus, this is a health control method suitable for a case that the health control apparatus and the server are always connected to each other.

[0450] The upload operation is a single action. This single action causes the upload of the measurement data and the renewal of the health control program. Accordingly, even when an instructor instructs the health control of many users, the operation is minimized.

[0451] As described above, the present invention provides a vital signs detection system, a vital signs processing apparatus, and a health control method in which vital signs can be obtained suitably to various purposes and various types of necessary data depending on the purpose.

What is claimed is:

1. A vital signs detection system comprising:

a terminal capable of being connected to detecting means of detecting vital signs;

a program server of storing a program and/or data to operate said detecting means; and

an information server of communicating with said terminal;

wherein:

when an operation switch of said detecting means is turned ON, said terminal transmits information including the type of said detecting means to said program server;

on receiving said information, said program server transmits a predetermined program and/or data corresponding to said information to said terminal according to said information;

said detecting means operates according to said predetermined program and/or data received by said terminal, and thereby detects vital signs; and

said terminal transmits the vital signs detected by said detecting means to said information server.

2. A vital signs detection method utilizing:

a terminal capable of being connected to detecting means of detecting vital signs;

a program server of storing a program and/or data to make said detecting means operate; and

an information server of communicating with said terminal;

and comprising:

the step in which when an operation switch of said detecting means is turned ON, said terminal transmits information including the type of said detecting means to said program server;

the step in which on receiving said information, said program server transmits a predetermined program and/or data corresponding to said information to said terminal;

the step in which said detecting means operates according to said predetermined program and/or data received by said terminal, and thereby detects vital signs; and

the step in which said terminal transmits the vital signs detected by said detecting means to said information server.

3. A terminal capable of being connected to detecting means of detecting vital signs, wherein:

said terminal communicates with a program server of storing a program and/or data to make said detecting means operate, and with an information server for storing vital signs detected by said detecting means;

when an operation switch of said detecting means is turned ON, said terminal transmits information including the type of said detecting means to said program server;

on receiving said information, said program server transmits a predetermined program and/or data to said terminal according to said information; said detecting means operates according to said predetermined program and/or data received by said terminal, and thereby detects vital signs; and said terminal transmits the vital signs detected by said detecting means to said information server.

4. A program server for communicating with a terminal capable of being connected to detecting means of detecting vital signs, and for storing a program and/or data to make said detecting means to operate, wherein:

when an operation switch of said detecting means is turned ON and thereby said terminal transmits information including the type of said detecting means, said program server receives said information and then

transmits a predetermined program and/or data corresponding to said information to said terminal according to said information;

said detecting means operates according to said predetermined program and/or data received by said terminal, and thereby detects vital signs; and

said terminal transmits the vital signs detected by said detecting means to said information server.

5. An information server of communicating with a terminal capable of being connected to detecting means of detecting vital signs, wherein:

said terminal communicates also with a program server for storing a program and/or data to make said detecting means operate;

when an operation switch of said detecting means is turned ON and thereby said terminal transmits information including the type of said detecting means to said program server,

said program server receives said information and then transmits a predetermined program and/or data corresponding to said information to said terminal;

said detecting means operates according to said predetermined program and/or data received by said terminal, and thereby detects vital signs; and

when said terminal transmits the vital signs detected by said detecting means, said information server receives said vital signs.

6. A vital signs processing apparatus comprising:

vital signs detecting means of detecting vital signs; and

vital signs processing means of processing, storing, and displaying said vital signs detected by said vital signs detecting means; wherein:

said vital signs detecting means comprises at least:

buffering means of temporarily storing said detected vital signs; and

first communicating means of communicating with said vital signs processing means;

said vital signs processing means comprises at least:

second communicating means of communicating with said vital signs detecting means;

storing means of storing said vital signs;

processing means of processing said vital signs stored in said storing means according to a predetermined program and/or data; and

displaying means of displaying said vital signs stored in said storing means and/or output data of said processing means.

7. The vital signs processing apparatus according to claim 6 wherein said vital signs processing means further comprises third communicating means of communicating with an external server.

8. The vital signs processing apparatus according to claim 6 wherein:

said buffering means and said storing means comprise a removable medium which can be detached; and

said removable medium is transferred between said vital signs detecting means and said vital signs processing means, whereby the data stored in said removable medium is transferred.

9. The vital signs processing apparatus according to any of claims **6-8**, wherein:

said vital signs detecting means is composed of a pulse wave sensor for measuring the pulse wave of a user; and

said processing means comprises: frequency processing means of performing FFT (fast Fourier transformation) processing onto the frequency of said pulse wave; heart rate measuring means of measuring heart rate from the output of said frequency processing means; and calorie consumption calculating means of calculating calorie consumption from said heart rate.

10. The vital signs processing apparatus according to claim 9 wherein:

said vital signs processing means further comprises FFT processing means of performing FFT processing onto said heart rate;

according to the result of said FFT processing, it is determined whether said user is exercising or not; and

when it is determined that said user is not exercising, and when said heart rate exceeds a predetermined set value, said calorie consumption calculating means does not use said measured heart rate, but calculates calorie consumption according to said user's resting heart rate stored previously.

11. The vital signs processing apparatus according to claim 9 further comprising inputting means of permitting a user to input: personal data including one's name, age, and sex; health control indices including daily, weekly, monthly, and final target values for calorie consumption; and exercise indices including upper and lower limits for heart rate at exercise, and exercise time.

12. The vital signs processing apparatus according to claim 11 wherein said health control indices and said exercise indices are displayed on said displaying means.

13. The vital signs processing apparatus according to claim 9 further comprising notifying means of warning said user when said heart rate falls outside the range between said upper and lower limits for heart rate having been input through said inputting means.

14. The vital signs processing apparatus according to claim 11 wherein:

said processing means performs: the accumulation of said calorie consumption; the calculation of the difference from said target value; the calculation of the degree of achievement to said target value; and the calculation of the expected time of achieving said target value at the current pace of calorie consumption; and then stores these data in a region different from that of said vital signs data, within said storing means; and

said displaying means displays: the time series of the change in said heart rate and said calorie consumption; said accumulated value of calorie consumption; and said expected time of achieving said target value.

15. The vital signs processing apparatus according to claim 6 wherein:

said vital signs detecting means is used as said detecting means connected to said terminal in claim 3; and

said vital signs processing means is used as said terminal in claim 3.

16. The vital signs processing apparatus according to claim 6 wherein said vital signs detecting means and said vital signs processing means are used as said detecting means connected to said terminal in claim 3.

17. A health control method wherein a vital signs processing apparatus according to any of claims **7**,**5** or **16** is used, whereby the health of a user of said vital signs processing apparatus is controlled according to instructions from a health control instructor who is a server user of said information server or said server, wherein

said method comprises:

a first step in which said information server or said server generates a health control program including all or part of the exercise indices, the exercise menu, and the health control indices of said user of said health vital signs processing apparatus according to a user chart containing vital signs including the height, the weight, the body fat percentage, and the temperature of said user, and then transmits said program to said vital signs processing apparatus;

a second step in which said vital signs processing apparatus receives said health control program, and in which said user uses said vital signs processing apparatus in accordance with said health control program, and thereby acquires said user's vital signs;

a third step in which said information server or said server renews said health control program according to said acquired measurement data; and

a fourth step in which when said measurement data falls outside the range of the values set in said health control program, said vital signs processing apparatus transmits warning information for requesting attention to said information server or said server; and wherein:

on recognizing said warning information, said health control instructor determines and alters said exercise indices and/or said exercise menu in said health control program according to said warning information;

said information server or said server transmits said altered exercise indices and/or exercise menu to said vital signs processing apparatus; and

when said vital signs processing apparatus receives said altered exercise indices and/or exercise menu, said user takes exercise according to said exercise indices and/or exercise menu.

18. The health control method according to claim 17 wherein:

said vital signs processing apparatus transmits prompt information for requesting the renewal of said measurement data, to said user;

on recognizing said prompt information, said user determines and operates said vital signs processing apparatus according to said prompt information; and

said vital signs processing apparatus acquires new measurement data, and then transmits them to said information server or said server.

19. The health control method according to claim 17 wherein:

said information server or said server transmits prompt information for requesting the renewal of said acquired measurement data, to said user;

on recognizing said prompt information, said user of said vital signs processing apparatus determines and operates said information server or said server according said prompt information; and

on receiving new measurement data, said information server or said server generates a new health control program based on said data.

20. The health control method according to claim 18 or **19** wherein said prompt information is output when said measurement data is not renewed for a predetermined time or longer.

21. The health control method according to claim 18 wherein said prompt information includes the method of operation of said vital signs processing apparatus for said user to renew said measurement data.

22. The health control method according to claim 19 wherein said prompt information includes the operation method of said information server or said server for said user of said vital sign processing apparatus.

23. The health control method according to claim 17 wherein:

said information server or said server further comprises a user ID (identifier) table for storing user IDs for corresponding the user chart of each user to that user uniquely; and

said user ID is transmitted together with said health control program to said health control apparatus.

24. A program of operating a computer as all or part of said terminal capable of being connected to detecting means of detecting vital signs; said program server for storing a program and/or data for causing said detecting means to operate; and said information server for communicating with said terminal; in said vital signs detection system according to claim 1.

25. A program of operating a computer as all or part of said terminal according to claim 3 capable of being connected to detecting means of detecting vital signs.

26. A program of operating a computer as all or part of said program server according to claim 4 for communicating with said terminal capable of being connected to detecting means of detecting vital signs, and for storing a program and/or data for causing said detecting means to operate.

27. A program of operating a computer as all or part of said information server according to claim 5 for communicating with said terminal capable of being connected to detecting means of detecting vital signs.

28. A program of operating a computer as all or part of said processing means of said vital signs processing means of said vital signs processing apparatus according to claim 6.

29. A program of operating a computer to carry out all or part of said first, second, third, and fourth steps in said health control method according to claim 17.

30. Data structure which can be used in a computer and comprises all or part of the data structure in said first, second, third, and fourth steps in said health control method according to claim 17.

31. A vital signs detection system comprising:

a terminal having detecting means of detecting, vital signs corresponding to an inspection item;

a program server of storing a program and/or data to make said detecting means operate; and

an inspection item judgment server of communicating with said terminal and thereby judging said inspection item according to said vital signs; wherein:

when said terminal is started, said inspection item judgment server judges a predetermined inspection item according to said vital signs corresponding to said predetermined inspection item; and according to the result of said judgment, said inspection item judgment server makes said terminal download a predetermined program and/or data from said program server, and thereby makes said detecting means operate according to said predetermined program and/or data.

32. A vital signs detection system comprising:

a terminal having detecting means of detecting, vital signs corresponding to an inspection item;

a program server of storing a program and/or data to make said detecting means to operate; and

an inspection item judgment server of communicating with said terminal and thereby judging said inspection item according to said vital signs; wherein:

when said detecting means detects said vital signs corresponding to a predetermined inspection item, said terminal transmits said vital signs to said inspection item judgment server;

on receiving said detected vital signs, said inspection item judgment server judges said predetermined inspection item according to said vital signs, and according to the result of said judgment, determines whether the operation of said detecting means is to be continued or not; and

when the result of said determination is the continuation of the operation of said detecting means, said inspection item judgment server makes said detecting means perform the same operation as previous, or alternatively, to download a predetermined program and/or data from said program server and thereby operate according to said predetermined program and/or data.

33. The vital signs detection system according to claim 31 or **32** wherein: said detecting means is connected to said terminal in an attachable and detachable manner; and in response to said download of said predetermined program and/or data, the type and/or the number of said detecting means connected to said terminal is changed.

34. The vital signs detection system according to claim 31 or **32** wherein said download of said predetermined program and/or data is carried out in order to change said inspection item to which said operation of said detecting means corresponds.

35. The vital signs detection system according to claim 31 or **32** wherein said download of said predetermined program and/or data is carried out in order to change the inspection method for the same inspection item to which said operation of said detecting means corresponds.

36. The vital signs detection system according to claim 31 or **32** wherein:

said judgment by said inspection item judgment server is carried out according to specific vital signs as said vital signs, which is in specific relevance to said organism of detection target of said detecting means;

said terminal is provided with an ID corresponding to said specific vital signs; and

said inspection item judgment server refers to said ID of said terminal, and thereby carries out said judgment according to said specific vital signs.

37. The vital signs detection system according to claim 36 wherein said ID is transmitted from said terminal to said inspection item judgment server, whereby said inspection item judgment server can refer to said ID.

38. The vital signs detection system according to claim 36 wherein said inspection item judgment server retains said ID in advance.

39. A terminal comprising detecting means of detecting, from an organism, vital signs corresponding to a predetermined inspection item, wherein

when at start-up, an inspection item judgment server for judging said inspection item according to said vital signs judges a predetermined inspection item according to said vital signs corresponding to said predetermined inspection item,

according to the result of said judgment, said terminal downloads a predetermined program and/or data from a program server for storing a program and/or data to make said detecting means operate, and thereby causes said detecting means to operate according to said predetermined program and/or data.

40. A terminal comprising detecting means of detecting, from an organism, vital signs corresponding to inspection item, wherein:

when said detecting means detects a vital signs corresponding to a predetermined inspection item, said terminal transmits said vital signs to an inspection item judgment server of communicating with said terminal and thereby judging said inspection item according to said vital signs;

on receiving said detected vital signs, said inspection item judgment server judges said predetermined inspection item according to said vital signs, and according to the result of said judgment, determines whether the operation of said detecting means is to be continued or not; and

when the result of said determination is the continuation of the operation of said detecting means, said inspection item judgment server makes said detecting means perform the same operation as previous, or alternatively, download a predetermined program and/or data from a program server for storing a program and/or

data to make said detecting means operate, and thereby operate according to said predetermined program and/or data.

41. The terminal according to claim 39 or **40** wherein: said detecting means is connected to said terminal in an attachable and detachable manner; and in response to said download of said predetermined program and/or data, the type and/or the number of said detecting means connected to said terminal is changed.

42. The terminal according to claim**39** or **40** wherein said download of said predetermined program and/or data is carried out in order to change said inspection item to which said operation of said detecting means corresponds.

43. The terminal according to claim 39 or **40** wherein said download of said predetermined program and/or data is carried out in order to change the inspection method for the same inspection item to which said operation of said detecting means corresponds.

44. A terminal according to claim 39 or **40** wherein:

said terminal is provided with an ID which corresponds to specific vital signs as said vital signs, in specific relevance to said organism of detection target of said detecting means and is thereby used for said judgment by said inspection item judgment server; and

said inspection item judgment server refers to said ID of said terminal, and thereby carries out said judgment according to said specific vital signs.

45. A vital signs detection method comprising:

a step including a detecting step of detecting, from an organism, vital signs corresponding to an inspection item;

a program storing step of storing a program and/or data to make detecting step carry out; and

an inspection item judging step of judging said inspection item according to said vital signs detected by said detecting step; wherein:

when said detecting step is started, in said inspection item judging step, said predetermined inspection item is judged according to said vital signs corresponding to said predetermined inspection item; and according to the result of said judgment, a predetermined program and/or data stored in said program storing step is downloaded for said step including said detecting step; whereby in said detecting step, operation is carried out according to said predetermined program and/or data.

46. A vital signs detection method comprising:

a step including a detecting step of detecting, from an organism, vital signs corresponding to a predetermined inspection item;

a program storing step of storing a program and/or data make said detecting step carry out; and

an inspection item judging step of judging said inspection item according to said vital signs detected by said detecting step; wherein:

when said vital signs corresponding to said predetermined inspection item is detected in said detecting step, said vital signs is transmitted, in said step including said detecting step, to said inspection item judging step for processing;

in said inspection item judging step, said predetermined inspection item is judged according to said detected vital signs, and according to the result of said judgment, it is determined whether said detecting step is to be continued or not; and

when the result of said determination is the continuation of said detecting step, the same operation as previous is carried out in said detecting step, or alternatively, a predetermined program and/or data stored in said program storing step is downloaded and thereby operation is carried out according to said predetermined program and/or data.

47. A program of operating a computer as all or part of: said terminal having detecting means of detecting, from an organism, vital signs corresponding to a predetermined inspection item; said program server for storing a program and/or data to make said detecting means operate; and said inspection item judgment server for communicating with said terminal and thereby judging said inspection item according to said vital signs; in said vital signs detection system according to claim 31.

48. A program of operating a computer as all or part of: said terminal having detecting means of detecting, from an organism, vital signs corresponding to a predetermined inspection item; said program server for storing a program and/or data to make said detecting means operate; and said inspection item judgment server for communicating with said terminal and thereby judging said inspection item according to said vital signs; in said vital signs detection system according to claim 32.

49. A computer-processable medium carrying a program of operating a computer as all or part of: said terminal capable of being connected to detecting means of detecting vital signs; said program server for storing a program and/or data to make said detecting means to operate; and said information server for communicating with said terminal; in said vital signs detection system according to claim 1.

50. A computer-processable medium carrying a program of operating a computer as all or part of: said terminal having detecting means of detecting, from an organism, vital signs corresponding to a predetermined inspection item; said program server for storing a program and/or data of operating said detecting means operate; and said inspection item judgment server for communicating with said terminal and thereby judging said inspection item according to said vital signs; in said vital signs detection system according to claim 31.

51. A computer-processable medium carrying a program of operating a computer as all or part of: said terminal having detecting means of detecting, from an organism, vital signs corresponding to a predetermined inspection item; said program server for storing a program and/or data for causing said detecting means to operate; and said inspection item judgment server for communicating with said terminal and thereby judging said inspection item according to said vital signs; in said vital signs detection system according to claim **32**.

* * * * *