(19) DANMARK

(10) DK/EP 3655829 T3

(12) Oversættelse af europæisk patentskrift

Patent- og Varemærkestyrelsen

(51) Int.Cl.: *B 01 F 33/452 (2022.01)* *B 01 F 33/81 (2022.01)* *B 01 F 35/22 (2022.01)* *B 01 L 7/00 (2006.01)*

(45) Oversættelsen bekendtgjort den: **2024-08-19**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2024-05-08**

(86) Europæisk ansøgning nr.: **18769705.7**

(86) Europæisk indleveringsdag: **2018-09-14**

(87) Den europæiske ansøgnings publiceringsdag: **2020-05-27**

(86) International ansøgning nr.: **EP2018074926**

(87) Internationalt publikationsnr.: **WO2019053208**

(30) Prioritet: **2017-09-15 DE 202017004815 U**

(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**

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(54) Benævnelse: **Laboratorieapparat med justerbare driftparametre til styring af en laboratorieapparaturfunktion**

(56) Fremdragne publikationer:
CN-U- 205 850 744
DE-A1-102011 111 581
US-A- 5 428 470
Anonymous: "MAGNETRÜHRER 2012/2013", 2mag AG, 27 May 2012 (2012-05-27), pages 1-44, XP055791988, Retrieved from the Internet: URL:https://files.vogel.de/vogelonline/vog elonline/companyfiles/4916.pdf [retrieved on 2021-03-31]
2mag: "MAGNETIC STIRRERS 2012/2013", , 15 July 2016 (2016-07-15), XP055846520, Retrieved from the Internet: URL:http://web.archive.org/web/20160715173 819if_/http://lobov.com.br/catalogos/repre sentadas/2mag/2mag_Catalogo_2012.pdf [retrieved on 2021-10-01]

[0001] The present invention relates to a laboratory device, in particular a magnetic stirrer, with at least one adjustable operating parameter for controlling at least one laboratory device function.

[0002] One such laboratory device is, for example, a magnetic stirrer comprising a support plate and a magnetic drive arranged in the housing of the laboratory device. The magnetic drive is designed to generate a suitable, typically time-varying magnetic field in order to set a stirrer in a vessel placed on the support plate in a stirring motion. In particular, the support plate can be a heating plate for heating or warming a substance in the vessel.

[0003] Such a magnetic stirrer is known, for example, from DE 10 2006 005 155 B3. To control its stirring and/or heating function, associated operating parameters, such as a hotplate temperature or a stirring intensity, can be set via a user interface arranged on the front of a housing with a display, several control buttons and a rotary control.

[0004] With several magnetic stirrers of this type, several vessels can also be stirred and/or heated simultaneously. The respective operating parameters must then be set separately for each magnetic stirrer from the other magnetic stirrers.

[0005] US 5,428,470 A describes an automatic analytical system module with individual modules which are grouped into module groups and controlled by means of central control units and a central input computer for a user. An alternative magnetic stirrer system is disclosed in document CN205850744U. Each magnetic stirrer module has a USB port, whereby an additional magnetic stirrer module is connected and the two modules are operated together. A similar modular magnetic stirrer system is also disclosed in the leaflet "MAGNETRÜHRER 2012/2013 magnetic emotion" from the company "2mag".

[0006] It is the object of the present invention to provide an alternative or improved laboratory device with at least one adjustable operating parameter for controlling at least one laboratory device function and a corresponding laboratory device set of similar laboratory device, with which the apparatus manufacture and/or its operation and/or its operation can be simplified or improved in the event that several similar laboratory device are used simultaneously.

[0007] This task is solved by a laboratory device set according to claim 1 and a retrofit kit according to claim 11. Further embodiments of the invention are given in claims 2-10. All further features and effects described in the claims and the description for said laboratory device set apply accordingly also with respect to the laboratory device set and the retrofit kit, and vice versa.

[0008] According to a first aspect of the invention, a laboratory device with at least one adjustable operating parameter for controlling at least one laboratory device function is provided, which can in particular represent a magnetic stirrer. The laboratory device according to the invention has an outer housing which has a coupling element for coupling the laboratory device according to the invention to at least one further laboratory device for the same at least one laboratory device function, in which the at least one operating parameter is also adjustable. The coupling element is designed in such a way that the laboratory device according to the invention and the at least one further laboratory device can be operated simultaneously by means of the coupling element and the at least one operating parameter can be set centrally via a common setting device independently and/or uniformly for the laboratory device according to the invention and the at least one further laboratory device.

[0009] The further laboratory device or devices mentioned thus represent laboratory devices of the same type as the laboratory device according to the invention with regard to their laboratory device functions; otherwise they can, but do not have to, be designed identically to it or to one another. The aforementioned centralised operation and/or control of the coupled laboratory devices by centrally setting their operating parameters by means of the common setting device can, for example, be carried out via the laboratory device according to the invention or one of the other laboratory devices or alternatively via a computer or another external control device. Various specific examples of this are explained below, in particular in relation to the laboratory device set according to the invention.

[0010] Through the aforementioned coupling and centralised operation and/or control of several similar laboratory devices, a single laboratory device can be expanded (in particular in a modular manner) into a multiple laboratory device, for example a single magnetic stirrer into a multiple magnetic stirrer. The laboratory devices that can be coupled together in this way can be designed in a simplified manner, in particular as similar laboratory devices that have to be operated and controlled individually. For example, there is no need to provide a separate setting device for each of the interconnectable laboratory devices to set its operating parameters. Depending on the application, further operating or control elements, such as a display for the user, etc., can be provided in a centralised manner in addition to the common setting device in a space-saving and cost-saving manner and omitted on individual laboratory devices that can be coupled together.

[0011] Thanks to the coupling element, the user of the laboratory device according to the invention has the option of deciding at a later stage whether and, if so, how many

further laboratory devices are to be coupled to it. In particular, the coupling element can be designed as a detachable coupling element that can preferably be reused several times or as often as desired in order to enable a modular structure that can be customised at any time, in particular with regard to the number of additional laboratory devices coupled.

[0012] The centralised setting of the operating parameters can in particular enable simpler, faster and/or more reliable operation and/or control of the laboratory devices coupled together in this way than if the operation and the operating parameter setting is separate for each of the laboratory devices used simultaneously. In particular, in the case of a standardised (i.e. identical) operating parameter setting for the coupled laboratory devices, there is no need to repeat the setting for each additional laboratory device, which can increase the comparability of the laboratory devices and the respective processes with each other and reduce the probability of any errors in the operating parameter setting.

[0013] In a specific embodiment, the common setting device represents a user interface integrated in the outer housing of the laboratory device according to the invention or in an outer housing of one of the other laboratory devices. Alternatively, the common setting device may represent a user interface or automatic control interface provided in an external control unit, in particular a computer. In this and any other embodiment, the common setting device for setting the at least one operating parameter can preferably be designed either uniformly or independently for the laboratory device according to the invention and the at least one further laboratory device, so that the user can decide between setting the same or individual operating parameters for the coupled laboratory devices, depending on the application.

[0014] According to one embodiment, the coupling element comprises

- at least one mechanical coupling element for a detachable and in particular rigid attachment of the at least one further laboratory device to the laboratory device according to the invention and/or
- at least one electrical coupling element for a detachable electrical connection of the laboratory device according to the invention to the at least one further laboratory device and/or for a detachable electrical connection of the laboratory device according to the invention to an external control unit, in each case for forwarding the at least one operating parameter set by means of the common setting device for the laboratory device according to the invention and/or for the at least one further laboratory device to the respective laboratory device.

[0015] The aforementioned mechanical coupling can ensure a particularly space-saving and, in particular when rigidly attached, a particularly stable arrangement of the laboratory devices coupled together, which can, for example, further simplify the simultaneous operation of the laboratory devices and/or save space on a user's work surface. In principle, any suitable mechanical or electrical coupling element can be used here, although some specific examples are given below purely by way of example. In particular, the electrical coupling element can be designed in addition to the power supply of the coupled further laboratory devices via the laboratory device according to the invention.

[0016] In a further development of the above embodiment, the at least one mechanical coupling element is integrally formed with the at least one electrical coupling element, in particular in the form of at least one mechanically fixing electrical plug connector. This can be particularly space-saving and/or contribute to the protection and stabilisation of the electrical coupling element by the mechanical coupling element. In particular, the mechanical coupling element can be designed to seal against liquids for this purpose.

[0017] Alternatively or additionally, the mechanical coupling element and/or the electrical coupling element may have a guide device for aligning the laboratory device according to the invention with the further laboratory device(s) to be coupled and/or a latching or clamping device for fixing the laboratory device according to the invention to the further laboratory device(s) to be coupled and/or comprise two mechanical and/or electrical coupling elements arranged on opposite sides of the outer housing of the laboratory device according to the invention, each for coupling one of the further laboratory devices. The guide device or the latching or clamping device can prevent unintentional displacement of the coupled laboratory devices relative to each other or their unintentional detachment from each other. With two mechanical or electrical coupling elements arranged on opposite sides of the outer housing, preferably symmetrically or opposite each other, a particularly stable and/or space-saving arrangement of the coupled laboratory devices can be achieved.

[0018] Preferably, the laboratory device according to the invention further comprises a monitoring unit which is designed to detect a total number of laboratory devices coupled together by means of the coupling element of the laboratory device according to the invention and corresponding or complementary coupling elements of the at least one further laboratory device and is particularly preferably also designed to output a warning signal and/or to limit the power of the laboratory device according to the invention if a predetermined total number limit value of the permissible total number of

coupled laboratory devices is exceeded. In particular, the detected total number of coupled laboratory devices can also be used for internal device control purposes and/or can be used internally when providing the forwarding of the operating parameters set via the common setting device to the respective laboratory devices. By monitoring that a predetermined total number limit value (e.g. four units) is not exceeded, it is possible, for example, to prevent overloading of individual components of the electrical power supply of the coupled laboratory devices.

[0019] Alternatively or additionally thereto, the laboratory device according to the invention preferably further comprises a user display arranged in the outer housing, which is designed to display the set at least one operating parameter for the laboratory device according to the invention and particularly preferably additionally for the further laboratory device coupled thereto and/or to display the total number of laboratory device coupled together. The display of the set operating parameters on the laboratory device according to the invention can simplify or support their setting and/or control for the user. The display of the total number of coupled laboratory devices can serve as an additional check by the user of the correct functioning of the overall system.

[0020] According to one embodiment, the laboratory device according to the invention and the at least one further laboratory device are designed as magnetic stirrers, each comprising a support plate, in particular a heating plate, and a magnetic drive arranged inside the outer housing for generating a suitable magnetic field in order to set a stirrer in a vessel standing on the support plate into a stirring movement. The laboratory device functions that can be controlled by the at least one adjustable operating parameter include the stirring and/or heating of a substance in a vessel placed on the support plate.

[0021] In a further development of this embodiment, the coupling element of the laboratory device according to the invention is furthermore designed for the mechanical and/or magnetic transmission of a drive energy to a magnetic drive of the at least one further laboratory device designed to convert this drive energy into a magnetic field suitable for the stirring function, so that the at least one further laboratory device preferably does not require its own drive energy to generate the magnetic field suitable for its stirring function. In particular, this can lead to a simplification of the design of the other laboratory devices and, for example, reduce their size, weight and/or manufacturing costs.

[0022] Another aspect of the invention is a control unit for a laboratory device of the type set forth herein, wherein the control unit is configured and/or programmed,

- to recognise the at least one operating parameter, which is set by means of the common setting device in relation to the laboratory device according to the invention, and to operate the laboratory device according to the invention as a function thereof and/or
- to recognise the at least one operating parameter, which is set by means of the common setting device in relation to the laboratory device according to the invention and to the further laboratory device coupled thereto, and to operate the laboratory device according to the invention and the further laboratory device coupled thereto as a function thereof and/or
- to detect a total number of laboratory devices coupled together by means of the coupling element of the laboratory device according to the invention and corresponding or complementary coupling elements of the at least one further laboratory device and preferably furthermore to limit a power of the laboratory device according to the invention and/or to output a warning signal if a predetermined total number limit value of the permissible total number of coupled laboratory devices is exceeded.

[0023] Such a control unit can, for example, be housed in the laboratory device according to the invention and/or in another or each of the coupled laboratory device. Alternatively or additionally, it can also be an external control unit that communicates with the laboratory device according to the invention and in particular also with the other laboratory devices coupled to it, for example by means of the aforementioned electrical coupling element(s). Recognising the settings of the operating parameters determined for the first laboratory device or for a specific one of the other laboratory devices coupled to it and controlling these laboratory devices as a function thereof makes it possible, in particular, to centrally set the operating parameters for all laboratory devices coupled together.

[0024] According to a further aspect, there is provided a laboratory device set comprising

- a laboratory device according to the invention of the type set forth herein, which is a first laboratory device, and
- the above-mentioned further similar laboratory devices which can be coupled to the first laboratory device by means of its coupling element, each of which has an outer housing with a coupling element for coupling to the first laboratory device or to one another, which is designed in such a way that the first and the at least one further laboratory device can be operated simultaneously by means of their coupling elements

and the at least one operating parameter of the respective laboratory device can be set independently and/or uniformly centrally via a common setting device.

[0025] The coupling elements of the first and the further laboratory devices are designed to be corresponding or complementary to each other in such a way that the first and the further laboratory devices can be coupled to each other by the interaction of the respective coupling elements. In other words, in order to couple two such laboratory devices, their coupling elements can be coupled to each other, which enables, for example, an optional modular connection of several laboratory devices of the laboratory device set.

[0026] For the coupling elements of the other laboratory devices of the set of laboratory devices according to the invention, in particular what is stated herein with respect to the coupling element of the first laboratory device can apply accordingly. Preferably, the coupling elements of the first and the further laboratory devices are designed uniformly, e.g. essentially the same.

[0027] In a specific embodiment of a laboratory device set of the type described herein, the first laboratory device represents a basis laboratory device (also referred to as a master or high-end laboratory device), in the outer housing of which the common setting device is integrated in the form of a user interface. The at least one further laboratory device represents a number (one or more) of extension laboratory devices (also referred to as slave or low-end laboratory devices), which are preferably essentially identical to each other and can be modularly coupled to the basis laboratory device by means of the respective coupling elements. The coupling elements of the basis laboratory device and the extension laboratory devices each comprise at least one electrical coupling element for a detachable electrical connection between the basis laboratory device and the extension laboratory devices for forwarding the at least one operating parameter set at the user interface of the basis laboratory device for the extension laboratory devices to the extension laboratory devices. In addition, in this embodiment variant, in particular what has been explained above and below for explaining the invention with respect to the first laboratory device can also apply accordingly to an extension laboratory device. The user interface can comprise any elements suitable for setting operating parameters, e.g. control knobs, rotary controls, a touch screen, etc.

[0028] In an alternative embodiment of the laboratory device set according to the invention, the first laboratory device and the at least one further laboratory device represent a number of modular and preferably mutually identical laboratory device which can be selectively coupled to one another by means of the respective coupling

elements. The respective at least one operating parameter of the modular laboratory devices can be set centrally via a common setting device provided in an external control unit, in particular a computer. For this purpose, the coupling element of each modular laboratory device comprises at least one electrical coupling element for a detachable electrical connection of the modular laboratory devices to the external control unit and/or to each other for forwarding the at least one operating parameter set for the respective modular laboratory device by means of the common setting device to this modular laboratory device.

[0029] The modular design of laboratory devices for simultaneous operation and/or control of several similar laboratory devices described herein makes it possible in particular to design the extension laboratory devices of the above first design variant or the modular laboratory devices of the above second design variant of a laboratory device set according to the invention more simply than laboratory devices to be operated individually. For example, it is possible to save costs and installation space in the simplified laboratory devices by constructively relocating the above-mentioned functional elements such as the setting device for operating parameters, display or drive to a central device. Overall, this can save space on a user's work surface. The operation of all laboratory devices that can be coupled together can be standardised, if necessary at least partially centralised, and thus designed to be particularly easy to understand, time-saving and/or straightforward. In particular, this makes it possible to save time when several identical processes are to be run, to increase their comparability and to prevent errors in the settings.

[0030] Another aspect of the invention is a retrofit kit for a laboratory device set of the type set forth herein, wherein the retrofit kit comprises one or more extension laboratory device as claimed in claim 10. This provides the user with the option, after purchasing a first laboratory device of the type set forth herein, to subsequently decide to purchase an extension.

[0031] The above and further embodiments, specific embodiments, features and functionalities of the invention are explained in more detail below with reference to the examples shown in the accompanying drawings. The drawings are purely schematic; in particular, they are not to be read as true to scale.

It shows:

Fig. 1 shows a basis structure of a laboratory device set according to the present invention with a basis laboratory device and at least one extension laboratory device with various types of coupling elements,

Fig. 2 shows the basis structure of a laboratory device set according to the present invention with several identical modular laboratory device and an external control unit,
Fig. 3 is a perspective view of an example of coupling elements on similar laboratory devices which can be coupled together in accordance with the present invention,
Fig. 4 is a perspective view of a further example of coupling elements on similar laboratory devices which can be coupled together in accordance with the present invention,
Fig. 5 a perspective view of two similar laboratory devices which can be coupled together according to the present invention in a non-coupled state, and
Fig. 6 the laboratory device of Fig. 5 in a coupled state.

[0032] All the different variants and specific design features of the laboratory device set according to the invention and the retrofit kit of the type set out herein mentioned above in the description and in the following claims can be implemented in the examples shown in Figs. 1 to 6. They are therefore not all repeated below. The same applies to the definitions of terms and effects given above in relation to individual features shown in the figures.

[0033] Fig. 1 is a schematic sketch of the basis structure of a laboratory device set 1 according to the invention. Fig. 1a) shows two conventional individual devices for comparison only, while Figs. 1b) and 1c) each show a laboratory device set 1 according to the invention.

[0034] By way of example only, the laboratory devices shown in the figures are designed as magnetic stirrers. Each of these magnetic stirrers comprises an outer housing 2, a heating plate 3 and a magnetic drive (not shown) arranged inside the outer housing 2 for generating a suitable magnetic field in order to set a stirrer in a vessel (not shown) standing on the heating plate 3 into a stirring movement.

[0035] In Fig. 1b), the laboratory device set 1 comprises a first laboratory device of the type set out herein as basis laboratory device 4 and at least one further laboratory device of the type set out herein as extension laboratory device 5 (only one in the figure for clarity). The basis laboratory device 4 and the extension laboratory device 5 are similar in the above sense because in this example they are both designed as magnetic stirrers with adjustable operating parameters, such as the temperature of the heating plate 3 or stirring intensity, for controlling their stirring and heating functions.

[0036] In contrast to the conventional individual devices shown in Fig. 1a), each of which requires a user interface 6 for setting its operating parameters, in the laboratory device set 1 of Fig. 1b) according to the invention only the basis laboratory device 4 has a user interface 6 integrated in its outer housing 2, which serves as a common

setting device of the type described herein, i.e. by means of which the operating parameters can be set centrally both for the basis laboratory device 4 and for the extension laboratory device 5.

[0037] Therefore, no user interface 6 is required for the extension laboratory device 5, which is symbolically indicated by a cross. In the present example, the said user interface 6 can also comprise a user display, for example in the form of a display, which is designed to display the set operating parameters for the basis laboratory device 4 and the extension laboratory device 5 and/or to display the total number of coupled laboratory devices.

[0038] In Fig. 1b), the basis laboratory device 4 and the extension laboratory device 5 are coupled to one another via their coupling elements (not shown). The coupling elements of the basis laboratory device 4 and the extension laboratory device 5 each comprise at least one mechanical coupling element for mechanically fastening the outer housings 2 of the basis laboratory device 4 and the extension laboratory device 5 to one another and at least one electrical coupling element for electrically connecting the basis laboratory device 4 and the extension laboratory device 5. at least one electrical coupling element for the electrical connection of the basis laboratory device 4 and the extension laboratory device 5 for forwarding the operating parameters set for the extension laboratory device 5 at the user interface 6 of the basis laboratory device 4 to the extension laboratory device 5 (indicated by a double arrow with an information sign). In the example of Fig. 1b), the mechanical coupling elements also comprise a latching or clamping device (symbolically indicated by "Click" and three lines at the connection points of the two outer housings 2) for fixing the outer housings 2 of the basis laboratory device 4 and the extension laboratory device 5 to each other.

[0039] In Fig. 1c), the laboratory device set 1 according to the invention differs from that of Fig. 1b) only in the specific configuration of the coupling elements of the basis laboratory device 4 and the extension laboratory device 5. In Fig. 1c), the coupling elements are designed as electrical coupling elements in the form of electrical connections 6 integrated in the outer housings 2, for example as suitable electrical plug connections which are electrically connected by a preferably short connecting cable 8.

[0040] Fig. 2b) shows an alternative to Fig. 1b) in principle structure of a laboratory device set 1 according to the invention. Here, the laboratory device set 1 comprises several (in the figure only two for clarity) preferably identical modular laboratory device 9, each of which can represent a first laboratory device of the type described herein.

As in Fig. 1a), Fig. 2a) also only shows two conventional individual devices for comparison.

[0041] In contrast to Fig. 1b), in Fig. 2a) the operating parameters of the modular laboratory devices 9 can be set centrally via a common setting device of the type described herein (for example computer keyboard etc.) provided in an external control unit 10, in particular a computer. For this purpose, the coupling element (not shown) of each modular laboratory device 9 comprises at least one electrical coupling element for electrically connecting one or both modular laboratory devices 9 to the external control unit 10 (indicated by a double arrow with an information sign) and/or to each other for forwarding the operating parameters set for the respective modular laboratory device 9 by means of the common setting device in the external control unit 10 to this modular laboratory device 9. Therefore, no user interface 6 is required for the modular laboratory devices 9 as is the case with the conventional individual devices of Fig. 2a), which is symbolically indicated in Fig. 2b) by a cross in the respective outer housing 2 of the modular laboratory devices 9. In all other respects, the same applies here as in Fig. 2b).

[0042] Fig. 3 shows a perspective view of an example of coupling elements 11a and 11b in outer housings 2 of two similar laboratory devices that can be coupled together in accordance with the present invention. In particular, these may be the magnetic stirrers of Figs. 1b), 1c), 2b) or of Figs. 5 and 6 below. The coupling elements 11a and 11b are designed to complement each other in such a way that the two outer housings 2 can be coupled to each other by the interaction of the coupling elements 11a and 11b, in the example of Fig. 3 by interlocking.

[0043] In Fig. 3, the respective coupling element 11a or 11b represents a mechanically fixing electrical plug connector, in which a mechanical coupling element 12a or 12b is integrally formed with an electrical coupling element 13a or 13b (the latter concealed in Fig. 3). The mechanical coupling element 12a/12b has the form of interlocking, preferably outwardly liquid-tight sleeves, whereby the outer sleeve 12b can be rotated around the inner sleeve 12a by means of a rotating handle 14 until the connector is in a locked state (indicated by a rotating arrow). During rotation, the outer sleeve 12b is guided along an external thread 15 of the inner sleeve 12a. Overall, this results in an aligning (guiding device) and fixing (latching or clamping device) function of the mechanical coupling elements 12a and 12b. The electrical coupling element 13a or 13b is arranged inside these in the form of adjoining electrical contacts.

[0044] Fig. 4 shows a perspective view of an alternative example of the coupling element 11a or 11b to Fig. 3, also in the form of a mechanically fixing electrical

connector, wherein elements with a similar or corresponding function as in Fig. 3 are labelled with the same reference signs. In Fig. 4, the mechanical coupling element 12a of the laboratory device on the right in Fig. 4 is designed as a projection in its outer housing 2, which is designed for preferably liquid-tight engagement in the mechanical coupling element 12b of the laboratory device on the left in Fig. 4, which is designed as a complementary recess in the outer housing 2 of the left laboratory device. This results in an aligning (guiding) function of the mechanical coupling elements 12a and 12b. The electrical coupling element 13a of the laboratory device on the right in Fig. 4 is designed as electrical plug contacts (two in Fig. 4, purely by way of example) extending vertically outwards from the projection of its outer housing 2, which have lateral latching notches 16 at their distal ends. When the mechanical coupling elements 12a and 12b engage, the spherical electrical contacts, for example, of the electrical coupling element 13b of the laboratory device on the left in Fig. 4, which are arranged in its outer housing 2 behind the recess 12b in side walls to the plug contacts of complementary channels 17 and are pressed laterally into the channels 17 by springs 18 (latching or clamping device), are pressed into these latching notches 16.

[0045] Fig. 5 shows a perspective view of two similar laboratory devices according to the present invention which can be coupled together in a modular manner in a state in which they are not coupled to one another, while Fig. 6 shows the laboratory devices of Fig. 5 in their coupled state. In particular, this may be a laboratory device system 1 of Figs. 1b) or 2b), whereby the presence and configuration of the user interfaces 6 in one or both of the laboratory device shown in Figs. 5 and 6 are to be regarded as purely exemplary and not mandatory.

[0046] As also described with reference to Figures 1 and 2, the laboratory devices shown in Figs. 5/6 are designed as magnetic stirrers. Each of these magnetic stirrers comprises an outer housing 2, a heating plate 3 and a magnetic drive (not shown) arranged inside the outer housing 2 for generating a suitable magnetic field in order to set a stirrer in a vessel (not shown) standing on the heating plate 3 into a stirring motion. Operating parameters, such as the temperature of the heating plate 3 or stirring intensity, can be set to control the stirring and heating function via the user interface 6 arranged on a front side of the outer housing 2, which comprises two rotary knobs 19 and 20 by way of example only.

[0047] In Fig. 5/6, each laboratory device has two coupling elements 11a and 11b arranged on opposite sides of its outer housing 2, which can be designed as in Fig. 3. In Fig. 6, the two laboratory devices are coupled to each other by the interaction of their complementary coupling elements 11a (on the right side of the left laboratory

device) and 11b (on the left side of the right laboratory device), as described in detail, for example, with reference to Fig. 3.

[0048] In addition to the USB interfaces or electrical plug connections and cable connections mentioned herein purely by way of example, the suitable electrical coupling elements of the coupling elements within the scope of the invention may also comprise or represent devices for wireless communication.

PATENTKRAV

1. Laboratorieapparatsæt (1) omfattende

et første laboratorieapparat (4, 9), især en magnetomrører, med i det mindste én justerbar driftparameter til styring af i det mindste én laboratorieapparaturfunktion og et udvendigt hus (2), og i det mindste ét yderligere laboratorieapparat (5, 9) for den samme i det mindste ene laboratorieapparatfunktion, i hvilket den i det mindste ene driftparameter også er justerbar,

hvor det udvendige hus (2) for det første laboratorieapparat har et koblingselement (11a, 11b) til at koble laboratorieapparatet (4, 9) med det i det mindste ene yderligere laboratorieapparat (5, 9) og det udvendige hus (2) for det i det mindste ene yderligere laboratorieapparat (5, 9) har et koblingselement (11a, 11b) til at koble til det første laboratorieapparat (4, 9), som er anbragt på en sådan måde, at det første laboratorieapparat (4, 9) og det i det mindste ene yderligere laboratorieapparat (5, 9) kan fungere samtidigt ved hjælp af koblingselementerne (11a, 11b) og den i det mindste ene driftparameter for det respektive laboratorieapparat kan indstilles centralt via en fælles indstillingsindretning, uafhængigt og/eller ensartet for laboratorieapparatet (4, 9) og det i det mindste ene yderligere laboratorieapparat (5, 9),

hvor den fælles indstillingsindretning er en brugerskilleflade (6) integreret i det udvendige hus (2) for det første laboratorieapparat (4, 9), og

hvor koblingselementerne (11a, 11b) omfatter i det mindste ét mekanisk koblingselement (12a, 12b) til udløseligt og især stift at fastgøre det i det mindste ene yderligere laboratorieapparat (5, 9) til det første laboratorieapparat (4, 9), og i det mindste ét elektrisk koblingselement (13a, 13b, 7, 8) til en udløselig elektrisk forbindelse af det første laboratorieapparat (4, 9) til det i det mindste ene yderligere laboratorieapparat (5, 9) for fremsendelse af den i det mindste ene driftparameter indstillet ved hjælp af den fælles indstillingsindretning for det første laboratorieapparat (4, 9) og/eller det i det mindste ene yderligere laboratorieapparat (5, 9) til det respektive laboratorieapparat,

hvor det mekaniske koblingselement for det første laboratorieapparat foreligger i form af et fremspring (12a) i det udvendige hus (2) og det mekaniske koblingselement for det i det mindste ene yderligere laboratorieapparat foreligger i

form af en udsparing (12b) i det udvendige hus (2), som er komplementær med fremspringet på det første laboratorieapparat, og
hvor det elektriske koblingselement for det første laboratorieapparat foreligger i form af elektriske stikkontakter, som strækker sig vertikalt udad fra fremspringet (12a) på det udvendige hus (2) og har indlåsningsnoter (16), **kendetegnet ved, at**
det elektriske koblingselement på det i det mindste ene yderligere laboratorieapparat foreligger i form af, eksempelvis, sfæriske elektriske kontakter, som er anbragt i det udvendige hus (2) bag udsparingen (12b) i sidevæggene af kanaler (17), som er komplementære med stikkontakterne på det første laboratorieapparat og presses sideværts ind i kanalerne (17) ved hjælp af fjedre (18).

2. Laboratorieapparatsæt (4, 9) ifølge krav 1, hvor den fælles indstillingsindretning til indstilling af den i det mindste ene driftparameter eventuelt er anbragt ensartet eller uafhængigt for det første laboratorieapparat (4, 9) og det i det mindste ene yderligere laboratorieapparat (5, 9).

3. Laboratorieapparatsæt (4, 9) ifølge et af kravene 1 til 2, hvor det i det mindste ene mekaniske koblingselement (12a, 12b) på det første laboratorieapparat omfatter to mekaniske koblingselementer (12a, 12b), som er anbragt på modstående sider af det udvendige hus (2) for det første laboratorieapparat, hver især til at tilkoble et af de yderligere laboratorieapparater (5, 9).

4. Laboratorieapparatsæt (4, 9) ifølge et af de foregående krav, som yderligere omfatter en overvågningsenhed anbragt til at detektere et totalt antal af laboratorieapparater (5, 9), som er koblet sammen ved hjælp af koblingselementerne (11a, 11b) på det første laboratorieapparat (4, 9) og koblingselementerne (11a, 11b) på det i det mindste ene yderligere laboratorieapparat (5, 9) og fortrinsvis også er indrettet til at afgive et advarselssignal og/eller at begrænse effekten for det første laboratorieapparat (4, 9), når en forudbestemt total antal grænseværdi for det tilladte totale antal af koblede laboratorieapparater overskrides.

5. Laboratorieapparatsæt (4, 9) ifølge et af de foregående krav, som yderligere omfatter en brugervisningsindretning (6), som er anbragt i det udvendige hus (2) for

det første laboratorieapparat og er indrettet til at fremvise den indstillede i det mindste ene driftparameter for det første laboratorieapparat (4, 9) og fortrinsvis yderligere for de yderligere laboratorieapparater (5, 9), som er koblet dertil og/eller at fremvise det totale antal af koblede laboratorieapparater.

6. Laboratorieapparatsæt (4, 9) ifølge et af de foregående krav, hvor

det første laboratorieapparat (4, 9) og det i det mindste ene yderligere laboratorieapparat (5, 9) foreligger i form af en magnetomrører, som hver især omfatter en understøtningsplade, især en varmeplade (3), og et magnetisk drev anbragt indvendigt i det udvendige hus (2) til at generere et egnet magnetfelt med henblik på at sætte en omrører i en beholder, som står på understøtningspladen, i en omrørende bevægelse, og laboratorieapparatfunktionerne, som kan styres af den i det mindste ene justerbare driftparameter omfatter omrøringen og/eller opvarmningen af en substans i beholderen, som står på understøtningspladen.

7. Laboratorieapparatsæt (4, 9) ifølge krav 6, hvor koblingselementet (11a, 11b) på det første laboratorieapparat yderligere er indrettet til mekanisk og/eller magnetisk at overføre en drivenergi til et magnetisk drev for det i det mindste ene yderligere laboratorieapparat (5, 9), som er indrettet til at konvertere denne drivenergi til et magnetisk felt, som er egnet til omrøringsfunktionen, således at det i det mindste ene yderligere laboratorieapparat (5, 9) fortrinsvis ikke kræver nogen egen drivenergi til at generere det magnetiske felt, som er egnet til dettes omrøringsfunktion.

8. Laboratorieapparatsæt (4, 9) ifølge ethvert af kravene 1 til 7, hvor det første laboratorieapparat yderligere omfatter en styreenhed, som er indrettet og/eller programmeret til

at genkende den i det mindste ene driftparameter, som er indstillet ved hjælp af den fælles indstillingsindretning med hensyn til det første laboratorieapparat (4, 9), og drive det første laboratorieapparat (4, 9) i afhængighed deraf, og

fortrinsvis yderligere at genkende den i det mindste ene driftparameter, som er indstillet ved hjælp af den fælles indstillingsindretning med hensyn til de yderligere laboratorieapparater (5, 9), som er koblet til det første laboratorieapparat (4, 9), og drive de yderligere laboratorieapparater (5, 9) i afhængighed deraf og/eller

fortrinsvis yderligere at detektere et totalt antal af laboratorieapparater, som er koblet sammen ved hjælp af koblingselementet (11a, 11b) på det første laboratorieapparat (4, 9) og tilsvarende eller komplementære koblingselementer (11a, 11b) på det i det mindste ene yderligere laboratorieapparat (5, 9) og yderligere fortrinsvis yderligere at begrænse en effekt for det første laboratorieapparat (4, 9) og/eller at afgive et advarselssignal, hvis en forudbestemt total antal grænseværdi for det tilladte totale antal af koblede laboratorieapparater overskrides.

9. Laboratorieapparatsæt (1) ifølge et af kravene 1 til 8,

hvor koblingselementerne (11a, 11b) på det første og den eller de yderligere laboratorieapparater er udformede til at være modsvarende eller komplementære med hinanden på en sådan måde, at det første og det eller de yderligere laboratorieapparater hver især kan kobles med hinanden ved samvirkningen mellem de respektive koblingselementer (11a, 11b),
hvor fortrinsvis koblingselementerne (11a, 11b) på det første og det eller de yderligere laboratorieapparater er udformede ensartet i forhold til hinanden.

10. Laboratorieapparatsæt (1) ifølge et af kravene 1 til 9, hvor

det første laboratorieapparat er et basalt laboratorieapparat (4), i det udvendige hus (2) af hvilket den fælles indstillingsindretning er integreret i form af en brugerskilleflade (6), og
det i det mindste ene yderligere laboratorieapparat repræsenterer et antal fortrinsvis indbyrdes identiske udvidelseslaboratorieapparater (5), som kan kobles modulært med det basale laboratorieapparat (4) ved hjælp af de respektive koblingselementer (11a, 11b),
hvor koblingselementerne (11a, 11b) på det basale laboratorieapparat (4) og udvidelseslaboratorieapparaterne (5) hver især omfatter i det mindste ét elektrisk koblingselement (13a, 13b, 7, 8) til udløselig elektrisk forbindelse af det basale laboratorieapparat (4) og udvidelseslaboratorieapparaterne (5) med hinanden til fremsendelse af den i det mindste ene driftparameter, indstillet ved brugerskillefladen (6) for det basale laboratorieapparat (4) for udvidelseslaboratorieapparaterne (5), til udvidelseslaboratorieapparaterne (5).

11. Eftermonteringssæt til et laboratorieapparatsæt (1) ifølge krav 10, hvor eftermonteringssættet omfatter ét eller flere udvidelseslaboratorieapparater (5) ifølge krav 10.

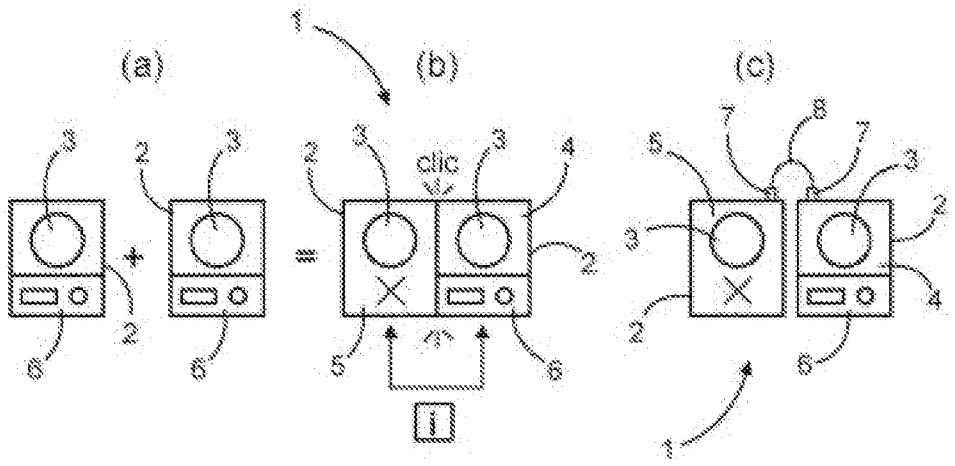

Fig. 1

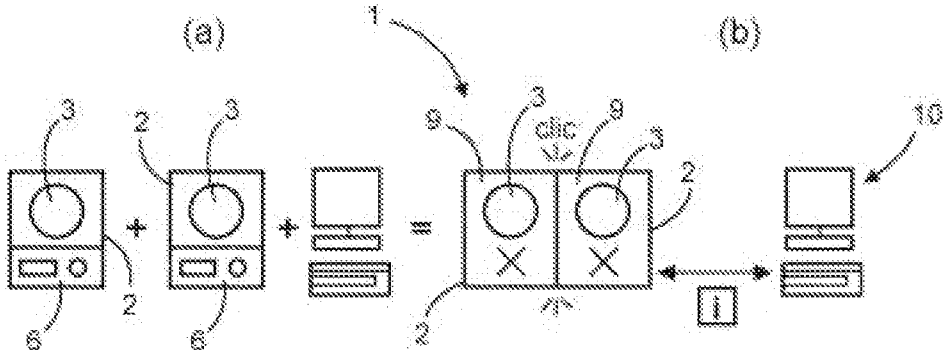

Fig. 2

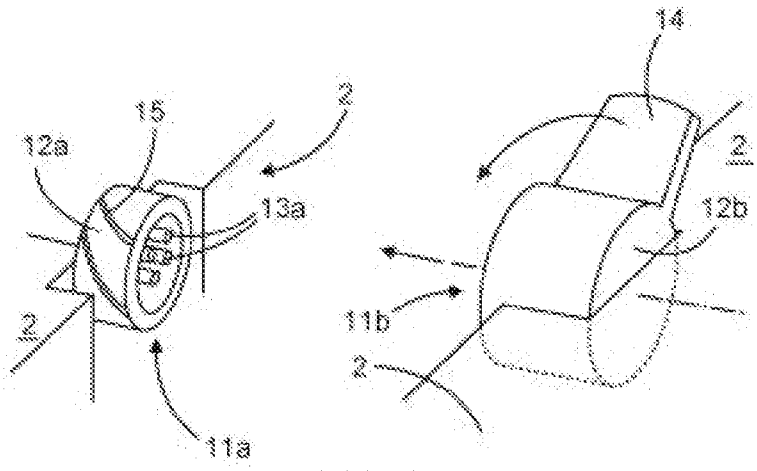
14
15
2
12a
13a
2
12b
11b
2
2
11a

Fig. 3

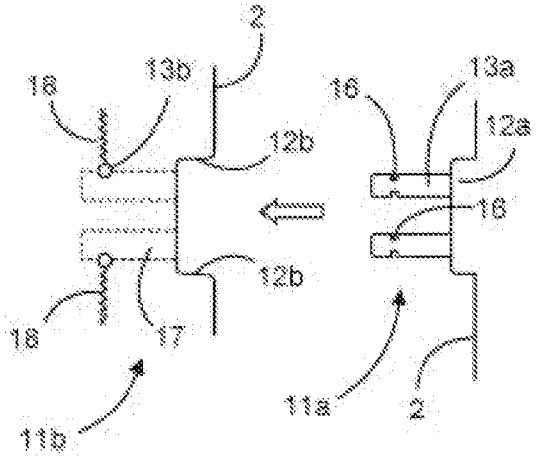
2
16
13b
12b
16
13a
12a
16
12b
18
17
11b
11a
2

Fig. 4

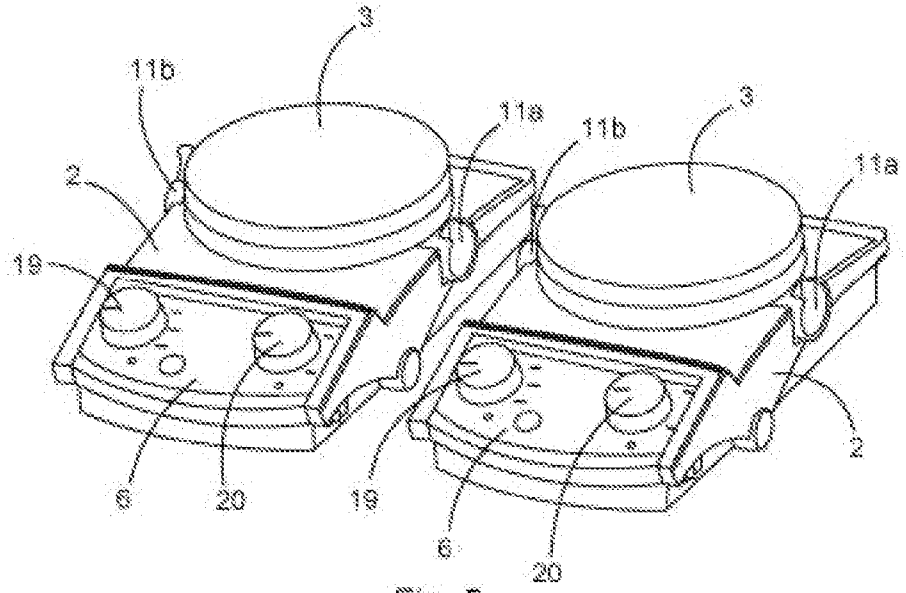
3
11b
11a
11b
3
11a
2
19
2
6
20
19
6
20

Fig. 5

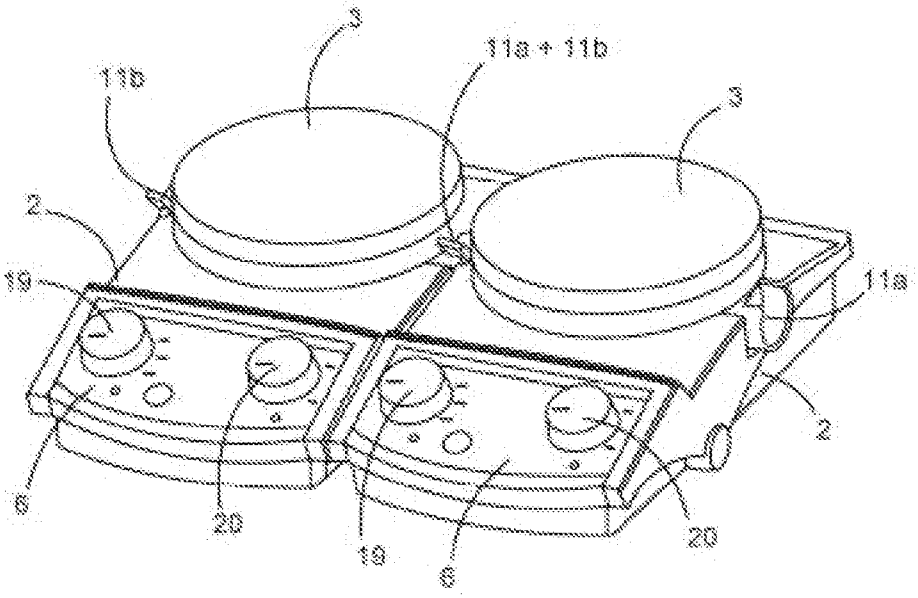
3
11a + 11b
11b
3
2
19
11a
2
6
20
19
20
6

Fig. 6