(19) DANMARK

(10) **DK/EP 2857841 T3**

Patent- og Varemærkestyrelsen

(12) Oversættelse af europæisk patentskrift

(51) Int.Cl.: ***G 01 N 35/00 (2006.01)***

(45) Oversættelsen bekendtgjort den: **2021-07-26**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2021-04-21**

(86) Europæisk ansøgning nr.: **13004811.9**

(86) Europæisk indleveringsdag: **2013-10-07**

(87) Den europæiske ansøgnings publiceringsdag: **2015-04-08**

(84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

(73) Patenthaver: **EPPENDORF AG, Barkhausenweg 1, 22339 Hamburg, Tyskland**

(72) Opfinder: **Goemann-Thoss, Wolfgang Dr., c/o Eppendorf AG, Barkhausenweg 1, 22339 Hamburg, Tyskland**
Wente, Wolf Dr., c/o Eppendorf AG, Barkhausenweg 1, 22339 Hamburg, Tyskland
Thieme, Andreas, c/o Eppendorf Instrumente GmbH, Barkhausenweg 1, 22339 Hamburg, Tyskland
Frerichs, Jan-Gerd, c/o Eppendorf AG, Barkhausenweg 1, 22339 Hamburg, Tyskland
Markau, Christiane, c/o Eppendorf AG, Barkhausenweg 1, 22339 Hamburg, Tyskland
Hacker, Jan-Hendrik, c/o Eppendorf AG, Barkhausenweg 1, 22339 Hamburg, Tyskland

(74) Fuldmægtig i Danmark: **Budde Schou A/S, Dronningens Tværgade 30, 1302 København K, Danmark**

(54) Benævnelse: **Laboratorieapparat til apparatstyret behandling af mindst én laboratorieprøve, og en fremgangsmåde til konfigurering af laboratorieapparatet ved hjælp af konfigurationsstyringen**

(56) Fremdragne publikationer:
EP-A1- 0 952 452
EP-A1- 2 299 277
EP-A2- 0 973 115
EP-A2- 1 840 576
WO-A1-94/11838
US-A1- 2003 141 116
US-A1- 2006 173 575

The invention relates to a configuration control device for a laboratory apparatus, a laboratory apparatus comprising the configuration control device for apparatus-controlled treatment of at least one laboratory sample, and a method for configuration of the laboratory apparatus by means of the configuration control device.

Laboratory apparatuses are used for processing laboratory samples, in particular fluid laboratory samples, in a highly efficient manner, in chemical, biological, biochemical, medical, or forensic laboratories. Laboratory apparatuses of this kind automate treatment steps at least in part, which steps would otherwise have to be carried out manually, and thereby increase the speed, precision, and reliability of said treatments. A treatment of at least fluid laboratory samples can be directed to changing said laboratory samples, in particular the composition thereof, physically, chemically, biochemically or in another manner, or to examine or analyze said samples.

During operation of the mentioned laboratory apparatuses, the user generally performs a plurality of hardware and/or software settings, before the desired treatment of a sample can be carried out. This relates on the one hand to settings which are influenced by the general mode of operation of the device, and relates on the other hand to settings which are intended to directly influence the desired treatment, or which define it. The laboratory apparatuses usually comprise a treatment device for apparatus-controlled treatment of the at least one laboratory sample. They often comprise a program control device, by means of which a user of the laboratory apparatus can specify the treatment to be performed, by setting the desired program parameters. The setting of the program parameters is carried out via an operating unit of the laboratory apparatus, which allows for the input and output of information, in particular of values of the program parameters. User errors during the input of parameters are a factor which continuously reduces the results quality and productivity of a laboratory.

The object of the present invention is that of providing a configuration control device for a laboratory apparatus, the laboratory apparatus comprising the configuration control device, and a method for configuration of the laboratory apparatus by means of the configuration control device, by means of which the productivity in a laboratory can be improved.

The invention achieves this object in particular by the laboratory apparatus according

to claim 1 and the method according to claim 11. The dependent claims relate in particular to preferred embodiments.

The use of user-dependent configuration data means that the user is no longer required to have to carry out the configuration of the laboratory apparatus, brought about by the user-dependent configuration data, completely manually. In addition, the provision of the configuration control device can result in a user-dependent design of operating elements of a user interface device, in particular of operating elements of the laboratory apparatus, in particular of the user interface of a display device. As a result of measures of this kind, input errors can be reduced and the productivity in a laboratory can be increased.

Configuration of an apparatus is understood to be the specification of at least one variable parameter which influences the mode of operation of the apparatus. This influence can be temporally limited or can be permanent, and can depend on other conditions, in particular parameters. The specification of the at least one parameter is preferably a procedure which can be repeated, in particular repeated in an unlimited manner. The procedure can, however, also denote a one-off specification of a parameter.

A **configuration control device** is understood to be an apparatus or apparatus component, the function(s) of which influence the configuration of the apparatus or of another apparatus, in particular of the laboratory apparatus. The configuration control device is or can be connected to said other apparatus by means of interface devices. The configuration control device can be a separate apparatus or an apparatus which can be separated from the other apparatus, in particular laboratory apparatus, i.e. a module. It is in particular preferable, however, for the configuration control device to be integrated in the other apparatus, in particular the laboratory apparatus, in particular in the control device of the other apparatus, in particular of the laboratory apparatus. In particular, the control device of the configuration control device can be integrated in the other apparatus, in particular the laboratory apparatus, in particular in the control device of the other apparatus, in particular of the laboratory apparatus. One, several or all functions of the configuration control device can be implemented as software functions. One, several or all functions of the configuration control device can be implemented in particular as executable program code, which can be executed by a control device.

Configuration data are data by means of which the configuration of a configurable apparatus, in particular the laboratory apparatus, can be influenced, in particular specified.

Configuration data can in particular be **apparatus data**. Apparatus data are understood to be data by means of which the mode of operation of an apparatus, in particular the laboratory apparatus according to the invention, can be influenced, in particular specified. Apparatus data are preferably suitable for influencing the control of the display of an optionally provided user interface of the laboratory apparatus according to the invention.

A laboratory apparatus, in particular the control device thereof, is preferably designed to configure the course of the treatment prior to starting a treatment. This can in particular take place by means of a method program. In order to perform the treatment, it is generally necessary for at least one parameter to be determined, in particular by the user. It is also possible, however, for the laboratory apparatus and/or the configuration control device to be designed to determine said at least one parameter, in particular to specify it in a user-dependent manner. The at least one parameter may be a program parameter, in particular a user parameter.

The term “treatment” in particular means that a laboratory sample, which is usually fluid, is moved, and/or transported, and/or examined, and/or changed, in particular with respect to the composition thereof, physically, chemically, biochemically, or in another manner.

The configuration procedure for an individual treatment is dependent on the type of the treatment. The configuration procedure for an individual treatment is preferably user-dependent. The laboratory apparatus, in particular the control means thereof, is preferably designed to carry out the configuration procedure for an individual treatment in a user-dependent manner, on the basis of the configuration data. It is possible for a user-dependent configuration procedure for an individual treatment to take place for the same type of treatment. In this case, the user can be offered a user-dependent selection of user parameters for setting, and/or can be displayed a user-dependent user interface. The configuration data, in particular the apparatus data, can inter alia determine the course of the configuration of a treatment in that they in particular influence a method program which is characteristic for the selected type of treatment.

The apparatus data preferably influence the design of the user interface, which is displayed by a display device, in particular a display, during operation of the laboratory apparatus, in particular during the definition of a treatment, in particular of a method program. Said display device is in particular part of the configuration control device or of a user interface device, which may be part of the configuration control device, of the laboratory apparatus or of an external data processing device.

Apparatus data are preferably not data of the type by means of which the performance of a treatment is directly influenced or defined. Apparatus data are preferably not method data and/or not program parameters and/or not user parameters.

However, configuration data can also be data, or comprise such data, by means of which, in the laboratory apparatus according to the invention, the individual planned treatment of the at least one laboratory sample, in particular the control of the at least one treatment device of a laboratory apparatus, can be influenced, in particular can be specified. Such data are also referred to, in the present case, as method data. Said influencing, in particular specification, is preferably performed at least for a planned treatment. However, it can also take place during a treatment. The specification of the configuration data preferably takes place prior to the start of a treatment. It can also take place during the treatment or thereafter. Configuration data may be program parameters or may determine program parameters.

Predetermined user-dependent configuration data are preferably stored in a memory device. This may be part of the configuration control device, of the laboratory apparatus, and/or of an external data processing device, in particular a computer, in particular a server. It is preferable for the laboratory apparatus, in particular the control device thereof, to be designed to determine configuration data during the operation of a laboratory apparatus by a user, in particular during the specification of the manual configuration by a user, and to store said data as user-dependent configuration data, in particular in the memory device. The user can then transfer said configuration data from the memory device into another laboratory apparatus if he wishes to use said configuration data on the other laboratory apparatus. In this case, said user is saved having to manually set all the configuration data again.

It is also possible for a user to be assigned user-dependent configuration data depending on his role, which is assigned to him when logging into the laboratory

apparatus.

User-dependent procedure means that it is possible to proceed depending on a user, in particular a class, group or role of the user, which may differ by various aspects, or in a manner individual to the user. A user-dependent display in the user interface means in particular that a particular user interface, in particular query dialog, is used, which is assigned to the user.

The user class or **role** can be determined via a database. For an individual, the user class can follow from their professional qualification, their occupational position within the company, or from the assignment according to another criterion. The criterion can also be linked to a measurement which is carried out by at least one sensor which is in signal connection with the control device and may be part of the laboratory machine. This measurement can in particular determine a person-related measuring parameter, in particular a body parameter of the person. This information in particular makes it possible to adjust the laboratory apparatus to the body size, e.g. the body height of the person, in order to for example automatically adjust a setting of the laboratory apparatus to said body size automatically. This can lead to improved ergonomics. The sensor may also comprise a microphone by means of which the speech of the user is detected, in particular recorded. The speech data can be used for creating a protocol file, and/or can be evaluated. The configuration control device, in particular the control device thereof, preferably comprises a speech recognition device. The speech detected by the sensor can be analyzed and evaluated by means of the speech recognition device, speech data being determined. The speech data can be used for detecting a control command, by means of which the control of the laboratory apparatus and/or the configuration control device can be influenced. The speech data can in particular be evaluated in order to determine the speech of the user. The user interface can be adjusted depending on the speech, in that the text displayed on the user interface, and/or the speech, output via a loudspeaker of the laboratory apparatus, of the speech determined by the speech analysis is adjusted.

The invention relates in particular to a user-dependent user interface, in particular a user-dependent query screen, and to a method for user guidance, in particular for user-dependent requesting of user parameters by means of said user-dependent user interface.

A user interface is a graphical user interface which preferably can be or is displayed on the screen of the user interface device. The screen can in particular be a touch screen. The user interface can be a display screen by means of which information is displayed and/or read in.

A query screen is a display screen for display in a screen of the user interface device, comprising at least one display area for displaying the variable value of a program parameter or user parameter. A display screen of this kind comprises static regions which ??? do not change during the display within the display screen. Such a display screen of the query screen furthermore comprises at least one display area, the representation of which during the display within the display screen is variable, in that for example the value changes automatically, e.g. when a time is displayed in said display area, or changes on the basis of a user input, e.g. the display of a value of a user parameter or of another program parameter. A user parameter is a program parameter selected by the user. A program parameter is a parameter of the kind that is used by the control device for controlling a treatment. A user parameter is also referred to as a first program parameter, or as a program parameter of the first type. Those program parameters which are not input by the user are referred to as a second program parameter. Second program parameters are specified by the control device, by calculation, or by values which are predetermined and stored in a data memory. The configuration control device is preferably designed to control the configuration of the laboratory apparatus such that the first program parameter and the second program parameter which are to be used when specifying a treatment, in particular when defining a method program, are specified on the basis of the user-dependent configuration data. As a result it is possible in particular for an inexperienced user to be offered a smaller number of first program parameter for selection than an experienced user, and it is also possible, in particular, for an inexperienced user to have a larger number of second program parameters specified than an experienced user. As a result, the inexperienced user will make fewer errors during operation of the laboratory apparatus, and the experienced user is allowed greater flexibility during operation of the laboratory apparatus. Both measures will increase the productivity in a laboratory, and reduce the costs.

The display screen can itself be movable, in that it can be scrolled on the screen for example, in particular together with a just partial representation.

A **data connection** in particular connects two data-processing units, in particular two data processing devices, such that data can be exchanged between the units, either unidirectionally or bidirectionally. The data connection can be implemented in a wired manner, or wirelessly, in particular as a radio link. A **remote data connection** in particular connects two data-processing units, in particular two data processing devices, which are arranged remotely from one another, which are in particular not part of the same apparatus, in particular the same configuration control device, access control device, user interface device or laboratory apparatus, if the mentioned apparatuses are designed as separate apparatuses. A data connection, in particular a remote data connection, of one apparatus to another apparatus, is preferably achieved via a direct connection of the two apparatuses, or an indirect connection of the two apparatuses, such that a third apparatus is connected between the two apparatuses, in order to convey data further. A remote data connection can be achieved in particular via a network of computers, in which the apparatuses connected via the remote data connection are connected via the network. The network may be a restricted network, e.g. an Intranet, or may be a worldwide network, in particular the Internet.

In a **first preferred embodiment** of the configuration control device according to the invention, the at least one interface device of the configuration control device for establishing at least one third data connection is preferably designed comprising at least one external data processing device, in particular a server, which in particular comprises a memory device on which configuration data can be stored. The control device of the configuration control device is preferably designed to receive configuration data via the at least one third data connection.

In a second preferred embodiment of the configuration control device according to the invention, which in particular comprises the first embodiment, the control device of the configuration control device is preferably designed to evaluate the configuration data received via the at least one third data connection, and to assign user-dependent configuration data to the identified user, which data can be used for user-dependent treatment of the at least one laboratory sample.

In a third preferred embodiment of the configuration control device according to the invention, which in particular comprises the first or second embodiment, the control device of the configuration control device is preferably designed to send identification data, which identify the user, to the at least one external data processing device via

the at least one third data connection, and to receive, from the external data processing device, the configuration data assigned to the identified user, in the form of said user-dependent configuration data for the laboratory apparatus.

In a fourth preferred embodiment of the configuration control device according to the invention, which in particular comprises the first, second or third embodiment, the configuration control device preferably comprises a user interface device for allowing the identified user access to the laboratory apparatus. The access control device is preferably designed to allow the identified user access to the laboratory machine via the first data connection, by means of the user interface device.

In a fifth preferred embodiment of the configuration control device according to the invention, which in particular comprises the first, second, third or fourth embodiment, the access control device is preferably designed to allow the identified user access to the laboratory apparatus, in particular to at least one function of the laboratory apparatus, only if. According to a sixth preferred embodiment of the configuration control device according to the invention, which in particular comprises the first, second, third, fourth or fifth embodiment, the access control device is designed to allow the identified user access to the laboratory apparatus only if at least one predetermined access condition with respect to the identified user is met. The access condition can use the result of the checking of the role of the user, the qualification of the user, a reservation entry in a reservation database, a time, and/or a request for release via a data connection which is performed by the laboratory apparatus.

The invention furthermore relates to a laboratory apparatus for apparatus-controlled treatment of at least one laboratory sample according to claim 1.

In a first preferred embodiment of the laboratory apparatus according to the invention the control device of the laboratory apparatus is preferably designed to use user-dependent configuration data, in particular apparatus data, depending on the identified user. The configuration data preferably determine a set of user-dependent program parameters, by means of which a program-controlled treatment can be controlled in a user-dependent manner by means of the treatment device.

In a second preferred embodiment of the laboratory apparatus according to the invention, which in particular comprises the first embodiment of the laboratory

apparatus, the laboratory apparatus preferably comprises a user interface device for input of data by the user. The user interface device preferably comprises at least one display device for displaying information for the user in at least one graphical user interface, the control device in particular being designed to control the display device such that a user-dependent design of the user interface is used, depending on the identified user and using the user-dependent configuration data.

In a third preferred embodiment of the laboratory apparatus according to the invention, comprising in particular the second embodiment of the laboratory apparatus, the control device of the laboratory apparatus is preferably designed to control the treatment on the basis of at least one user parameter selected by a user, and, in particular, to acquire at least one user parameter in a user-dependent requesting procedure, by means of the user interface device, in that
i) at least one user-dependent, i.e. for example dependent on a user class, e.g. qualification, or also individually dependent, query screen, i.e. in particular display screen having at least one display area for displaying the variable value of a program parameter or user parameter, is displayed to the user, on the user interface, and preferably
ii) at least one user parameter is retrieved by retrieving at least one input of the user in the at least one query screen.

The invention further relates to a system for the apparatus-controlled treatment of at least one laboratory sample, comprising at least one laboratory apparatus according to the invention and at least one external data processing device, in particular a server, which are connected to one another for the exchange of data, in particular configuration data.

In a first preferred embodiment of the system according to the invention, the system preferably comprises at least one first and one second laboratory apparatus according to the invention which are each configured to process the first user-dependent configuration which can be used for user-dependent control of the first laboratory apparatus, and which can also be used for user-dependent control of the second laboratory apparatus.

In a second preferred embodiment of the system according to the invention, which in particular comprises the first embodiment of the system, the system preferably

comprises an external data processing device, and the user interface device, which may be part of the external data processing device, it being possible for user-dependent configuration data to be generated from the user inputs, using the user interface device.

Within the context of the present invention, a **control device** generally in particular comprises a data processing device, in particular an arithmetic unit (CPU) for processing data, and/or a microprocessor, or is a data processing device. An arithmetic unit of the control device of a laboratory apparatus is preferably also designed for controlling the treatment process and/or the individual treatments.

The control device of the laboratory apparatus, and/or the access control device, and/or the optional user interface device can, in particular all, be integrated in a physical apparatus unit, but can also be an independent physical apparatus unit. A physical apparatus unit can in particular be a module which is or can be connected to the laboratory apparatus. The control device of the laboratory apparatus, and/or the access control device, and/or the optional user interface device, or parts of these components, can also be implemented by software functions, or can in particular be provided as program code. A laboratory apparatus may for example comprise a computer which, in combination with software functions, implements the control device of the laboratory apparatus, and/or the optional access control device, and/or the optional user interface device, at least in part in each case. If, for example, the access control device is integrated in the laboratory apparatus, the access control device itself can be part of the control device of the laboratory apparatus or be implemented by means of the control device, in particular by software functions, in particular as executable program code at least in part.

A **communication device** is preferably designed for transmitting and/or receiving data, in particular for data exchange, via a data connection provided by the communication device, in particular a remote data connection to a remote apparatus. In particular, the apparatus arranged remotely with respect to a laboratory apparatus is also referred to as the “remote apparatus” or external apparatus. In particular, a data processing device, which is not part of a laboratory apparatus, is also referred to as an external data processing device. The data connection, in particular remote data connection, can be established via a restricted (in particular an Intranet) or worldwide (in particular the Internet) network of computers. The data connection, in particular

remote data connection, can also be established via a radio link. The data connection, in particular remote data connection, can in particular be established via a cellular connection.

Each user can enter into a first data connection with the access control device via the same **user interface device**, or a plurality of users can enter into a first data connection with the access control device via different user interface devices. A user interface device may be part of the access control device. An access control device may be part of the user interface device. A user interface device may be part of a laboratory apparatus. A user interface device in each case preferably comprises: a control means for a user interface device; a communication device for establishing a data connection to a laboratory apparatus via an interface device thereof; an input device for collecting user inputs of a user; an output device, in particular a display, for outputting information to the user. In this case, the control device of the user interface device is preferably designed to exchange data with the laboratory apparatus via the data connection, which data were acquired from the user inputs and which, in the laboratory apparatus according to the invention, cause permissions and/or access rights to be granted to the second user, on the laboratory apparatus according to the invention, such that a simultaneous sign-in and/or simultaneous access of a first and at least one second user on the laboratory apparatus according to the invention via the interface device can be controlled using access rights to functions of the laboratory apparatus, allocated in each case.

In a laboratory apparatus, the **access control device** makes it possible to control the access of one or more further users on the laboratory apparatus, while a first user is already signed in and their session on the laboratory apparatus is still ongoing, i.e. while the further user's access is still active. This embodiment makes it possible for the laboratory apparatus to be used more efficiently and for the productivity of the laboratory to be improved. The access control device can be integrated into the control device of the laboratory apparatus. The access control device can be designed as a module. The access control device can be part of the configuration control device. The configuration control device can be part of the access control device. The access control device and configuration control device can be arranged in a module.

A module can in particular comprise the access control device, and/or the configuration control device, and/or a user interface device. A module is an apparatus

which is separated from other apparatuses and/or an apparatus which can be separated from the other apparatus, in particular laboratory apparatus. A laboratory apparatus can comprise a connection device, by means of which the module can be connected to the laboratory apparatus, in particular by means of a connection which is releasable by the user. A module may be portable, i.e. transportable by a user. The module can also be rigidly connected to the laboratory apparatus. The modular construction provides advantages when manufacturing laboratory apparatuses. A portable module offers greater flexibility in the use of a laboratory apparatus.

Preferred embodiments of the access control device and of the laboratory apparatus comprising said access control device are mentioned within the scope of the description of the present invention, or can be derived therefrom.

The access control device is preferably designed to control the request of the at least one further user for sign-on at the access control device during the first user's session, in particular to control access to at least one function of the laboratory apparatus, in particular to grant the request (access permitted) or to refuse the request (access denied).

The access control is a device designed for data processing, which in the present case is also referred to as an "access control device". It is used to control access. The access control device comprises a control device. The control device is designed for data processing. The control device is in particular an electronic control device. It preferably comprises a data processing device which is in particular electronic.

The **data processing device** preferably comprises an arithmetic unit, in particular a CPU, more preferably at least one data memory device, in particular for temporary and/or permanent storage of data. The data processing device is preferably designed to establish, via the first interface device, one or more first data connections to one or more user interface devices, which can in particular be part of the configuration control device, the access control device, and/or the laboratory apparatus; preferably to establish a second data connection to the laboratory apparatus via the second interface device; and preferably to control access rights for access by users via the user interface devices and the first and second data connections to functions of the laboratory apparatus; it preferably being possible for the access rights to be controlled such that simultaneous access (being logged in) of a first and at least one further user,

having mutually separately assigned access rights to functions of the laboratory apparatus, takes place.

An **interface device** is used for connecting two devices which can in each case process, in particular transmit and/or receive, signals, in particular information, in particular data. An interface device can contain at least one hardware interface and/or at least one software interface.

Hardware interfaces are in particular interfaces between electrically operating units, according to the conventional understanding in electrical engineering and electronics. In the present case, the term "hardware interface" in particular also refers to the connection components between at least two electrically operating units themselves, i.e. in particular all parts which make this connection possible, e.g. integrated circuits, electronics, and cables, via which electrical signals are transmitted between the at least two electrically operating units. Said two electrically operating units can in particular be a laboratory apparatus and an external data processing device, or two laboratory apparatuses, or two electrically operating units within a laboratory apparatus. A hardware interface does not have to, but may, comprise a releasable connection device for releasing and/or re-establishing said connection, in particular at least one plug connector.

Software interfaces, in particular software-side data interfaces, are in particular logical contact points in an information management system, in particular software system: they allow for and control the exchange of commands and data between different processes and components. Software interfaces may be data-oriented interfaces used only for communication. In this case, the software interface contains merely the information which is exchanged between participating system parts.

The access control device is preferably designed to control the access rights, in that the control device uses a data connection to a **database for access rights**. The database for access rights is preferably stored in at least one, preferably in exactly one, memory device for access rights. The at least one memory device for access rights may be arranged in the access control device, and/or may be arranged in an external data processing device. External means that the apparatus, in this case the data processing device, is not part of the device in question, in this case the access control device. The database for access rights may be stored centrally, but may also

be stored in a plurality of memory devices which may in each case comprise some of the data of the database or may comprise a copy of the data of the database.

An in particular **external data processing device** may be a computer, in particular a server, or may comprise a computer, in particular a server, which is designed in particular for establishing a data connection to more than one access control device and/or more than one laboratory apparatus. An in particular **external data processing device** may comprise a computer or microprocessor. A server is in particular a computer, the hardware of which is preferably matched to server applications. An external data processing device may be a mobile data processing device which is designed for establishing a wireless data connection, in particular a data connection via a restricted or worldwide computer network. A computer network is a combination of various technical, primarily autonomous, electronic systems (in particular computers, but also sensors, actuators, agents and/or other radio components, etc.), which allows for communication of the independent systems with one another.

The access control device may be a **communication device** for establishing a data connection to an external data processing device, in particular via the first, second, or another interface device of the access control device. The access control device is preferably designed for establishing the access rights using the data connection to the external data processing device, in particular via the first, second, or another interface device of the access control device. The external data processing device preferably comprises the database for access rights, at least in part or completely.

The access control device, in particular a control device of the access control device, is preferably designed to control permissions and/or access rights for access of users, via the user interface devices and the first and second data connections, to functions of the laboratory apparatus. A user-dependent use of the laboratory apparatus is thereby made possible, which use is controlled depending on the access rights granted in each case. In particular, a simultaneous use of the laboratory apparatus by at least one first and at least one second user is possible.

The access control device carries out the access control. The term “access control” denotes in particular methods for managing the requests for resources and/or data which are managed by an information management system, and for managing decisions as to how the request is handled, in particular whether or not access is

granted, and/or in what manner access is granted or not. The information management system can in particular be an operating system which is executed on the access control device. If the user of an information management system wishes to perform a particular operation on a particular resource and/or using particular data, the access control decides whether this request should actually be granted or refused. An access control decision (yes/no) refers in particular to an "access control triple" consisting of "subject", "object" and "operation".

Subject refers in particular to an active entity of a system, which wishes to perform a particular operation on a particular object. An entity refers, in this connection, to a clearly determinable unit about which information is intended to be stored and/or processed. The unit may be tangible or intangible, concrete or abstract. Subjects are in particular human users of an information management system, or computer programs which are used by human users for fulfilling tasks. A subject can also be a group of users, e.g. laboratory personnel, service technicians, administrators. Accordingly, the group combines a plurality of individual subjects.

A user may represent an individual, or a group of several individuals, or a class of individuals, which have been selected according to a class rule or role rule.

The access control device can preferably distinguish the at least one first user and the at least one second user from one another. A user is preferably clearly identified by the access control device. For this purpose, the access control device preferably processes identification data. The access control device is preferably designed to authenticate the requesting user, i.e. perform a verification procedure by means of which the authenticity of the requesting user is checked, and the user is authenticated, if the verification is positive. Authentication data contain for example a login text and a password text, or a dataset for face recognition or for iris scanning or for fingerprint scanning, etc. The authentication can furthermore take place by means of an RFID chip or NFC chip, or by gesture recognition. An authentication can in particular take place by means of direct access to the laboratory apparatus or the access control device thereof on site, or by remote access.

The access control device preferably comprises an **information management system**, by means of which the access control is implemented. The information management system is preferably an operating system of a laboratory apparatus

and/or of the access control device thereof, by means of which the access control device and/or the laboratory apparatus is operated.

The access control device is preferably designed to sign the **requesting user**, in particular a plurality of requesting users, in particular the at least one first user and the at least one second user, into the access control device, in particular into the information management system of the access control device. The sign-on procedure is also referred to as logging in. The successfully signed-on user preferably receives predetermined permissions and/or access rights. The sign-on can be reversed by the user themselves or on account of other conditions, e.g. by the apparatus-controlled sign-out of the user, in particular in the case of exceeding a maximum sign-on time in which the user was logged on via the access control device without interruption, or after a predetermined time of inactivity, or depending on the time point of the end of a treatment carried out by the user, or on account of individual method programming. The reversal of the sign-on preferably means that the authorization granted upon sign-on is removed again.

The logging into the information management system is preferably carried out in that the user is authenticated. Following successful authentication, for logging on the user receives personalized access to the information management system, comprising permissions and/or access rights, which are determined using the database for access rights. Upon login, a session begins which is ended by a logout, also referred to as sign-out.

The access control device is preferably designed to enable the use of permissions, operations and objects on the laboratory apparatus, or the functions and services of the laboratory apparatus, which the access control device comprises, on the basis of the predetermined access rights, i.e. to authorize the authenticated user. The access control device is preferably software-controlled, in particular program-controlled. Preferably an LDAP (Lightweight Directory Access Protocol) is used as an application log in the implementation of the software functions.

Object refers, in the case of access or an access attempt, in particular to a passive entity on which an operation is intended to be performed. Objects are also referred to as “resources”. Objects may for example be: data or data collections, i.e. files, data objects in databases, e.g. tables or columns), services or functions, in particular those

services or functions which can be carried out using the access control device and/or the laboratory apparatus. Such services can for example refer to making available a calendar database, it being possible for this use to provide for the display of calendar data, which can provide read and/or write rights on the calendar database. Such services and functions can for example designate a message function, by means of which messages can be sent to the user, which messages can in particular contain information relating to the availability of the laboratory apparatus in a particular calendar period. A function of this kind would in particular also be making available the execution of a treatment, which can in particular include granting the access rights necessary therefor. A function can be for example switching on UV lighting of the laboratory apparatus, or opening a housing door of a laboratory apparatus housing.

Operations refers to procedures which are carried out on an object. Operations can in particular be functions, in particular functions of the access control device or of the laboratory apparatus. A plurality of functions can be carried out on an object. If the object is a file, possible operations are writing, reading, adding, amending, copying, or deleting data. If the object is a service or a function, then execution may be the only possible operation. The number of possible operations depends on the type of the object. The number of operations which can be performed by individual subjects on the same object may be different.

A particular object in combination with a particular operation is in particular referred to as permission. “Read permission” can be understood for example as the combination of the operation “read” with the object “file”; “execution permission” can be understood for example as the operation “execute” with the object “function”.

The access control can in particular be formulated as an authorization function, formally described by

$$Authorization\_for(Subject, Object, Operation) \rightarrow (yes, no).$$

If this function is subject to the three parameters (subject, object, operation), then the authorization function returns either “yes” (access granted) or “no” (access denied).

It is also possible to provide a further input parameter in the case of this authorization function, which parameter delivers a further condition for the access decision. This

condition can for example denote the purpose for which particular access is intended to take place. It is furthermore possible for the authorization function not, or not only, to return the yes/no decision relating to the access authorization, but rather to return a requirement (also "obligation"), depending on that decided with respect to the access authorization. In particular an "authorization with reservations" can be defined thereby. An obligation of this kind is in particular already fulfilled before the access or access attempt, but can also be fulfilled during or after the access or the operation to be allowed.

The access control can take place according to one or more special data models. A special data model of this kind is in particular the Access Control Model (ACM). The access control can in particular comprise what is known as a reference monitor. This component is to be understood in particular as a functional core of the access control device. The reference monitor fulfils the function of deciding whether the access, desired by a subject, to an object, is granted. The access control device preferably cannot release access to a resource of the laboratory apparatus, without the reference monitor being used. The reference monitor preferably also fulfils the function of recording the successful access attempts.

The database of access rights preferably contains information in the form of data relating to what operations are available for an object, in particular in a manner dependent on a particular time point or time period. It is thereby possible in particular to specify whether access to the at least one treatment device is permitted for a user at a particular time point and/or in a particular time period, in particular whether the right is granted, at a particular time point and/or in a particular time period, to start or change a treatment on the laboratory apparatus, the laboratory apparatus being connectable and/or connected to the access control device via the second data connection.

The database of access rights preferably contains information in the form of data relating to what permissions can be granted to the requesting user, in particular depending on possible rights on account of a group affiliation and/or role affiliation.

The access control is preferably designed according to one or according to more of the known basic forms DAC ("Discretionary Access Control"), MAC ("Mandatory Access Control") or RBAC ("Role-Based Access Control"), RBAC being particularly preferred.

According to the RBAC model, individual subjects are not assigned rights directly, but rather indirection via what are known as “roles”. A possible standard of the RBAC model applicable within the context of the design of the access control device is described in detail in the US standard ANSI INCITS 359-2004. The access control device can be designed as an RBAC model at least in part, in particular according to the mentioned US standard at least in part.

The access control preferably provides for the use of at least one role, preferably a plurality of roles, in particular rights being combined in the role in each case. The at least one role is preferably stored in the database for access rights. A role is in particular suitable for transmitting directly to the laboratory apparatus, via the access control device, in a manner adapted to the responsibility or a task description within the context of the use of a laboratory apparatus, in particular within the company using the laboratory apparatus and/or in the company which fulfils a maintenance agreement relating to the laboratory apparatus, and/or at the manufacturer of the laboratory apparatus, for example the firmware updates, calibrations, or information relating to the laboratory apparatus and/or the accessories thereof. Such roles can in particular combine rights. Instead of storing a set of individual rights for each user, at least one role can be assigned to said user. The role allocation is particularly reliable to implement and requires relatively little outlay, in particular management outlay, when determining and storing the rights.

The access control preferably provides for at least two, preferably more, **roles**. Possible roles are in particular administrator (“Admin”), servicing (“Maintenance”), normal laboratory user (“LabUser”), inexperienced laboratory user (“Inexperienced”), manager. Roles of this kind allow for reliable and efficient access control. The use of a laboratory apparatus provided with the access control device is reliable and efficient. A user is prevented in a simple manner, for example on account of a lack of qualification, from carrying out particular operations on the laboratory apparatus, which may lead to damage or inefficient use of the laboratory apparatus, or to increased costs in operation, for example due to excessive use of consumables which are used for a treatment.

The access control preferably provides for at least one role or more than one role, which can be assigned to a user simultaneously. An individual can thus obtain access for example as an administrator or as a normal laboratory user, depending on a further

condition. The user themselves can preferably decide the role in which they receive access on the laboratory apparatus. It is also possible, however, that the user does not decide this themselves but rather that the access control device decides it. This condition may be the dataset used for authentication, in particular the password used, or may depend on a parameter of the laboratory apparatus, in particular on an operating parameter of the laboratory apparatus, for example an operating parameter which characterized the error status of the laboratory apparatus.

The control device of the access control device is preferably designed such that more than one user can be signed into the access control device simultaneously, in order to have permissions and/or access rights assigned. An access control device of this kind for simultaneous use of a laboratory apparatus represents an efficient solution for increasing the productivity in a laboratory.

The access control device, in particular the control device of the access control device, is preferably designed such that a check is made as to whether at least one further predetermined condition is met upon sign-in to the user interface device, and the access rights for access to the laboratory apparatus are assigned via the second user interface device only if the at least one further predetermined condition is also met.

The configuration control device, in particular the control device of the configuration control device, is preferably designed such that a check is made as to whether at least one further predetermined condition is met upon sign-in to the user interface device, and a user-dependent control of the display on a user interface device is used only if the at least one further predetermined condition is also met.

Said further predetermined condition(s) can depend on the role of the user, on the status of the laboratory apparatus, and/or on the type of a user interface device, which was identified by the laboratory apparatus upon connection to the laboratory apparatus.

Said further predetermined condition(s) can in particular be dependent on the **use case**. Similar conditions can be generally taken into account by the access control device, if a decision is made on the granting of permissions and/or access rights of a signing in or signed in user.

Possible use cases are for example, preferably in each case, the monitoring of the laboratory apparatus via a remote data connection ("remote monitoring"), the control of the laboratory apparatus via a remote data connection ("remote control"), the inclusion of a booking schedule for time-dependent planning of the use of the laboratory apparatus by a plurality of users ("booking schedule"), the preprogramming of a treatment, in particular of a program-controlled treatment, in particular by method programming ("preprogramming"), or the remote access of a service technician ("remote service access"). The condition can furthermore take into account the role of the user and/or the operating state of the laboratory apparatus. The operating state of the laboratory apparatus can in particular be a state of idle running, i.e. a state in particular without a treatment running, in which, however, the laboratory apparatus can in particular be ready for sign-on of a user and/or for carrying out a treatment. The operating state of the laboratory apparatus can in particular be a state in which a treatment is or was programmed, and/or the treatment was prepared and is just about to be executed. The operating state of the laboratory apparatus can in particular be a state in which a treatment has already been started and is running, or a state in which a treatment has been stopped, or a state in which the booking schedule has a reservation entry for treatment by a user, it being possible to make a distinction between whether said user is signed in or not. The operating state of the laboratory apparatus can in particular be an energy-saving state ("standby" mode) of the laboratory apparatus. Further examples of the possible or preferred embodiment of such permissions depending on the mentioned conditions can be found in "Enclosure 1" of the description.

The access control device, in particular the control device of the access control device, is preferably designed such that, in particular if a further condition is met, information relating to the operating state of the laboratory apparatus, measured values, or settings or programming of the laboratory apparatus which can be influenced by the user, can be transferred by the interface device to the second user interface device. This condition can in particular be that a user has requested this information transfer during access control. The access control device, in particular the control device of the access control device, is preferably designed such that, if this condition is met, information relating to the operating state of the laboratory apparatus, measured values, or settings or programming of the laboratory apparatus which can be influenced by the user, can be transferred by the interface device to the second user interface device.

The access control device, in particular the control device of the access control device, is preferably designed such that the settings which can be influenced by the user contain at least one program parameter for the program-controlled treatment of a laboratory sample, which is controlled in particular by means of a method program.

The control device of the access control device and/or the control device of the laboratory apparatus preferably comprises a memory device in which **user qualification data** are stored, in which a qualification in the form of at least one qualification value or certificate is assigned for each user of the laboratory apparatus. The access control device, in particular the control means of the access control device, is preferably designed such that a user is granted the permissions and/or access rights, in particular assigned a role, depending on their qualifications. As a result, users can use the laboratory apparatus in accordance with their qualifications, and in particular inexperienced users are not overwhelmed. As a result, the productivity and operating reliability during use of the laboratory apparatus is increased.

The control device of the access control device, and/or the control device of the laboratory apparatus, is preferably designed to carry out a **qualification method** for at least one user, in which the at least one user passes through a qualification check performed and evaluated by the control device, and the qualification method in particular providing for evaluation of the data input by the at least one user in response to specific questions, and in particular providing for assignment of a qualification to the at least one user, in particular according to a comparison table or calculation specification, depending on the result of said evaluation. A qualification method of this kind, carried out on the access control device or on the laboratory apparatus, is particularly practical and therefore efficient.

The control device of the access control device, and/or the control device of the laboratory apparatus, is preferably designed to grant to and/or withdraw from the user particular access rights to functions of the laboratory machine, depending on said user's qualification and by means of the access control device.

The control device of the access control device, and/or the control device of the laboratory apparatus, is preferably designed to display to the user, depending on their qualification, at least one graphical user interface, corresponding to the qualification,

on the display of the user interface device, and/or in particular to make available or to not make available particular assistance programs and/or assistance information.

The control device of the access control device, and/or the control device of the laboratory apparatus, preferably comprises a timer, in particular a clock, and in particular a **booking means** which comprises a memory device in which booking data are stored, which in particular contain a booking dataset or a plurality of booking datasets which describe at least one booking schedule, in particular individually for each treatment device.

A booking dataset contains in particular at least one of the items of information, in particular which user is carrying out, has carried out, or will carry out, in particular at what time point, in particular what treatment of samples, in particular by means of which laboratory apparatus. The booking data preferably contain information relating to the bookings accepted by the booking means, which information was actually confirmed and incorporated into the booking schedule following a comparison with the available free capacity in the booking schedule. However, the booking data can also contain booking requests which the booking means can check again, in particular also at a later timepoint after the request has been made, and optionally later accept, if for example an earlier entry in the booking schedule was subsequently cancelled. The booking dataset preferably also contains the information relating to what type of treatment is planned on a laboratory apparatus in each case, what specific time period or what duration of occupancy of the laboratory apparatus is intended in this case, and/or contains information relating to the method program to be used, and preferably in particular contains at least one program parameter or control parameter.

The access control device is preferably designed to send to a user, on request, at least one item of information relating to the booking schedule, in particular to send the booking schedule in part or completely, or to send at least one amendment of the booking schedule. The access control device is preferably designed to automatically send a message to a user, depending on at least one condition. This condition could be the change of the booking schedule of a laboratory apparatus, in particular relating to the availability of an appointment for carrying out a treatment, in particular the release or cancellation of an appointment.

The “type of treatment” is in particular specified by the program parameters, which

characterize a treatment. Program parameters of this kind are in particular used by the control device to create a method program. A method program is in particular a control code for controlling the treatment by means of control parameters. The control parameters are in particular generated by the control device, in particular by a control program running in the control device, e.g. an operating system, using the program parameters. The treatment of a sample is in particular carried out in that a method program is executed by the control device. A “type of treatment” means a method, specifically a type of application (e.g. “MagSep Blood gDNA”, “Compose Mastermix” etc.). In a preferred embodiment of the laboratory apparatus as a laboratory machine, the user first selects a desired application, i.e. a “type of treatment”, by selecting an application, in particular on the touchscreen of an apparatus. This application, also referred to as “method”, is in particular assigned to a program module, which can in particular be part of the control program. The user requests at least one program parameter, in particular by means of the program module. A program module in particular generates a method program on the basis of the at least one program parameter selected by the user.

The control device of the access control device, and/or the control device of the laboratory apparatus, is preferably designed to store booking data in the memory device of the booking means.

The control device of the access control device, and/or the control device of the laboratory apparatus, is preferably designed to record the booking dataset input by a user into the laboratory apparatus, in particular by means of the user interface device or a portable or mobile user interface device.

The control device of the access control device, and/or the control device of the laboratory apparatus, is preferably designed to compare the booking dataset input by a user with booking data already stored in the memory device of the user interface device.

The control device of the access control device, and/or the control device of the laboratory apparatus, is preferably designed to store, in the memory device, at least one, some, or all, booking datasets input by at least one user.

The control device of the access control device, and/or the control device of the

laboratory apparatus, is preferably designed to evaluate some or all booking datasets input by at least one user and stored in the memory device, according to an evaluation method stored in the control device, and to draw up the schedule, according to at least one criterion, in which schedule the booking dataset(s) are sorted according to the at least one criterion of a sorting method stored in the control device.

The control device of the access control device, and/or the control device of the laboratory apparatus, is preferably designed to assign a priority to the at least one booking dataset by means of an evaluation method, which priority is determined according to at least one criterion.

The criterion can in particular be represented by a data table stored in the control device, in which table for example the priority is correlated with at least one other parameter, it being possible for said other parameter to characterize for example the user or a user group or the classification of a treatment according to a relevance list (e.g. from important to unimportant, expensive to cheap, etc.).

The control device of the access control device, and/or the control device of the laboratory apparatus, is preferably designed such that the sorting method sorts at least two booking datasets according to at least one criterion, in order in particular to draw up a schedule which uses different time data from that provided in the user's booking datasets.

The criterion can be selected according to the definitions in the evaluation method. The control device is preferably designed to implement a preferred criterion, to sort the booking datasets from the perspective of a resource being optimized.

Said resource can for example be the time, in particular a minimization of the waiting times can be sought, which a user receives in each case as the difference between the start time they desire and the start time for their experiment, i.e. the treatment they desire, allocated by the laboratory apparatus following evaluation and sorting. Minimization of the inactivity time can also be sought, while the laboratory apparatus is not used. In particular, interim maintenance, cleaning and/or sterilization procedures can also be planned in, while the for example at least one work region of at least one laboratory apparatus or laboratory machine is prepared, in particular manually and/or

automatically prepared, and/or cleaned, and/or sterilized.

This resource can also be the energy which is possibly used to different degrees over different and successive treatments, depending on the sequence thereof.

This resource can also be a consumable, in particular a substance such as a cleaning product, or particular transport containers, e.g. pipette tips, or storage containers, e.g. microtiter plates, which are used to different degrees over different and successive treatments, depending on the sequence thereof. It is possible for the same methods to be used in the case of treatments planned by different users, such that it may be efficient to sort the bookings on the basis of the methods. It is conceivable, for example, for a particular substance and/or a particular consumable and/or a particular tool to be used in a plurality of methods planned by different (or the same) user(s). It may then in particular be efficient to store said substance or said consumable or said tool in the laboratory apparatus, such that some transport procedures are superfluous, as a result of which time is saved, and possibly also the resource itself, which often has to be stored under sterile conditions. It would also be possible, for example, for two treatments provided in temporal succession in the booking schedule to be able to share particular consumables. For example, the same storage container could be usable in both treatments, such that it is efficient to use the storage container after completion of the first treatment for the second treatment, instead of emptying the first storage container at the end of the first treatment, and using a further storage container at the start of the second treatment. As a result, material and time can be saved in many situations.

The resource may also be the plurality of laboratory apparatuses over which the bookings occurring in a booking period are intended to be automatically distributed, in accordance with the plurality of booking datasets of a plurality of users, in order to achieve optimal utilization of the park of laboratory apparatuses available in a laboratory. In particular, there may be experiments which require the synchronized use of more than one laboratory apparatus. The resource can therefore consist in using a plurality of laboratory apparatuses in a temporally optimal manner, in particular taking account of at least one experiment or a plurality of experiments which may each require different laboratory apparatuses.

For example, it is possible that a higher-ranking role, e.g. an “administrator” may be

able to delete or shift booking entries already provide din the booking schedule, for example because an (external) service technical has/wishes to service the treatment device(s) at the appointment time, or for other reasons set out above. In this case, from the customer perspective in particular, unsolicited action is not preferred, but rather an indication to the user(s) of the previously occupied one or more treatment devices that the use of the treatment device has to be shifted to a later time. In this case, it may also be expedient to propose a suitable alternative time. The control device is preferably designed to output an indication of this kind via the user interface device of the relevant user, in particular using a remote data connection.

If a treatment device is very much in demand, a booking mechanism which is constructed as a FIFO list (FIFO - first in first out) and which is in turn used to inform the user at the top of the list at the moment when the treatment device is not occupied or that said device will not be occupied in a selected time period in the future, is particularly suitable. This information then preferably also includes the timeframe for which the treatment device is available. The user at the top of the list would then be granted priority, for a defined time period, for occupying the treatment device. If said user does not do this, they are removed from the list and the occupancy option passes to the next user on the list, etc.

The term “**apparatus-controlled treatment**” means that the treatment of the at least one laboratory sample is controlled, in particular performed, by the laboratory apparatus at least in part. If the treatment is controlled and/or performed by the laboratory apparatus, this is in particular not controlled and/or performed by the user in this respect, in particular not manually controlled and/or performed by the user.

An apparatus-controlled treatment furthermore preferably means that the treatment is controlled, in particular performed, by the laboratory, apparatus at least in part, on the basis of at least one user input. The user input can take place prior to the start of the treatment and/or during the treatment. The user preferably takes place via a user interface device, which is preferably part of the laboratory apparatus or is provided separately from the laboratory apparatus, and with which the control device of the laboratory apparatus and/or the control device of the access control device is in signal connection. The user input serves in particular for inputting at least one parameter, the value of which influences and/or controls the treatment. This parameter can in particular be a program parameter.

The “apparatus-controlled treatment” in particular denotes the at least partially automated treatment. In the case of partially automated treatment, it is in particular possible for the treatment to be performed such that at least one user input takes place after the start of the treatment and before the end of the treatment, by means of which input the user can influence the ongoing treatment, in particular in that they respond to an automatic request taking place via a user interface device of the laboratory apparatus for example, in particular confirms or denies this via an input, or performs other inputs. In the case of the partially automated treatment it is in particular possible for the treatment to comprise a plurality of treatment steps, which are in particular carried out automatically, in temporal succession, and to comprise at least one treatment step which requires a user input which takes place in particular via a user interface device.

An apparatus-controlled treatment is preferably a **program-controlled treatment**, i.e. a treatment controlled by a program. A program-controlled treatment of a sample is to be understood to mean that the procedure of the treatment takes place substantially by means of executing a plurality of program steps. The program-controlled treatment preferably takes place using at least one program parameter, in particular at least one program parameter selected by the user. A parameter selected by a user is also referred to as a user parameter. The program-controlled treatment preferably takes place using a digital data processing device, which may in particular be part of the control device of the laboratory apparatus. The digital data processing device can comprise at least one processor, i.e. a CPU, and/or can comprise at least one microprocessor. The program-controlled treatment is preferably controlled and/or carried out according to the specifications of a program, in particular a control program. In particular in the case of a program-controlled treatment, substantially no user activity is required, at least after acquisition of the program parameters required on the user side.

A **program parameter** is understood to be a variable which can be set, in a predetermined manner, within a program or subprogram, and is valid for at least one execution (call-up) of the program or subprogram. The program parameter is specified, e.g. by the user, and controls the program or subprogram, and brings about a data output depending on said program parameter. In particular, the program parameter influences and/or controls, and/or the data output by the program control, the control of the apparatus, in particular the control of the treatment by means of the at least one

treatment device.

A program parameter may be a program parameter required on the user side. A program parameter required on the user side is characterized in that it is required for carrying out a treatment, in particular for carrying out a method program. Other program parameters which are not required on the user side can be derived from the program parameters required on the user side, or can be made available in another manner, in particular optionally set by the user. The setting of a program parameter by a user takes place in particular by displaying a selection of possible specified values from a list of specified values stored in the laboratory apparatus, the user selecting, and thus setting, the desired parameters from said list. It is also possible for said program parameter to be set in that the user inputs the value by for example inputting a number via a number pad, which number corresponds to the desired value, or in that the user raises or lowers a value, continuously or in increments, until said value corresponds to the desired value, and thus sets the value. Other forms of input, e.g. by voice control and/or gesture control, are conceivable.

A **program** is in particular understood to be a computer program. A program is a sequence of statements, in particular consisting of declarations and instructions, in order to be able to handle and/or solve a particular functionality, task, or problem, on a digital data processing system. A program is generally provided as software which is used together with a digital data processing system. The program can in particular be provided as firmware, in the case of the present invention in particular as firmware of the control device of the laboratory apparatus, and/or of the access control device. The program is usually provided on a data carrier, as an executable program file, often in what is known as machine code, which is uploaded into the working memory of the computer of the digital data processing system for execution. The program is processed, and thus executed, by the processor(s) of the computer as a sequence of machine, i.e. processor, commands. “Computer program” is in particular also understood to mean the source text of the program, from which the executable code can result during the control of the laboratory apparatus.

A **statement** refers, in a conventional manner, to a central element of a programming language. The programs of said languages are primarily composed of one or more statements. A statement constitutes an individual instruction, formulated in the syntax of a programming language, which is to be executed within the context of processing

the program. The required syntactic appearance of a statement is specified by the relevant programming language and/or the specification thereof. In machine-oriented programming, statements are often also referred to as commands. Statements are typically assignments, control statements (such as jumps, loops and conditional statements), and procedure calls. Depending on the programming language, assurances, declarations, class, and function definitions, are sometimes also statements. The statements of the control program can thus be configured in a conventional manner.

A **program module** is understood, in a typical manner, to be a closed functional unit of software, consisting of a sequence of processing steps and data structures. In this case, in particular the following definitions may apply: The content of a module is frequently repeated calculation or processing of data, which has to be carried out several times. Modules offer encapsulation by means of the separation of interfaces and implementation: The interface of a module defines the data elements which are required by the module as input and result of the processing. The implementation contains the actual program code. A module is called up for example as a function or subprogram, carries out a series of processing steps, and delivers, as a result, data back to the requesting program. A module can itself call up further modules; thus a hierarchy of program call-ups is possible. The data structures and methods specified in modules can optionally be bequeathed, and inherited by other modules. Modules are therefore an essential element in the structured and object-oriented programming.

A **control program** is understood to be an executable computer program, which preferably controls and/or performs the desired treatment of the at least one sample, in particular depending on the at least one program parameter. Said program parameter can be a program parameter influenced and/or set by the user. The treatment can in particular be controlled in that the control device generates one or more control parameters on the basis of the program parameters, by means of which control parameters the at least one treatment device is controlled. The laboratory apparatus preferably comprises an operating system, which may be or comprise a control program. The control program can in particular denote an operating system of the laboratory apparatus or be a part of the operating system. The operating system controls the treatment and further operating functions of the laboratory apparatus.

The control program can in particular be in signal connection with the access control

device, and/or can control the access control device. The control device of the access control device can be integrated into the control device of the laboratory apparatus, or can be formed separately from said control device. The access control device can be integrated into the control device of the laboratory apparatus. The control device of the access control device can be integrated into the control device of the laboratory apparatus, can be controllable by the control program, and/or can in particular be integrated into the control program. The control program can control further functions, preferably provided, of the laboratory apparatus, for example an energy-saving function of the laboratory apparatus, or a communications function for communication with external data processing devices, which are in particular provided separately from the laboratory apparatus, and are in particular not part of the laboratory apparatus.

A **method program** is understood to be a program which determines the specific course of a treatment, in particular according to a predetermined treatment type and/or according to a manner specified on the user side.

The invention furthermore relates to a **laboratory apparatus** for apparatus-controlled treatment of at least one laboratory sample, which laboratory apparatus comprises at least one treatment device for carrying out the treatment of the at least one laboratory sample, and an access control device according to the invention.

The laboratory apparatus preferably comprises a communication device for establishing a remote data connection for data exchange with an external apparatus, which likewise comprises a suitable communication device for establishing a remote connection for data exchange with the laboratory machine. A communication device of this kind can be designed to establish a radio connection, in particular a cellular connection. The communication device is preferably designed to allow for remote access of a user to the laboratory apparatus, in particular selection or setting of at least one parameter, in particular a parameter for controlling the function of the laboratory apparatus, in particular the function of carrying out a treatment.

The control device of the access control device and/or of the laboratory apparatus, is preferably designed to provide synchronization data. The access control device, in particular the control device of the access control device, is preferably designed such that, when at least condition is met, information relating to the operating state of the laboratory apparatus, measured values, or settings or programming of the laboratory

apparatus which can be influenced by the user can be transferred by the interface device to the second user interface device. The information transfer makes it possible for the laboratory apparatus, in particular a treatment being performed thereon, to be further observed and/or controlled by means of the second user interface device. In particular, the use state of the first user interface device can be copied or cloned, in part or completely, into the second user interface device. The information transfer can in particular be a synchronization procedure. The first and second user interface can be synchronized in particular in this manner. The at least one condition may be that the access of the accessing user via a remote data connection takes place via a (mobile) user interface device, and the user's request takes place following a synchronization. The at least one condition can furthermore be the condition a) or b), specifically the response to the check as to whether the signing-in user has, via a first user interface device, previously already a) activated one or more currently executed functions of the laboratory apparatus, or b) is already signed in. In cases a) and b), the synchronization would just one user with an active session and/or functions currently activated on the laboratory apparatus, in particular ongoing treatments which were initiated by the user. It is also possible and preferable, however, that a further user may be permitted to perform a synchronization, for example in order to carry out a remote control for the purpose of assistance in an ongoing session or treatment, or maintenance works, etc.

The control device of the access device is preferably designed to transmit said synchronization data to an in particular mobile user interface device. Said synchronization data are preferably suitable for displaying the information displayed in the display of the user interface device on the display of the (mobile) user interface device in an identical manner, at least in part.

The term **laboratory apparatus** in particular denotes an apparatus which is designed for apparatus-controlled treatment of at least one laboratory sample, and which is designed for use in a laboratory. Said laboratory can in particular be a chemical, biological, biochemical, medical, or forensic laboratory. Laboratories of this kind are used for research and/or analysis of laboratory samples, but can also be used for producing products by means of laboratory samples, or for preparing laboratory samples.

A laboratory apparatus is preferably one of the following laboratory apparatuses, and/or is preferably designed as at least one of the following laboratory apparatuses: Laboratory centrifuges, also referred to, within the context of the description of the present invention, as a “centrifuge”; Thermocyclers, also referred to, within the context of the description of the present invention, as a “cycler”; Laboratory spectral photometers, also referred to, within the context of the description of the present invention, as a “biospectrometer”; Cell counters, also referred to, within the context of the description of the present invention, as a “cellcounter”, in particular optical counters; Laboratory incubators, also referred to, within the context of the description of the present invention, as an “incubator”; Laboratory shakers, also referred to, within the context of the description of the present invention, as a “shaker”; Laboratory mixer, also referred to as a “mixing device”; Laboratory freezers, also referred to, within the context of the description of the present invention, as a “freezer”; Bioreactors, also referred to, within the context of the description of the present invention, as a “fermenter”; Safety cabinet, in particular biological safety cabinet, also referred to, within the context of the description of the present invention, as a “biosafety cabinet”; Sample plate readers, also referred to, within the context of the description of the present invention, as a “plate reader”, in particular “microplate reader”; Laboratory machine for treatment fluid samples, in particular an automatic pipette.

A **laboratory centrifuge** is an apparatus which operates in a manner making use of inertia. The laboratory centrifuge, in particular the treatment device of the laboratory centrifuge, in particular comprises at least one rotor, in which the at least one laboratory sample can be arranged. The at least one rotor is rotatably arranged in at least one centrifuge kettle. The laboratory centrifuge, in particular the treatment device of the laboratory centrifuge, comprises at least one drive means, by means of which the rotation can be driven and/or braked. The samples can be arranged in the at least one rotor, preferably in laboratory containers, e.g. sample tubes, which are arranged in suitable retainers in the rotor. The laboratory centrifuge, in particular the treatment device of the laboratory centrifuge, preferably comprises at least one heating/cooling device, by means of which the temperature of the at least one sample, arranged in the rotor, can be controlled and/or regulated. The laboratory centrifuge, in particular the treatment device of the laboratory centrifuge, preferably comprises a timer means, by means of which temporal parameters of the rotation or temperature setting can be controlled. The mode of operation is based on the centrifugal force, which occurs on account of a uniform circular motion of the sample to be centrifugated. The centrifugal

force is used for substance separation of substances of different densities, which are contained in a sample. A centrifuge can carry out a separation process, in which in particular the components of suspensions, emulsions and/or gas mixtures can be separated. The apparatus-controlled treatment of the at least one laboratory sample corresponds, in the case of a laboratory centrifuge, to a rotational treatment, which the at least one sample undergoes. Possible parameters, in particular program parameters, in particular user parameters, which are used for influencing a rotational treatment, in particular define a temperature of the laboratory centrifuge, a rotational speed of the laboratory centrifuge, a temporal parameter of the rotation or temperature setting, and/or at least one cycle parameter which influences or defines the course, in particular the sequence, of a rotation program consisting of a plurality of rotation steps. The temperature of the laboratory centrifuge can in particular be at least one temperature in the interior of the at least one rotor, in particular at least one temperature of at least one sample.

A **thermocycler** is an apparatus which is capable of setting the temperature of at least one sample, in temporal succession, to a predetermined temperature, and keeping it at said temperature level for a specified duration. The course of said temperature control is cyclical. That is to say that a predetermined temperature cycle, i.e. a succession of at least two temperature levels, is carried out repeatedly. This method is in particular used for carrying out a polymerase chain reaction (PCR). In this connection, a thermocycler is also sometimes referred to as a PCR block. A thermocycler, in particular the treatment device of the thermocycler, preferably comprises a thermoblock. A thermoblock is a sample holder made of a heat-conducting material, usually a metal-containing material or a metal, in particular aluminum or silver. The sample holder comprises a contacting side, which is contacted by at least one heating/cooling device of the thermocycler, in particular a Peltier element. The thermocycler, in particular the treatment device of the thermocycler, comprises a control device having at least one control loop which is assigned the at least one heating/cooling device as an actuator, and the at least one temperature measuring device as a measuring element. The control device controls the temperature of a temperature level. A cooling element of the thermocycler, in particular of the treatment device of the thermocycler, is used for cooling portions of the thermocycler, in particular for cooling the Peltier elements. The thermocycler, in particular the treatment device of the thermocycler, can comprise further heating and/or cooling elements. The thermocycler, in particular the treatment device of the

thermocycler, preferably comprises a timer means, by means of which temporal parameters of the setting of the temperature cycle can be controlled. The apparatus-controlled treatment of the at least one laboratory sample corresponds, in the case of a thermocycler, to a temperature cycle treatment, which the at least one sample undergoes. Possible parameters, in particular program parameters, in particular user parameters, which are used for influencing a temperature cycle treatment, in particular define a temperature of the temperature level, the duration of a temperature level, the control of further heating and/or cooling elements, and/or the number of temperature levels or cycles, and/or at least one cycle parameter which influences or defies the course, in particular the sequence, of a temperature control program consisting of a plurality of steps.

A **laboratory spectral photometer** is an apparatus which determines the remission values by illuminating at least one measuring volume of at least one laboratory sample, usually over the entire spectrum, from infrared to ultraviolet, of visible light. The remission refers to the situation in which a measuring volume absorbs a portion of the light spectrum and transmits (transparent media) or reflects (opaque media) a portion of the spectrum. The laboratory spectral photometer in particular measures the absorption capacity of a sample, on the basis of the light wavelength. Furthermore, it is possible in particular to expand the field of application of the laboratory spectral photometer by means of various modules. It is thus conceivable, for example, to arrange a fluorescence module for measuring fluorescence, or a temperature-control module for controlling the temperature of the sample, in the spectrometer. The measured absorption spectrum contains in particular the light intensities measured at particular wavelengths. The absorption spectrum is characteristic of the laboratory sample and/or the substance or substances contained therein. This can be used for qualitative analysis of the laboratory sample. If the fluid sample and/or the substance dissolved therein is known, the concentration of the dissolved substance can be determined by measuring the absorption. This can be used for quantitative analysis of the laboratory sample. The laboratory spectral photometer, in particular the treatment device of the laboratory spectral photometer, preferably comprises at least one light source, preferably at least one timer, preferably at least one photodetector. The apparatus-controlled treatment of the at least one laboratory sample corresponds, in the case of a laboratory spectral photometer, to a light and measurement treatment, which the at least one sample undergoes. Possible parameters, in particular program parameters, in particular user parameters, which are used for influencing a light and

measurement treatment, in particular define the optical light spectrum with which the at least one sample is irradiated, and/or at least one cycle parameter which influences or defines the course, in particular the sequence, of a light and measuring treatment program consisting of a plurality of steps.

A **cell counter** is used for counting biological cells or particles which are contained in a laboratory sample. There are various physical principles which come into question for counting cells, in particular optical methods in which the laboratory sample to be measured is arranged in a counting chamber, is additionally illuminated in particular in the case of automatic operation, and an image of the cells or particles arranged in the counting chamber is acquired and evaluated. A further established method is the impedance measurement: a cell counter designed as a Coulter Counter conducts the laboratory sample, containing the cells, through an aperture ("measurement gate"). Each instance of a cell passing through the aperture is detected electrically as a countable event. Depending on the embodiment, optical cell counters, in particular the treatment device of the optical cell counter, preferably comprise at least one light source, at least one image acquisition means, and at least one image evaluation means*, and sometimes additionally a positioning means. The apparatus-controlled treatment of the at least one laboratory sample corresponds, in the case of an optical cell counter, e.g. to a light and measurement treatment, and in the case of an apparatus operating according to the Coulter principle to a pumping and measurement treatment, which the at least one sample undergoes. Possible parameters, in particular program parameters, in particular user parameters, which are used for influencing a light and measurement treatment or a pumping and measurement treatment, in particular define the light intensity of the light source by means of which the at least one sample is irradiated, and/or at least one cycle parameter which influences or defines the course, in particular the sequence, of a light and measuring treatment program or pumping and measuring treatment program consisting of a plurality of steps. In the case of optical counters, furthermore the algorithms required for the image evaluation, the sequence and parameterization thereof, are decisive for the significance of the measurement result ???. Optical measuring apparatuses, but also Coulter Counters, often use counting chambers for single use ("consumables"); these are plastics articles based on the conventional Neubauer counting chambers, or, in the case of Coulter Counters, single-use chambers similar to a "Lab-on-a-Chip". There are also apparatuses which operate without said consumables (e.g. "CASY").

A **laboratory incubator** is an apparatus by means of which controlled climatic conditions for different biological development and growth processes can be created and maintained. It is used for creating and maintaining a microclimate having controlled gas, and/or humidity, and/or temperature conditions in an incubator chamber, it being possible for said treatment to be time-dependent. The laboratory incubator, in particular the treatment device of the laboratory incubator, in particular comprises a timer, in particular a time switch, a heating/cooling device, and preferably a setting means for regulating an exchange gas, in particular fresh air, supplied to the incubator chamber, a setting means for the composition of the gas in the incubator chamber of the laboratory incubator, in particular for setting the CO_2 and/or O_2 content of the gas, and/or a setting means for setting the humidity in the incubator chamber of the laboratory incubator. The laboratory incubator, in particular the treatment device of the laboratory incubator, in particular comprises the incubator chamber, and furthermore preferably comprises a control device having at least one control loop which is assigned the at least one heating/cooling device as an actuator, and the at least one temperature measuring device as a measuring element. The temperature in the incubator can be controlled by means of the control device. CO_2 incubators are used in particular for cultivation of human and/or animal cells. Incubators may comprise turning devices for turning the at least one laboratory sample, and/or a shaking device for shaking or moving the at least one laboratory sample. The apparatus-controlled treatment of the at least one laboratory sample corresponds, in the case of a laboratory incubator, to a climatic treatment, which the at least one sample undergoes. Possible parameters, in particular program parameters, in particular user parameters, which are used for influencing a climatic treatment, in particular define the temperature of the incubation chamber in which the at least one sample is incubated, the O_2 and/or CO_2 partial pressure in the incubation internal space, the humidity in the incubation internal space, and/or at least one cycle parameter which influences or defines the course, in particular the sequence, of an incubation treatment program consisting of a plurality of steps.

A **laboratory shaker** is used for moving a laboratory sample, in particular for mixing a laboratory sample comprising a plurality of components. There are various designs of laboratory shakers, in particular as overhead shakers or as flat-bed shakers. Laboratory shakers may have a temperature-control function for controlling the temperature of the at least one laboratory sample, and can in particular have an incubator function for incubation of the at least one laboratory sample under controlled

climatic conditions. Laboratory shakers, in particular the treatment device thereof, can in particular be designed for performing an oscillating movement. Laboratory shakers, in particular the treatment device thereof, in particular comprise a drive for driving the movement, in particular comprise a timer means which can control the temporal parameters of the setting of the shaking treatment, and in particular comprise at least one heating/cooling device and at least one control device having at least one control loop which is assigned the at least one heating/cooling device as an actuator, and the at least one temperature measuring device as a measuring element. The apparatus-controlled treatment of the at least one laboratory sample corresponds, in the case of a laboratory shaker, to a shaking treatment, which the at least one sample undergoes. Possible parameters, in particular program parameters, in particular user parameters, which are used for influencing a shaking treatment, in particular define the movement frequency in the case of an oscillating drive, a time period in the case of the shaking treatment, and/or at least one cycle parameter which influences or defines the course, in particular the sequence, of a light and measuring treatment program consisting of a plurality of steps.

A **laboratory mixer**, also referred to as a “mixing device”, is used, like the laboratory shaker, for moving a laboratory sample, in particular for mixing a laboratory sample comprising a plurality of components. Compared with a laboratory shaker, a laboratory mixer allows for movements at high frequencies, in particular high rotational speeds. Laboratory mixers, in particular the treatment device thereof, can in particular be designed for performing an oscillating movement. Laboratory mixers, in particular the treatment device thereof, in particular comprise a drive for driving the movement, in particular comprise a timer means which can control the temporal parameters of the setting of the mixing treatment, and in particular comprise at least one heating/cooling device and at least one control device having at least one control loop which is assigned the at least one heating/cooling device as an actuator, and the at least one temperature measuring device as a measuring element. The apparatus-controlled treatment of the at least one laboratory sample corresponds, in the case of a laboratory mixer, to a mixing treatment, which the at least one sample undergoes. Possible parameters, in particular program parameters, in particular user parameters, which are used for influencing a mixing treatment, in particular define the movement intensity, in particular the movement frequency in the case of an oscillating drive, of a time period during mixing treatment, and/or at least one cycle parameter which influences or defines the course, in particular the sequence, of a mixing treatment

program consisting of a plurality of steps.

A **laboratory freezer** is used for storing at least one laboratory sample in a freezer space at controlled temperatures, in particular in the deep-freeze range of from -18°C to -50°C or in the ultradeep-freeze range of from -50°C to -90°C. A laboratory freezer is in particular not a fridge, which can be used for cooling at temperatures in particular in the range of from 0°C to 10°C or from -10°C to 10°C. A laboratory freezer, in particular the treatment device of the laboratory freezer, in particular comprises at least one cooling device and at least one control device having at least one control loop which is assigned the at least one cooling device as an actuator, and the at least one temperature measuring device as a measuring element. A laboratory freezer, in particular the treatment device of the laboratory freezer, in particular comprises a control measuring apparatus for temperature measurement, and/or in particular an alarm device by means of which an alarm signal is output if the temperature measured in the freezer space leaves a permitted temperature range. A laboratory freezer, in particular the treatment device of the laboratory freezer, can in particular comprise an information reader for reading the information. This information can also be contained on an information carrier, which can be connected to an article. Said article can in particular be a sample container which can contain at least one laboratory sample. The information carrier can in particular comprise an RFID chip or other identification features, such as a barcode, a Data Matrix code, a QR code, which are readable using suitable methods. The apparatus-controlled treatment of the at least one laboratory sample corresponds, in the case of a laboratory freezer, to a low-temperature treatment, which the at least one sample undergoes. Possible parameters, in particular program parameters, in particular user parameters, which are used for influencing a low-temperature treatment, in particular define the temperature of the freezer space in which the at least one sample is deep-frozen, and/or the information reading procedure which is preferably carried out when an article provided with an information carrier is transferred by a user into the laboratory freezer.

A **bioreactor** comprises a container in which particular microorganisms, cells, algae or plants, e.g. mosses, are cultivated (also: fermented) under the most optimal conditions possible. The operation of a bioreactor is thus biotechnology application, which uses or renders usable biological processes, in particular bioconversion or biocatalysis, in technical equipment. Factors which can be controlled in most bioreactors, in particular by setting corresponding parameters, are the composition of the growth medium, the

oxygen supply, temperature, pH, sterility, and/or other factors. The purpose of the cultivation in a bioreactor can be that of obtaining cells or components of the cells, or obtaining metabolic products. These can be used for example as an active ingredient in the pharmaceutical industry, or as a basic chemical in the chemical industry. The decomposition of chemical compounds can also take place in bioreactors, such as in the case of wastewater treatment in wastewater treatment plants. The production of beer, wine, and other similar products, also takes place in bioreactors. A very wide range of organisms are cultivated, for various purposes, in bioreactors. A bioreactor can therefore be designed in varying ways. It can be designed as a stirred-tank reactor, which may have a volume of from a few milliliters to hundreds of liters, and can be filled with growth solution. It can also be used or designed as a fixed bed reactor or a photobioreactor. A bioreactor may be part of a bioreactor system, preferably a parallel bioreactor system. In the case of a parallel bioreactor system of this kind, a plurality of bioreactors are operated in parallel and controlled at a high degree of precision. A bioreactor, in particular the treatment device thereof, in particular comprises a stirring means for stirring the sample contained in the reactor vessel, in particular the growth medium. A bioreactor, in particular the treatment device thereof, in particular comprises a pumping means for pumping the laboratory sample, preferably formed as a growth medium. A bioreactor, in particular the treatment device thereof, in particular comprises a setting means for setting a gas content in the reactor vessel, in particular the content of CO_2 and/or O_2, or of dissolved oxygen (DO). A bioreactor, in particular the treatment device thereof, in particular comprises a setting means for setting, in particular controlling, a pH in the sample in the reactor vessel. The apparatus-controlled treatment of the at least one laboratory sample in particular corresponds, in the case of a bioreactor, to a growth medium treatment, which the at least one sample, preferably formed as a growth medium, undergoes. Possible parameters, in particular program parameters, in particular user parameters, which are used for influencing a growth medium treatment, in particular define the temperature of the growth medium in the reactor vessel, and/or the speed of the stirring means, in particular the rotational speed, and/or the pumping speed or metering speed, and/or a gas content in the growth medium, in particular CO_2 and/or O_2, or dissolved oxygen (DO), and/or the pH of the growth medium, and/or at least one cycle parameter which influences or defines the course, in particular the sequence, of a growth medium treatment program consisting of a plurality of steps.

A **safety cabinet** is used in particular for secure storage of hazardous substances, in

particular in order to fulfil a biosafety level. These levels are standardized in particular in the EU Directive 2000/54/EG relating to the protection of workers from risks related to exposure to biological agents at work, and in the German Ordinance on Biological Agents. A safety cabinet is intended to prevent the environment from being damaged in the case of danger occurring in the case of a laboratory sample stored in a safety cabinet. The safety is ensured in particular in that atmosphere contained in the receiving region of the safety cabinet is exchanged and in particular filtered. In this case, in particular this atmosphere is conveyed through the receiving region by a conveying means, and moved through a filter which filters the atmosphere, in particular purifies it of hazardous substances. The safety cabinet, in particular the treatment device thereof, in particular comprises a conveying means for conveying atmospheric gas, in particular comprises a timer means for measuring a filter operation duration and a fan operation duration, and/or in particular comprises a measuring device for measuring a conveyed amount of atmospheric gas. The apparatus-controlled treatment of the at least one laboratory sample corresponds, in the case of a safety cabinet, in particular to an atmospheric gas treatment for treating the atmospheric gas in which the at least one sample is stored. Possible parameters, in particular program parameters, in particular user parameters, which are used for influencing an atmospheric gas treatment, in particular define the temperature of the atmospheric gas in the receiving region, and/or the flow speed of the atmospheric gas conveyed by the conveying means, the conveyed amount of air, the filter operation duration, and/or the fan operation duration.

The **sample plate reader**, also referred to as a “plate reader” or “microplate reader” is a laboratory apparatus for demonstrating biological, chemical or physical events of samples in microtiter plates. They are widely used in research, drug discovery, bioassay validation, quality control, and manufacturing processes in the pharmaceutical and biotechnology industry, and academic organizations. The sample plate readers can in particular comprise at least one light source or radiation source, can comprise at least one photodetector, can comprise a temperature control means for temperature control of the samples or the sample plates, can comprise a timer. Sample reactions can be tested in 6-1536-well format microtiter plates. The most frequent format for sample plates, in particular microtiter plates, used in academic research laboratories or clinical-diagnostic laboratories, is a 96-well plate (an 8 by 12 matrix) having a typical single volume of between 100 and 200 µl per well. Microtiter plates of a high density (384- or 1536-well microtiter plates) are typically used for

screening applications, when the throughput (number of samples processed per day) and assay costs per sample become critical parameters, having a typical assay volume of between 5 and 50 µl per well. The treatment is in particular an optical measurement of the microtiter plate, in particular the measurement of an absorption, fluorescence intensity, luminescence, time-resolved fluorescence, and/or fluorescence polarization. Possible parameters, in particular program parameters, in particular user parameters, which are used for influencing a measurement, define for example the intensity of the light source, the sensitivity of a photodetector, a time duration, and/or a temperature.

A **laboratory machine for treatment fluid samples**, in particular an automatic pipette, is used for program-controlled treatment of said samples. A laboratory machine may be a laboratory apparatus or may comprise a laboratory apparatus of the type mentioned above, and/or may be designed to perform at least one, a plurality, or all, of the treatment which can be carried out by said above-mentioned laboratory apparatus. A laboratory machine comprises the treatment device for automatic, program-controlled treatment of the at least one laboratory sample, the treatment being controlled using a plurality of program parameters which are selected by the user, at least in part. In this case, the sample can for example be moved and/or transported by the laboratory machine or a treatment device of the laboratory machine. The movement can take place by means of transport in movable sample containers, or by means of conduction in tube systems, capillaries, or pipette tips. In this case, fluid samples are transported in particular by means of suction, i.e. pipetting, or, more generally, by applying pressure differences. Treatment of the sample makes it possible for a sample to be divided or diluted for example. The ingredients of a sample can be analyzed, or new ingredients can be created, for example by means of a chemical reaction, in particular using the sample. Laboratory machines are helpful in particular in connection with the processing and analysis of DNA or RNA, or the components thereof, in order to obtain a large amount of information within a suitable time period, or to analyze a plurality of such samples. Said treatment device of a laboratory machine usually comprises a work surface comprising workstations, on which samples can be processed or stored in various manners. For the purpose of transport of for example fluid samples between various positions, in particular sample containers, the treatment device usually comprises an apparatus-controlled movement device and an apparatus-controlled fluid transfer means, which may comprise a pipetting system for example. Both the transport of the samples and the treatment thereof at the different

stations can be performed in an apparatus-controlled manner, in particular in a program-controlled manner. The treatment then preferably takes place in an at least partially or completely automated manner.

The user of the laboratory machine can preferably specify the type of the treatment of the sample. A treatment type of this kind can in particular be used:

for nucleic acid purification, in particular

- "MagSep Blood gDNA": Purification of genomic DNA from full blood, in particular using the Eppendorf® MagSep Blood gDNA kit;
- "MagSep Tissue gDNA": Purification of genomic DNA from living tissue, in particular using the Eppendorf ® MagSep Tissue gDNA kit;
- "MagSep Viral DANN/RNA": Purification of viral RNA or DNA from cell-free bodily fluids, in particular using the Eppendorf ® MagSep Viral DNA/RNA kit;

and PCR applications, in particular

- "Compose Mastermix";
- "Normalize Concentrations";
- "Create Dilution Series";
- "Setup Reactions".

A laboratory apparatus, in particular the laboratory machine, is preferably designed such that the control of the treatment of the at least one laboratory sample can take place automatically, using the acquired program parameters. The laboratory apparatus, in particular the laboratory machine, in particular the control program thereof, is preferably designed such that the inputs carried out by the user, in particular the at least one value of at least one program parameter, are used to optionally automatically determine further preferred program parameters, in particular by calculation or by comparison with data in a database of the laboratory machine. In particular, the control parameters which are preferably to be used in order to carry out the treatment in detail, are preferably determined automatically. These measures make the operation of the laboratory machines more convenient, the user is in particular saved having to create a program code, since these steps are performed by

the laboratory apparatus, in particular laboratory machine, in particular automatically. In a preferred embodiment, the user merely demands the inputs which are directly related to the sample treatment to be carried out. These are frequently the same specifications which would also be required for carrying out the treatment manually, and with which the user is familiar. In contrast, such parameters, which relate to the control of the laboratory apparatus, in particular of the laboratory machine, in particular the control parameters, are not specified in detail, since they are preferably specified automatically. Control parameters are the parameters required for controlling the technical parts of the treatment device in detail. Control parameters may be program parameters or may be parameters derived therefrom for technical implementation, in particular automatically determined parameters.

A laboratory apparatus, in particular the laboratory machine, preferably automatically selects the suitable set of program parameters, proceeding from the treatment type selected by the user, the program parameter of which parameters, required on the user side, is then requested by the user in steps (b) and (c). The program parameter set can contain the program parameters required on the user side, and can also contain further program parameters. Said further program parameters can be specified automatically, depending on the selected treatment type, or can be automatically specified depending on at least one, or all, of the program parameters input by the user, and/or can be stored in the memory device. The stored parameter sets are preferably optimized, by the laboratory apparatus, in particular laboratory machine, for the treatment type, such that the user preferably does not require any special knowledge for optimizing the parameters. The control parameters, which are required for carrying out the specific treatment by means of the treatment device, are derived from the program parameter set.

For a treatment type, a program parameter set of program parameters specific for said treatment type is preferably defined. The program parameters of said program parameter set can in particular define the accessory parts to be used for the treatment, e.g. sample container, transport container, and/or the tools to be used, and/or further consumables.

The association of the program parameter set and treatment type is stored in the memory device of the laboratory apparatus, in particular of the laboratory machine. The laboratory apparatus, in particular the laboratory machine, is preferably designed

such that the user can store and/or use further associations of this kind in the laboratory apparatus, in particular the laboratory machine. This association, in combination with the clear and well-structured requesting of the program parameters, makes the operation of the laboratory apparatus particularly efficient. This association preferably takes place by using one or more program modules, one program module, in each case, being tailored to a particular application:

The laboratory apparatus, in particular the laboratory machine, preferably comprises at least one program module, a predetermined program module being used for controlling a predetermined laboratory task for treatment laboratory samples.

The invention further relates to a method according to claim 11 for configuration of a laboratory apparatus according to any of claims 1 to 7.

Preferred embodiments of the method according to the invention can be derived from the description of the configuration control device according to the invention and of the laboratory apparatus according to the invention, and from the preferred embodiments thereof.

Preferred embodiments of the configuration control device according to the invention and of the laboratory apparatus according to the invention and of the method according to the invention can be found in the following description of the embodiments, in conjunction with the figure and the description thereof. Identical components of the embodiments are substantially denoted by the same reference signs, unless otherwise described, or unless something different follows from the context. In the drawings:

Fig. 1 schematically shows an embodiment of the configuration control device according to the invention.
Fig. 2 shows an embodiment of the laboratory apparatus according to the invention, which comprises a configuration control device according to the invention.
Fig. 3 shows an embodiment of the system 300 according to the invention, which comprises a server and at least one laboratory apparatus 1.
Fig. 4 shows the way in which an embodiment of the method according to the invention can be implemented using a configuration control device according to the invention.

Fig. 5 shows an embodiment of the method according to the invention, for configuration of a laboratory apparatus.
Fig. 6 shows a further embodiment of the laboratory apparatus according to the invention, a thermocycler.
Fig. 7 shows, as a further embodiment of the laboratory apparatus according to the invention, a laboratory freezer.

Fig 1 shows the configuration control device 100. The configuration control device 100 is designed for a laboratory apparatus which is used for the apparatus-controlled treatment of a laboratory sample, in particular for the laboratory apparatus 1 in Fig. 2, the configuration control device 100 comprising: an interface device 101 for establishing a first data connection to a user interface device, and an interface device 102 for establishing a second data connection to a control means of the laboratory apparatus; and a control device 103. Said control device comprises an access control device 104 for identifying a user accessing via the first data connection, and data processing device 105 for processing predetermined user-dependent configuration data. The control device 103 is designed to identify an accessing user, and to transfer the user-dependent configuration data assigned to the identified user to the laboratory apparatus 1 via the second data connection, in order to thereby configure said laboratory apparatus in a user-dependent manner.

Fig. 2 shows the laboratory apparatus 1, which is designed here as a laboratory machine 1 for treatment fluid samples, and specifically is designed as a pipetting machine (laboratory machine). The laboratory machine 1 is used for program-controlled treatment of said samples.

Fig. 2 shows the laboratory machine 1 for the automated processing of fluid samples, in particular for the program-controlled treatment of fluid samples. The laboratory machine 1 is a tabletop device and is arranged, by the four bases 17 thereof, on the workbench 20. It comprises an electronic control device 2 (not shown) which is suitable for processing a program code for the program-controlled treatment of the fluid samples. The control device 2 is attached in the control chamber, which is denoted by the arrow E and is separated from the working chamber 10 by a vertical wall 14. The control chamber also accommodates the voltage supply components which deliver the suitable supply voltage for the electrical components of the laboratory machine. In the present case, the control device 103 of the configuration

control device 100 from Fig. 1 is integrated in the control device 2.

The laboratory machine 1 comprises a treatment chamber 10 for receiving the fluid sample to be treated, a sample processing device 3 which can be controlled in a program-controlled manner and is intended for carrying out at least one program-controlled treatment step on the at least one sample which is arranged in the processing chamber. The components 3a, 3b, 3c and 3d of the movement device are assigned to the sample processing device 3.

The laboratory machine 1 comprises a housing 12 which comprises a front face 12a, a rear face 12f (not shown) arranged opposite the front face, an upper face 12b, a lower face 12e (not shown) arranged opposite the upper face, and opposing lateral faces 12c and 12d. The sides 12a, 12b and 12c are essentially made of a material which is transparent for visible light.

The front face 12a, which is substantially designed in the manner of a door 12a, specifically a sliding door 12a, can be moved manually and/or in a program-controlled manner, and can and close at the bottom, substantially along the z-axis of the cartesian coordinate system. Fig. 2a shows the closed position of the door 12a.

The treatment chamber 10 is limited by the front face 12a and the two side faces 12c and 12d, as well as the wall 14 and the work surface 8 which forms the upper face of the base plate 9. The work surface 8 provides six processing stations. The processing stations are substantially planar surfaces in the processing region 8. Pins are used for orienting labware, i.e. for example thermoracks 33, microtiter plates 32, and waste receptacles 31, at the relevant processing station. The exact positioning allows for precise, robot-controlled addressing of the sample containers, in particular the depressions in the microtiter plates 32. A magnetic separation means 16 is arranged in the vicinity of the wall 14, where a thermorack 33, i.e. a temperature-controlled sample vessel holder, is arranged. The magnetic fork (not shown) of the magnetic separation means 16 enters corresponding receiving channels of the thermorack from the side, in order to implement its magnetic effect laterally on the laboratory vessels (sample tubes).

The laboratory machine 1 comprises two decontamination means, an electronically controllable air purification apparatus 4a, 4a'' for purification of the air in the treatment

chamber, which is electronically and digitally controlled by the control device and comprises a ventilation device. The ventilation device comprises three fans (not shown) which transport an airflow from outside of the device into the treatment chamber.

The control device 2 comprises a control program. The laboratory machine 1 comprises a sample processing device 3 which comprises a movement device having three rail elements 3a, 3b, 3c which correspond to movements along the y, x, and z-axis of the cartesian coordinate system. Electronically controllable linear motors are provided for driving the movement along the desired direction. In this way, the mounting head 21 can be moved into the processing chamber 10 so as to be accessible in any desired position. The movement device is part of a robot system of the sample processing device 3. The mounting head 21 can be transported thereby in a program-controlled manner. A tool device, e.g. a pipette head or a gripper, can be connected to the mounting head. The components arranged in the treatment chamber, in particular the sample processing device 3, are part of the treatment means of the laboratory machine.

The laboratory machine comprises a user interface device 5 designed as a module, by means of which a user can locally log-in to the laboratory machine. Said user is then identified by the access control device of the configuration control device. In the present example, the configuration control device sends the user's identification data to an external server 90 (see Fig. 3), and receives the user-dependent configuration data 80 from an external server 90. The laboratory apparatus 1 is configured automatically on the basis of the configuration data 80. The user-dependent configuration data 80 may have been previously set on a laboratory apparatus 1' by the user for example (Fig. 3). According to an aspect of the invention, on each laboratory apparatus 1, 1' (Fig. 3) which can use said user-dependent configuration data 80 for configuration, the user can use the corresponding laboratory apparatus without renewed setting of the configuration data, or at least a portion thereof. In particular, the usual user-dependent user interface is displayed to the user, on the display device of the user interface 5, on the laboratory apparatuses 1, 1' configured in a user-dependent manner.

Fig. 4 shows the way in which an embodiment of the method according to the invention can be implemented using a configuration control device according to the

invention. In this example, the case is compared in which first User A uses the laboratory apparatus 1, and subsequently User B uses the same laboratory apparatus 1. User A is an inexperienced user, User B is an experienced user. First of all, user-dependent configuration data 80 must exist which can be assigned to User A, and user-dependent configuration data 80' must exist which can be assigned to User B. The user-dependent configuration data can be manually assigned to the relevant user, or can be assigned automatically on the basis of a criterion. The latter is the case here. On the basis of their qualification, which was determined in advance and is clearly linked to their identification data, each user is assigned the user-dependent configuration data assigned to the qualification (steps 231, 232 in Fig. 5). The information relating to these assignments is stored in a database of the server 90. The user-dependent configuration data are stored and kept available on the server 90. If User A now logs into laboratory apparatus 1 (step 211 in Fig. 5), then the user is identified by the access control device of the configuration control device (step 201 in Fig. 5), in particular by an authentication method. The laboratory apparatus sends the identification data to the server 90, and receives the corresponding user-dependent configuration data 80 therefrom (step 202 in Fig. 5). On the basis of said configuration data, the configuration control device configures the laboratory apparatus in a user-dependent manner (step 203 in Fig. 5), and, specifically, differently for the inexperienced User A compared with for the experienced User B. The inexperienced User A receives a configuration which provides for a help file 60 to be made available to the User A via the user interface of the user interface device 5. This is not provided in the case of User B. In this way, the use of the laboratory apparatus 1 is simpler, and the productivity in the laboratory is improved, for User A.

Fig. 6 shows, as a further embodiment of the laboratory apparatus 400, a thermocycler. The laboratory apparatus 400 is a tabletop device and is arranged, by means of the feet 405 thereof, on a workbench (not shown). It comprises an electronic control device 406 (not shown) which is suitable for processing a program code for the program-controlled treatment of the generally fluid samples. The treatment is typically time-controlled temperature control. The control device 406 comprises an access control device for identifying a user accessing via the first data connection, and a data processing device for processing predetermined user-dependent configuration data, it being possible for said configuration data to be used for user-dependent treatment of the at least one laboratory sample, the control device being designed to identify an accessing user, and to transfer user-dependent configuration data assigned to the

identified user to the laboratory apparatus via a second data connection, in order to thereby configure said laboratory apparatus in a user-dependent manner.

The control device 406 is accommodated in the housing 401. The housing also accommodates the voltage supply components which deliver the suitable supply voltage for the electrical components of the laboratory apparatus. The control device of the access control device is integrated into the control device 406.

The laboratory apparatus 400 comprises a treatment chamber 403 for receiving the fluid samples to be treated. The treatment chamber comprises at least one treatment device 407 (not shown) for carrying out at least one program-controlled treatment step on the at least one sample which is arranged in the treatment chamber.

The control device 406 comprises a control program.

The laboratory apparatus comprises a user interface device 404, by means of which a user can locally log-in to the laboratory apparatus.

Fig. 7 shows, as a further embodiment of the laboratory apparatus 500, a laboratory freezer. The laboratory apparatus is a freestanding apparatus which is positioned on the ground (not shown) by means of the feet 505. It comprises an electronic control device 506 (not shown) which is suitable for setting, controlling, and monitoring the temperature control of the laboratory apparatus by means of a program code, and for controlling the treatment of the generally fluid samples. The treatment is typically temperature control. The control device 506 comprises an access control device for identifying a user accessing via the first data connection, and a data processing device for processing predetermined user-dependent configuration data, it being possible for said configuration data to be used for user-dependent treatment of the at least one laboratory sample, the control device being designed to identify an accessing user, and to transfer user-dependent configuration data assigned to the identified user to the laboratory apparatus via a second data connection, in order to thereby configure said laboratory apparatus in a user-dependent manner.

The control device 506 is accommodated in the housing 501. The housing also accommodates the voltage supply components which deliver the suitable supply voltage for the electrical components of the laboratory apparatus. The control device of

the access control device is integrated into the control device 506.

The laboratory apparatus 500 comprises a treatment chamber 503 for receiving the fluid samples to be treated. The treatment chamber comprises at least one treatment device 507 (not shown) for carrying out at least one program-controlled treatment step on the at least one sample which is arranged in the treatment chamber. In this case, the program-controlled treatment step is the permanent temperature control at a defined temperature.

The control device 506 comprises a control program.

The laboratory apparatus comprises a user interface device 504, by means of which a user can locally log-in to the laboratory apparatus.

Annex 1

Possible program parameters depending on the type of the laboratory apparatus

Apparatus	Most important parameters				
Centrifuge	Temperature	Speed		Time	
Cycler	Temperature			Time	
Biospectrometer	Temperature (kinetic)				Result
Plate reader	Temperature	Number of samples			Result
Cell counter					Result
Incubator	Temperature	CO_2/O_2	rel. humidity	Time	
(Thermo) mixer	Temperature	Speed		Time	
Shaker	Temperature	Speed		Time	
Pipette control device	Sample volume		Pipetting tool		Transfer type
Freezer	Temperature	Alarm value			
Laboratory machine	Number of samples	Sample volume	Pipetting tool	Source/aim	Transfer type (pipetting/ dispensing)
Fermenter / bioreactor		Stirring speed	Dissolved oxygen (DO)	pH	Metering speed (pumping)
Biosafety cabinet		Flow speed	Filter operation duration	Fan operation duration	Amount of air

Use cases to consider (examples):	Remote monitoring Remote control Booking schedule Service access Preprogramming	
Roles to consider (examples):	Admin LabUser Inexperienced Manager Service	
Apparatuses to consider (examples):	Cycler	n treatment devices (thermoblocks)

Assumption: access rights are apparatus-independent	Centrifuge	1 treatment device (rotor)
	Shaker	1 treatment device (shaking platform, a plurality also conceivable)
	Incubator	1 treatment device
	Cell Counter	1 treatment device
	BSC	1 treatment device
	Freezer	n treatment devices conceivable (differently actuatable cooling planes)
	Biospectrometer	1 treatment device

Use Case: **Remote monitoring**

User: Admin		
State	Role logged-in	Access possible?
Idle (ready)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Programmed	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Started (running)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Stopped (finished)	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Booking	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Standby	--	y

Use Case: **Remote monitoring**

User: LabUser		
State	Role logged-in	Access possible?
Idle (ready)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Programmed	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Started (running)	Admin	y
	LabUser	y

	Inexperienced	y
	Manager	y
Stopped (finished)	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Standby	--	y

Use Case: **Remote monitoring**

User: Inexperienced		
State	Role logged-in	Access possible?
Idle (ready)	Admin	n
	LabUser	n
	Inexperienced	n
	Manager	n
Programmed	Admin	n
=idle?	LabUser	n
	Inexperienced	n
	Manager	n
Started (running)	Admin	n
	LabUser	n
	Inexperienced	n
	Manager	n
Stopped (finished)	Admin	n
=idle?	LabUser	n
	Inexperienced	n
	Manager	n
Standby	--	y
User: Manager		
State	Role logged-in	Access possible?
Idle (ready)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Programmed	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Started (running)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Stopped (finished)	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Standby	--	y

Use Case: **Remote control**

User: Admin		
State	Role logged-in	Access possible?
Idle (ready)	Admin	n
	LabUser	y
	Inexperienced	y
	Manager	y
Programmed	Admin	n
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Started (running)	Admin	n
	LabUser	y
	Inexperienced	y
	Manager	y
Stopped (finished)	Admin	n
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Booking	Admin	n
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Standby	--	n

Use Case: **Remote control**

User: LabUser		
State	Role logged-in	Access possible?
Idle (ready)	Admin	n
	LabUser	n
	Inexperienced	y
	Manager	n
Programmed	Admin	n
=idle?	LabUser	n
	Inexperienced	y
	Manager	n
Started (running)	Admin	n
	LabUser	n
	Inexperienced	y
	Manager	n
Stopped (finished)	Admin	n
=idle?	LabUser	n
	Inexperienced	y
	Manager	n
Booking	Admin	n
=idle?	LabUser	n
	Inexperienced	y
	Manager	n
Standby	--	n

Use Case: **Remote control**

User: Inexperienced		
State	Role logged-in	Access possible?
Idle (ready)	Admin	n
	LabUser	n
	Inexperienced	n
	Manager	n
Programmed	Admin	n
=idle?	LabUser	n
	Inexperienced	n
	Manager	n
Started (running)	Admin	n
	LabUser	n
	Inexperienced	n
	Manager	n
Stopped (finished)	Admin	n
=idle?	LabUser	n
	Inexperienced	n
	Manager	n
Booking	Admin	n
=idle?	LabUser	n
	Inexperienced	n
	Manager	n
Standby	--	n

Use Case: **Remote control**

User: Manager		
State	Role logged-in	Access possible?
Idle (ready)	Admin	n
	LabUser	y
	Inexperienced	n
	Manager	n
Programmed	Admin	n
=idle?	LabUser	y
	Inexperienced	n
	Manager	n
Started (running)	Admin	n
	LabUser	y
	Inexperienced	n
	Manager	n
Stopped (finished)	Admin	n
=idle?	LabUser	y
	Inexperienced	n
	Manager	n
Booking	Admin	n
=idle?	LabUser	y
	Inexperienced	n
	Manager	n
Standby	--	n

Use Case: **Booking schedule**

User: Admin		
State	Role logged-in	Access possible?
Idle (ready)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Programmed	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Started (running)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Stopped (finished)	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Booking	Admin	n
=idle?	LabUser	n
	Inexperienced	n
	Manager	n
Standby	--	y

Use Case: **Booking schedule**

User: LabUser		
State	Role logged-in	Access possible?
Idle (ready)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Programmed	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Started (running)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Stopped (finished)	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Booking	Admin	n
=idle?	LabUser	n
	Inexperienced	n
	Manager	n
Standby	--	y

Use Case: **Booking schedule**

User: Inexperienced		
State	Role logged-in	Access possible?
Idle (ready)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Programmed	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Started (running)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Stopped (finished)	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Booking	Admin	n
=idle?	LabUser	n
	Inexperienced	n
	Manager	n
Standby	--	y

Use Case: **Booking schedule**

User: Manager		
State	Role logged-in	Access possible?
Idle (ready)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Programmed	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Started (running)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Stopped (finished)	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Booking	Admin	n
=idle?	LabUser	n
	Inexperienced	n
	Manager	n
Standby	--	y

Use Case: **Preprogramming**

User: Admin		
State	Role logged-in	Access possible?
Idle (ready)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Programmed	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Started (running)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Stopped (finished)	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Booking	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Standby	--	y

Use Case: **Preprogramming**

User: LabUser		
State	Role logged-in	Access possible?
Idle (ready)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Programmed	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Started (running)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Stopped (finished)	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Booking	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Standby	--	y

Use Case: **Preprogramming**

User: Inexperienced		
State	Role logged-in	Access possible?
Idle (ready)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Programmed	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Started (running)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Stopped (finished)	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Booking	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Standby	--	y

Use Case: **Preprogramming**

User: Manager		
State	Role logged-in	Access possible?
Idle (ready)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Programmed	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Started (running)	Admin	y
	LabUser	y
	Inexperienced	y
	Manager	y
Stopped (finished)	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Booking	Admin	y
=idle?	LabUser	y
	Inexperienced	y
	Manager	y
Standby	--	y

Use Case: **Remote service access**

User: Service		
State	Role logged-in	Access possible?
Idle (ready)	Admin	y
	LabUser	n
	Inexperienced	n
	Manager	y
Programmed	Admin	y
=idle?	LabUser	n
	Inexperienced	n
	Manager	y
Started (running)	Admin	y
	LabUser	n
	Inexperienced	n
	Manager	y
Stopped (finished)	Admin	y
=idle?	LabUser	n
	Inexperienced	n
	Manager	y
Booking	Admin	y
=idle?	LabUser	n
	Inexperienced	n
	Manager	y
Standby	--	y

Patentkrav

1. Et laboratorieapparat (1; 1'; 1") til apparatstyret behandling af mindst én laboratorieprøve, hvor nævnte laboratorieapparat vælges fra gruppen med ét af de følgende laboratorieapparater: en laboratoriecentrifuge, en termocykler, et laboratorie-spektrofotometer, en celletæller, en laboratorieinkubator, et laboratorie-rysteapparat, en laboratoriefryser, en bioreaktor, en biologisk sikkerheds-arbejdsbænk, en prøvepladelæser, en laboratorieautomat til behandling af væskeprøver, og hvor laboratorieapparatet (1; 1'; 1") omfatter:

• mindst én behandlingsindretning til apparatsty
ret behandling af den mindst ene laboratorieprøve;
• en styreindretning til brugerafhængig styring af laboratorieapparatet, især af behandlingsindretningen, hvor
styreindretningen er konfigureret til at modtage konfigurationsdata under laboratorieapparatets drift, når den manuelle konfiguration fastlægges af en bruger, og til at lagre disse konfigurationsdata som brugerafhængige konfigurationsdata i en hukommelsesindretning for at gøre det muligt at overføre disse konfigurationsdata fra hukommelsesindretningen til et andet laboratorieapparat, når brugeren ønsker at anvende disse på et andet laboratorieapparat, og
• en konfigurationsstyring (100) til brugerafhængig konfiguration af laboratorieapparatet, hvor konfigurationsstyringen omfatter:
• mindst én snitfladeindretning til oprettelse af en første dataforbindelse til en brugersnitfladeindretning og til oprettelse af en anden dataforbindelse til laboratorieapparatets styringsindretning, hvor den mindst ene snitfladeindretning af konfigurationsstyringen er indrettet til at oprette mindst én tredje dataforbindelse til mindst én ekstern databehandlingsindretning, i særdeleshed en server, som omfatter en hukommelsesindretning, som kan lagre de brugerafhængige konfigurationsdata, og;
• en styreindretning af konfigurationsstyringen, som omfatter en adgangsstyring til identifikation af en bruger, som søger adgang via den nævnte første dataforbindelse, og en databehandlingsindretning til behandling af forudbestemte brugerafhængige konfigurationsdata, hvor nævnte konfigurationsdata er brugbare til brugerafhængig behandling af nævnte mindst ene laboratorieprøve,

hvor konfigurationsstyringens styringsindretning er indrettet til at

- identificere en adgangssøgende bruger,
- modtage konfigurationsdata via den mindst ene tredje dataforbindelse, og
- overføre brugerafhængige konfigurationsdata tildelt den identificerede bruger til laboratorieapparatet via en anden dataforbindelse for at konfigurere laboratorieapparatet brugerafhængigt, hvor laboratorieapparats styringsindretning er indrettet til at
- modtage brugerenafhængige konfigurationsdata fra konfigurationsstyringen, og
- styre laboratorieapparatet i overensstemmelse med de brugerafhængige konfigurationsdata, og
- afhængigt af den identificerede bruger anvendes de brugerafhængige konfigurationsdata til at fastlægge et sæt brugerafhængige programparametre, med hvilke en programstyret behandling kan styres brugerafhængigt ved hjælp af behandlingsindretningen.

2. Laboratorieapparat i overensstemmelse med krav 1,
hvor konfigurationsstyringens styringsindretning er konfigureret til at

• evaluere de via den mindst ene tredje dataforbindelse modtagne konfigurationsdata, og
• tilordne den identificerede bruger brugerafhængige konfigurationsdata, som kan anvendes til brugerafhængig behandling af den mindst ene laboratorieprøve.

3. Laboratorieapparat i overensstemmelse med krav 1 eller 2,
hvor konfigurationsstyringens styringsindretning er konfigureret til at sende identifikationsdata, som identificerer brugeren, til den mindst ene eksterne databehandlingsindretning via den mindst ene tredje dataforbindelse og til fra den eksterne databehandlingsindretning at modtage konfigurationsdata tilordnet den identificerede bruger som de nævnte brugerafhængige konfigurationsdata for laboratorieapparatet.

4. Laboratorieapparat i overensstemmelse med et hvilket som helst af de foregående krav, som omfatter en brugersnitfladeindretning til at gøre det muligt for den identificerede bruger at tilgå laboratorieapparatet, og
hvor adgangsstyringen er indrettet til ved hjælp af brugersnitfladeindretningen at give den identificerede bruger adgang til laboratorieapparatet via den første dataforbindelse.

5. Laboratorieapparat i overensstemmelse med et hvilket som helst af de foregående krav, hvor adgangsstyringen kun tillader den identificerede bruger adgang til laboratorieapparatet, hvis mindst ét forudbestemt adgangsvilkår er opfyldt i forhold til den identificerede bruger.

6. Laboratorieapparat i overensstemmelse med et hvilket som helst af de foregående krav, som omfatter en brugersnitfladeindretning til brugerens input af data og mindst én fremvisningsindretning til fremvisning af oplysninger til brugeren på mindst én grafisk brugersnitflade, hvor laboratorieapparatets styringsindretning er konfigureret til at styre fremvisningsindretningen på en sådan måde, at der anvendes en brugerafhængig udformning af brugersnitfladen afhængigt af den identificerede bruger og ved anvendelse af brugerafhængige konfigurationsdata.

7. Laboratorieapparat i overensstemmelse med krav 6, hvor laboratorieapparats styringsindretning styrer behandlingen afhængigt af mindst én brugervalgt brugerparameter og er beregnet til at hente mindst én brugerparameter i en brugerafhængig forespørgselsproces ved hjælp af brugersnitfladeindretningen, hvorved

i) brugeren vises mindst one brugerafhængig (afhængig af brugerklasse, for eksempel kvalifikation, eller også individuelt afhængig) forespørgselsmaske på brugersnitfladen, hvor forespørgselsmasken er en fremvisningsskærm med mindst ét fremvisnings-område til visning af den variable værdi af en programparameter eller brugerparameter, og
ii) mindst én brugerparameter hentes ved at indhente mindst ét input fra brugeren på den mindst ene forespørgselsmaske.

8. System (300) til indretningsstyret behandling af mindst én laboratorieprøve, som omfatter mindst ét laboratorieapparat i overensstemmelse med et hvilket som helst af de foregående krav og mindst én ekstern databehandlingsindretning, i særdeleshed en server, som er forbundet med hinanden til udveksling af data, i særdeleshed konfigurationsdata.

9. System i overensstemmelse med krav 8, som omfatter mindst ét første og ét andet laboratorieapparat i overensstemmelse med et af kravene 1 til 7, som hver er konfigureret til at behandle første brugerafhængige konfigurationsdata, som kan anvendes til brugerafhængig styring af det første laboratorieapparat, og som også kan anvendes til brugerafhængig styring af det andet laboratorieapparat.

10. System i overensstemmelse med et hvilket som helst af de foregående krav 8 eller 9, som omfatter en ekstern databehandlingsindretning, og som omfatter en bruger-snitfladeindretning, med hvilken brugerafhængige konfigurationsdata kan genereres ud fra brugerens input.

11. En fremgangsmåde (200) til at konfigurere et laboratorieinstrument i overens-stemmelse med et hvilket som helst af kravene 1 til 7, hvor fremgangsmåden omfatter trinene med:

• Identifikation af en bruger ved brug af kontrolindretningens adgangskontrol; og
• konfigurering af laboratorieindretningen eller konfigurering af en behandling ved brug af brugerafhængige konfigurationsdata.

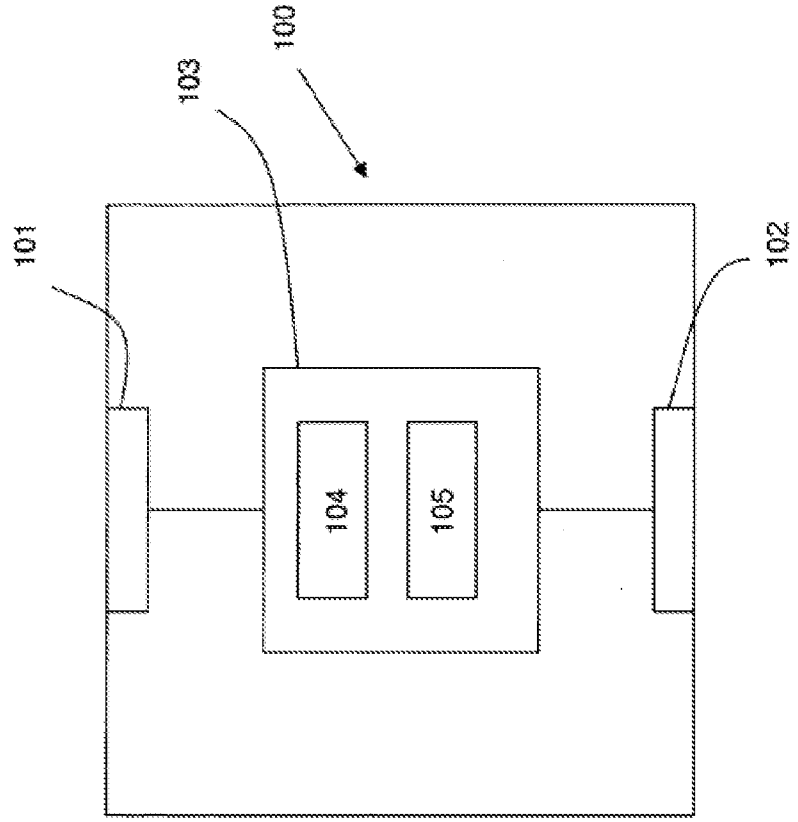

Fig. 1

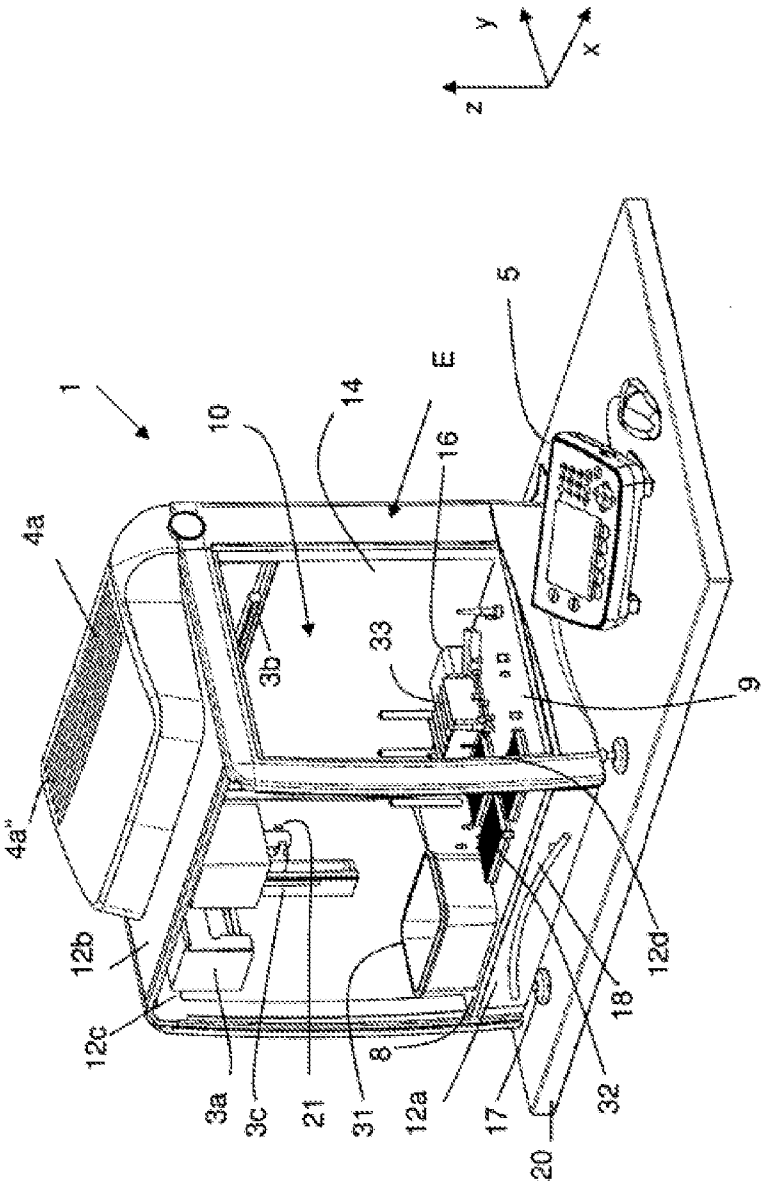
y
x
z
1
10
14
E
16
5
4a
4a''
3b
33
9
12b
12c
12d
18
3a
3c
21
31
8
12a
17
32
20

Fig. 2

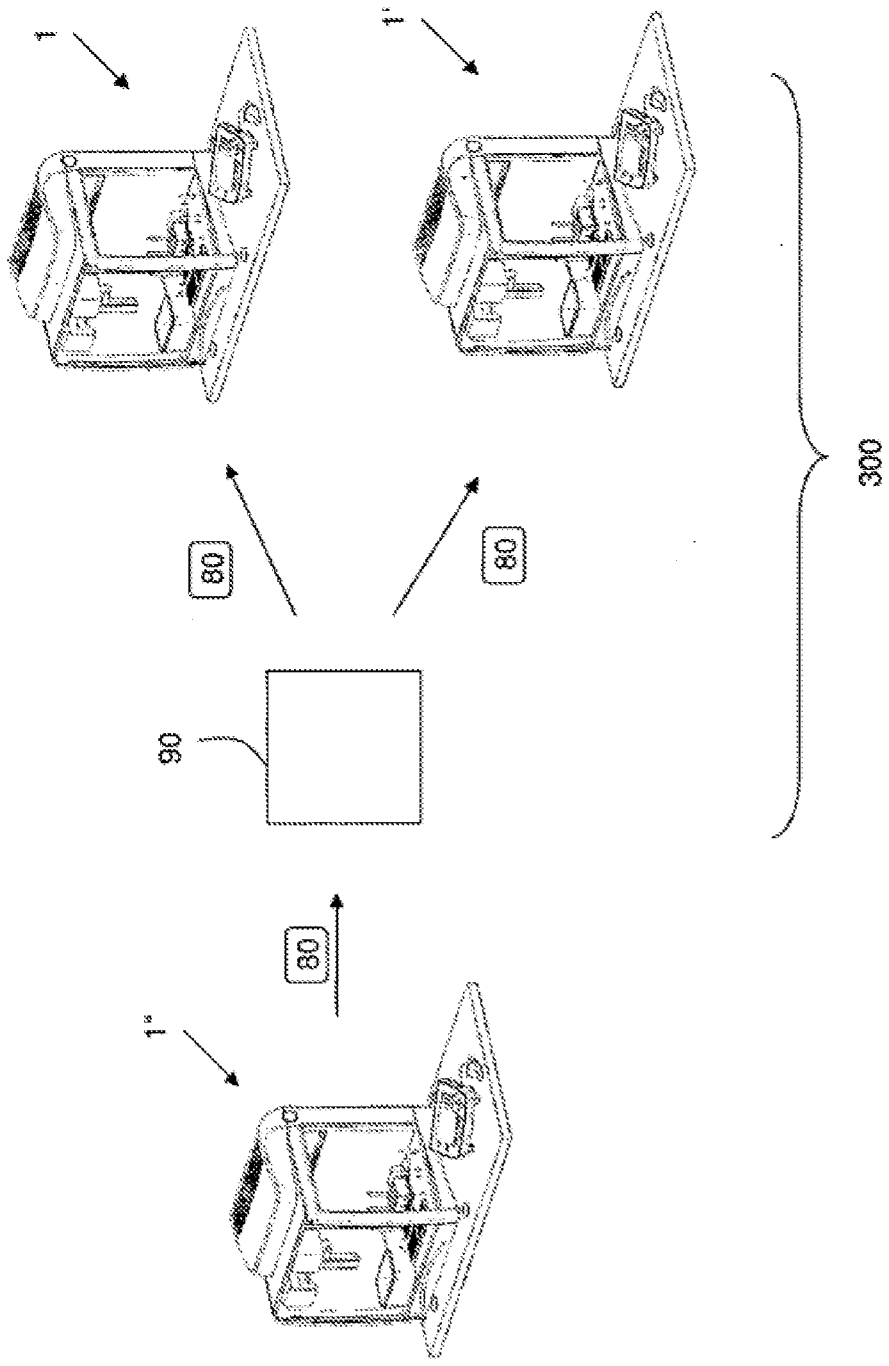

Fig. 3

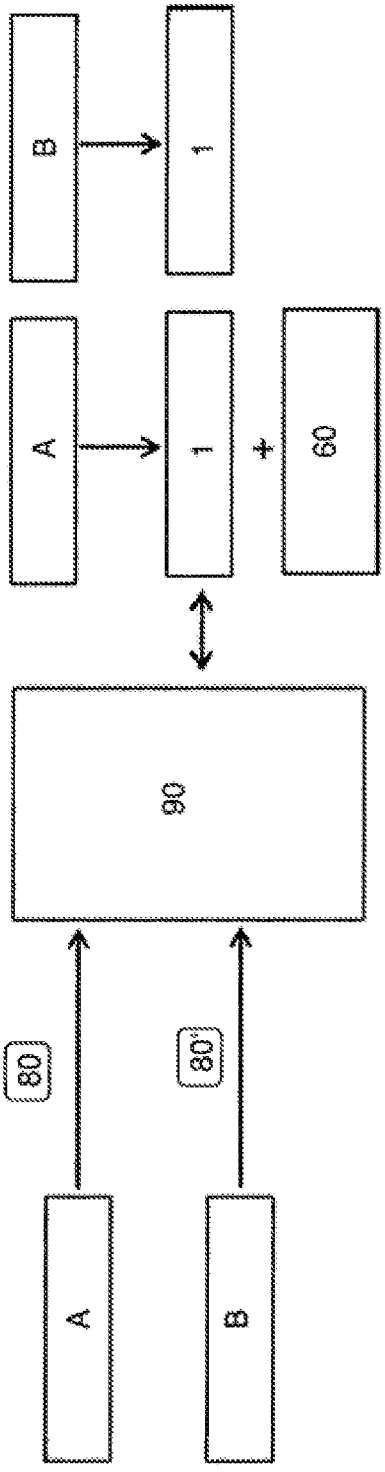

Fig. 4

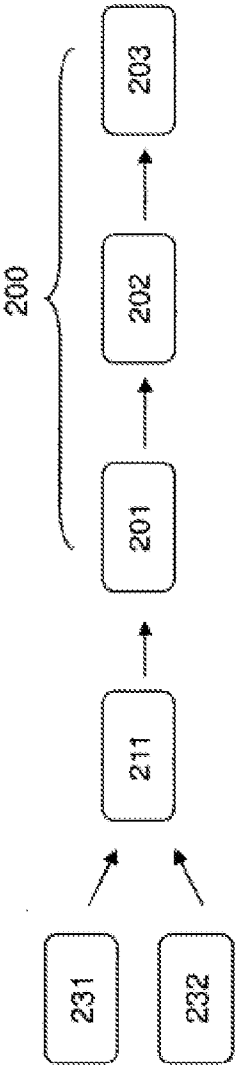

Fig. 5

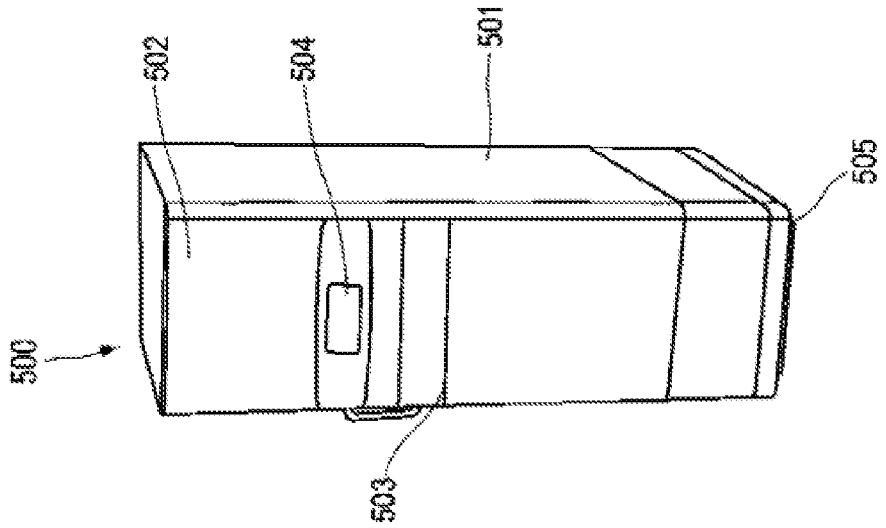

Fig. 7

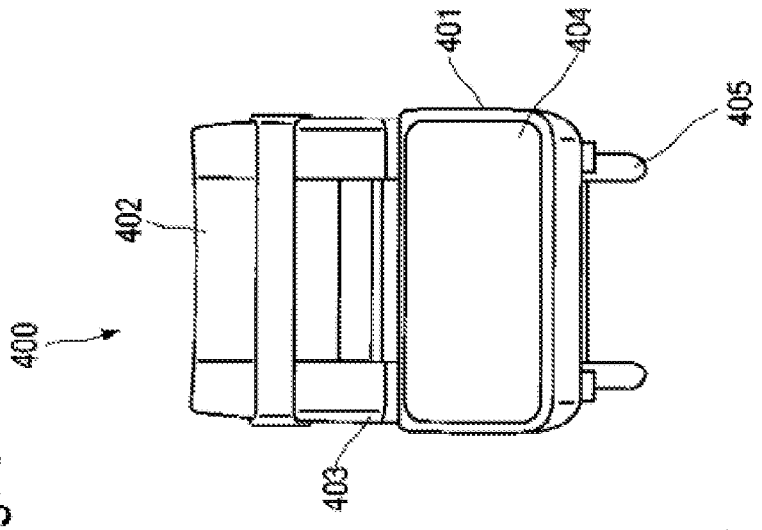

Fig. 6