Innovation, Sciences et Développement économique Canada
Office de la Propriété Intellectuelle du Canada

Innovation, Science and Economic Development Canada
Canadian Intellectual Property Office

CA 3144815 A1 2021/06/03

(21) 3 144 815

(12) DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION

(13) A1

(86) Date de dépôt PCT/PCT Filing Date: 2020/07/23
(87) Date publication PCT/PCT Publication Date: 2021/06/03
(85) Entrée phase nationale/National Entry: 2021/12/22
(86) N° demande PCT/PCT Application No.: EP 2020/070771
(87) N° publication PCT/PCT Publication No.: 2021/104689
(30) Priorité/Priority: 2019/11/28 (DE10 2019 132 312.6)

(51) Cl.Int./Int.Cl. *A47L 11/40* (2006.01), *A47L 11/10* (2006.01), *A47L 11/28* (2006.01), *A47L 13/44* (2006.01)

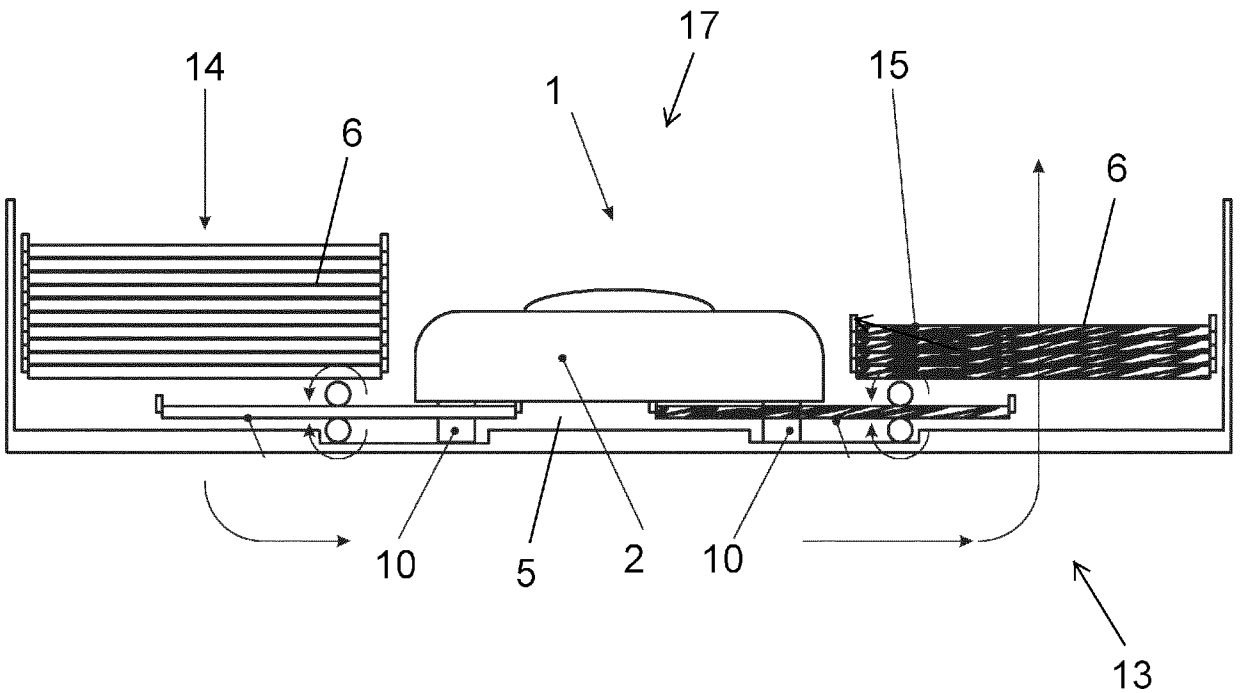
(71) Demandeur/Applicant:
CARL FREUDENBERG KG, DE

(72) Inventeurs/Inventors:
WEIS, NORBERT, DE;
HEILAND, MARC, DE;
STENGLEIN, CHRISTIAN, DE

(74) Agent: BORDEN LADNER GERVAIS LLP

(54) Titre : ROBOT DE NETTOYAGE ET SYSTEME DE NETTOYAGE
(54) Title: CLEANING ROBOT AND CLEANING SYSTEM

Fig. 7



(57) Abrégé/Abstract:
The invention relates to a cleaning robot (1), comprising a main body (2), a drive device (3) and a cleaning device (4), wherein: the cleaning device (4) is equipped for wet cleaning floors to be cleaned; an accommodation unit (5) for a mop covering (6) is associated with the main body (2) on the side facing the floor to be cleaned; for the wet cleaning, a mop covering (6) is fastened to the accommodation unit (5); and the cleaning robot (1) is equipped to automatically replace the mop covering (6) fastened to the accommodation unit (5) with another mop covering (6). The invention further relates to a cleaning system (17).

Abstract

The invention relates to a cleaning robot (1), comprising a main body (2), a drive device (3) and a cleaning device (4), wherein: the cleaning device (4) is equipped for wet cleaning floors to be cleaned; an accommodation unit (5) for a mop covering (6) is associated with the main body (2) on the side facing the floor to be cleaned; for the wet cleaning, a mop covering (6) is fastened to the accommodation unit (5); and the cleaning robot (1) is equipped to automatically replace the mop covering (6) fastened to the accommodation unit (5) with another mop covering (6). The invention further relates to a cleaning system (17).

Date reçue/ date received 2021-12-22

Patent Application

Cleaning robot and cleaning system

The invention relates to a cleaning robot, comprising a main body, a drive device and a cleaning device, wherein the cleaning device is equipped for wet cleaning of floors to be cleaned, wherein a receiving unit for a mop cover is assigned to the main body on the side facing the floor to be cleaned, wherein, for the wet cleaning, a mop cover is fastened to the receiving unit. The invention furthermore relates to a cleaning system, comprising a cleaning robot and a base station.

Robots which are designed for wet cleaning are known, for example, from EP 3 482 669 A1. In the case of the previously known cleaning robot, a cleaning element can be placed onto a floor to be cleaned and can be spaced apart again from the floor to be cleaned. The cleaning element here is connected fixedly to the cleaning robot. A disadvantage in this case is that the surface performance of such a cleaning robot is limited since dirt accumulates on the cleaning element and has to be removed from time to time. For this purpose, it is, however, required to interrupt the cleaning work of the cleaning robot and to remove the dirt manually from the cleaning element.

The invention is based on the object of providing a cleaning robot for wet cleaning, which has a greater surface performance.

This object is achieved by the features of claim 1. The dependent claims refer to advantageous refinements.

In order to achieve the object, the cleaning robot is equipped to automatically exchange the mop cover fastened to the receiving unit for another mop cover. In this case, the mop cover is fastened releasably to the receiving unit, wherein the cleaning robot is equipped to automatically carry out the changing of the mop cover without the assistance of an operator. If a relatively large surface is to be cleaned, it is conceivable that the surface performance of an individual mop cover is insufficient. By means of the refinement according to the invention, the cleaning robot can exchange a used mop cover for a new mop cover during the cleaning work. As a result,

Date reçue/ date received 2021-12-22

it is possible for the cleaning robot to achieve a greater surface performance and in particular to be able to completely clean even relatively large surfaces.

A first storage unit for storing mop covers can be assigned to the main body. The first storage unit is equipped here to receive a plurality of mop covers and to supply them to the receiving unit upon request. For example, the first storage unit can be equipped to receive five unused mop covers.

The mop covers stored in the first storage unit can be provided with a cleaning agent. In this refinement, the mop covers are pre-wetted and stored prepared for cleaning in the first storage unit. The pre-wetted mop covers stored in this manner are immediately ready for use for wet cleaning after being supplied to the receiving unit.

A second storage unit for storing used mop covers can be assigned to the main body. If a used mop cover is exchanged for a new mop cover during the cleaning work, a new mop cover is removed from the first storage unit and the used mop cover is supplied to the second storage unit.

Alternatively, it is conceivable for a mop cover to be removed from the first storage unit, to be supplied to the receptacle and for the used mop cover to be supplied again to the first storage unit from the receptacle.

The mop covers can be reusable. Such mop covers are preferably formed from a textile material. The mop covers are preferably machine-washable here, and therefore hygienic cleaning of the mop covers in a washing machine is possible.

The mop covers can be designed as disposable items. The disposable items can be designed here as disposable cloths. It is in particular conceivable here for the disposable items to be stored pre-wetted with a cleaning agent in a box. It is conceivable for the box to be a sales unit and for the box with the mop covers arranged therein to be able to be acquired by the user as a unit.

Furthermore, it is conceivable for the box to form the storage unit, and therefore the box with the mop covers stored therein can be arranged directly in the main body of the cleaning robot. This results in particularly simple handling.

Alternatively, it is conceivable for the mop covers to be formed from a textile and thereby to be repeatedly reusable. In this case, it is particularly advantageous if the mop covers are machine-washable. In this refinement, it is advantageous that the amount of waste is reduced.

The main body can be assigned a transport device which transports mop covers from the storage unit to the receiving unit and/or from the receiving unit to the second storage unit. For this purpose, the transport device can have, for example, a gearwheel arrangement or a belt drive or the like.

The mop covers are preferably held in a form-fitting manner on the receiving unit. For this purpose, the mop covers are provided with an arrangement of apertures, for example in the form of a perforated strip pattern, on mutually opposite edges. The apertures engage in elevations assigned in the receiving unit, for example in gearwheel-like protrusions. The mop cover can thereby be held securely on the receiving unit. Furthermore, it is conceivable for the transport unit to engage in the form-fitting elements and for the mop cover to be transported from the first storage unit to the receiving unit and/or from the receiving unit to the second storage unit.

The mop covers can be held on the receiving unit via a fixing means. The fixing means can be composed, for example, of magnets which are assigned to the mop cover and to the receiving unit. Furthermore, it is conceivable for the mop cover to be held on the receiving unit by means of a touch and close fastener.

If a mop cover fastened to the receiving unit in this way is to be released for removal, it is conceivable for the receiving unit to be mounted movably under the main body and to retract into the main body for removal of the mop cover. In this case, the mop cover is removed in the receiving unit and can be exchanged.

The mop cover can be equipped with a stiffening means. The latter can be formed from a textile strip or plastics strip assigned to the edges of the mop cover. The stiffening means result in a dimensionally stable mop cover.

The object is also achieved by a cleaning system as claimed in claim 11. Advantageous refinements of the cleaning system make reference to claim 11.

In order to achieve the object, the cleaning system comprises a cleaning robot as described above and a base station, wherein the base station is equipped to receive a first store of mop covers.

Base stations for cleaning robots are known, wherein, in the case of the known cleaning robots, the base station is used to charge the storage batteries of the electric drive of the cleaning robot. For this purpose, the cleaning robot can automatically arrive at the base station.

In the case of the refinement according to the invention, the base station is furthermore provided with a first store in which mop covers are accommodated. If the cleaning robot arrives at the base station, the cleaning robot can automatically receive one or more mop covers from the base station. If the cleaning robot is equipped to receive only one mop cover, the latter is supplied directly to the receiving unit. If the cleaning robot is equipped to receive a plurality of mop covers, the latter are supplied to the storage unit of the cleaning robot.

The base station can be provided with a second store for receiving used mop covers. In this connection, it is conceivable for the cleaning robot to be provided only with a single mop cover which is situated on the receiving unit, the cleaning robot arriving at the base station in order to exchange the mop cover. In this case, the mop cover can be supplied directly to the second store from the receiving unit. In another refinement, the cleaning robot is equipped to supply used mop covers temporarily stored in a second storage unit to the second store of the base station.

The base station can have a pretreatment device for the pretreatment of the mop covers. In this connection, it is conceivable in particular for the base station to be provided with a fresh water connection and/or a waste water connection. If the base station is provided with a pretreatment device, the mop covers can be stored untreated, i.e. dry, in the first store. If the mop covers are supplied to the cleaning robot, the mop covers are pretreated by the pretreatment device. However, the mop covers arranged in the first store can also be pretreated. In this case, the mop covers are preferably provided

with a suitable cleaning agent. It is conceivable here for a cleaning agent, which is matched to the forthcoming cleaning task, to be applied to the mop cover. For example, a cleaning agent which is suitable for natural stone or a cleaning agent which is suitable for wooden floors can be applied to the mop cover depending on requirements. Furthermore, it is conceivable to apply fragrances or care products to the mop covers.

The metering and selection of the cleaning agents or care products can be dependent on an automatic identification of the forthcoming cleaning task, or of the floor to be cleaned, or of a predefined assignment of a floor surface to be cleaned or of a room. For this purpose, the cleaning robot can be equipped with a device for room recognition. Furthermore, the cleaning robot can be provided with a memory unit in which a predetermined cleaning program is stored for a predetermined room. The cleaning program can define the mopping duration, the amount of cleaning liquid to be applied, the contact pressure of the mop cover on the floor to be cleaned and/or the type of cleaning agent or care product.

It is also conceivable for the mop cover to be equipped with communication means for communicating with the cleaning robot. Various, preferably electronically readable identifiers are conceivable as the communication means. Examples of identifiers of this type include QR codes, perforated strip patterns and radio transponders, such as RFID chips. In this case, it is conceivable for differently configured mop covers to be available to the cleaning robot in the storage unit or in the base station and for the cleaning robot to select a mop cover which is predefined by the cleaning program and is intended for the forthcoming cleaning task, the mop cover being found by means of the communication means.

The pretreatment device can be designed as a spray device which sprays the mop covers with a cleaning agent and care product when said mop covers are removed from the store. However, it is also conceivable for the pretreatment device to be equipped to pretreat all the mop covers stored in the first store.

A base station can have an aftertreatment device for the aftertreatment of mop covers. The aftertreatment device is equipped in particular to aftertreat the used mop covers transferred from the cleaning robot into the second store. The aftertreatment may comprise disinfecting and/or drying. For the

disinfecting, it is conceivable to expose the used mop covers to UV light. The mop covers can be dried using an airflow, for example by means of a fan.

A number of refinements of the cleaning robot according to the invention and of the cleaning system according to the invention will be explained in more detail below with reference to the figures, in which, in each case schematically:

Fig. 1 shows a cleaning robot;
Fig. 2 shows in detail the receiving unit of the cleaning robot;
Fig. 3 shows a mop cover equipped with communication means;
Fig. 4 shows various refinements of mop covers;
Fig. 5 shows a cleaning system with a first store;
Fig. 6 shows a cleaning system with a first store and a second store;
Fig. 7 shows a cleaning system with a transport device;
Fig. 8 shows a cleaning system with a pretreatment device;
Fig. 9 shows a cleaning system with a pretreatment device and an aftertreatment device.

Figure 1 shows a cleaning robot 1, comprising a main body 2, a drive device 3 and a cleaning device 4. The cleaning robot 1 is equipped to autonomously move over a floor to be cleaned and, in the process, to carry out cleaning work. For this purpose, the drive device 3 comprises wheels which are driven via an electric motor, wherein the electric motor is supplied with power via a rechargeable storage battery. The drive device 3 furthermore comprises a sensor device by means of which the cleaning robot 1 can navigate over the floor to be cleaned. The storage battery is charged in a base station 13. The cleaning robot 1 is configured to automatically arrive at the base station 13.

The cleaning device 4 is equipped for wet cleaning of floors to be cleaned. For this purpose, a receiving unit 5 for a mop cover 6 is assigned to the main body 2 on the side facing the floor to be cleaned. For the wet cleaning, a mop cover 6 is fastened to the receiving unit 5. The cleaning robot 1 is equipped here to automatically exchange the mop cover 6 fastened to the receiving unit 5 for another mop cover 6.

According to an advantageous refinement of the cleaning robot 1, a first storage unit 7 for storing mop covers can be assigned to the main body 2. The first storage unit 7 is preferably integrated in the main body 2 such that

a store of mop covers 6 is arranged in the first storage unit 7 within the main body 2. The mop covers 6 which are stored in the storage unit 7 can be pretreated with a cleaning agent such that they are immediately ready for use when they are supplied to the receiving unit 5. A second storage unit 8 for storing used mop covers 6 can be assigned to the main body 2. In this refinement, the mop covers 6 are preferably designed to be reusable.

Alternatively, the mop covers 6 can be designed as disposable items or disposable cloths.

Figure 2 shows in detail the receiving unit 5 of the cleaning robot 1 described in figure 1. The main body 2 is assigned a transport device 10 which transports mop covers 6 from the first storage unit 7 to the receiving unit 5 and subsequently from the receiving unit 5 to the second storage unit 8. The mop cover 6 is held in a form-fitting manner on the receiving unit 5 and is held securely on the receiving unit 5 via a fixing means 11 in the form of magnets.

Figure 3 shows a development of the cleaning robot 1 described in figure 1, wherein the mop cover 6 is equipped with communication means 9 for communicating with the cleaning robot 1. In this refinement, the cleaning robot 1 also comprises communication means 9 in order to be able to exchange data with the mop cover 6. The communication means 9 are equipped to communicate via near field communication (NFC). For this purpose, an RFID chip can be integrated in the mop cover 6. The RFID chip here can contain data permitting an unambiguous assignment of the mop cover 6. In this connection, it is conceivable in particular to detect the number of cleaning cycles carried out by the mop cover 6 and to localize the mop cover 6.

Figure 4 shows various refinements of mop covers, wherein the mop cover 6 illustrated at the top is produced from a textile material and can be used several times. The mop cover 6 can be cleaned by washing in a machine. The mop cover 6 illustrated at the bottom is designed as a disposable item or as a disposable cloth.

Figure 5 shows a cleaning system 17, comprising a cleaning robot 1 as previously described, and a base station 13. The base station 13 is equipped to receive a first store 14 of mop covers 6. In this refinement, the cleaning

robot 1 is equipped to remove a mop cover 6 from the first store 14 and to supply it to the receiving unit 5. If the cleaning robot 1 has a storage unit 8, the cleaning robot 1 can also remove a plurality of mop covers 6 from the first store 14.

Figure 6 shows a further refinement of the cleaning system 17 described in figure 5. In this refinement, the base station 13 comprises a second store 15 for receiving used mop covers 6.

Figure 7 shows the process of exchanging mop covers 6 while the cleaning robot 1 is in the base station 13. During the exchanging of mop covers 6, a charging operation can take place at the same time, in which the storage battery integrated in the main body 2 of the cleaning robot 1 is charged. If the cleaning robot 1 is in the base station 13, a used mop cover 6 can be transported from the receiving unit 5 in the direction of the second store 15 by the transport device 10. Subsequently, a fresh mop cover 6 is removed from the first store 14 and supplied by the transport device 10 to the receiving unit 5 and fastened there in a force- and form-fitting manner to the receiving unit 5 by the fixing means 11.

In an alternative refinement, in which the cleaning robot 1 has a first storage unit 7 and a second storage unit 8, the used mop covers 6 received in the second storage unit 8 are supplied to the second store 15, while a plurality of mop covers 6 are removed from the first store 14 and supplied to the first storage unit 7.

Figure 8 shows a development of the previously described cleaning system 17. In the refinement here, the base station 13 is equipped with a pretreatment device 16 for the pretreatment of mop covers 6. The pretreatment device 16 here is configured to apply a cleaning agent, which is matched to the forthcoming cleaning task, to a mop cover 6. In this refinement, the pretreatment device 16 comprises a spray device which is designed to provide the mop covers 6 arranged in the first store 14 with a cleaning agent. The mop cover which is supplied to the receiving unit 5 of the cleaning robot 1 is in each case pretreated here. Accordingly, the cleaning agent is applied directly before the mop cover is supplied to the receiving unit 5. The pretreatment device 16 comprises a reservoir 19 in which cleaning agent is arranged.

Figure 9 shows a further refinement of the cleaning system 17. In the present refinement, the base station 13 is equipped with a first store 14 for receiving unused mop covers 6 and with a second store 15 for receiving used mop covers 6. Furthermore, the base station 13 has a pretreatment device 16 for the pretreatment of mop covers 6 which are arranged in the first store 14. Furthermore, the base station 13 has an aftertreatment device 18 for the aftertreatment of mop covers 6 which are situated in the second store 15. The aftertreatment device 18 is designed as a drying device and, for this purpose, has a fan.

Patent Claims

1. A cleaning robot (1), comprising a main body (2), a drive device (3) and a cleaning device (4), wherein the cleaning device (4) is equipped for wet cleaning of floors to be cleaned, wherein a receiving unit (5) for a mop cover (6) is assigned to the main body (2) on the side facing the floor to be cleaned, wherein, for the wet cleaning, a mop cover (6) is fastened to the receiving unit (5), characterized in that the cleaning robot (1) is equipped to automatically exchange the mop cover (6) fastened to the receiving unit (5) for another mop cover (6).

2. The cleaning robot as claimed in claim 1, characterized in that a first storage unit (7) for storing mop covers (6) is assigned to the main body (2).

3. The cleaning robot as claimed in claim 2, characterized in that the mop covers (6) stored in the first storage unit (7) are provided with cleaning agents.

4. The cleaning robot as claimed in one of claims 1 to 3, characterized in that a second storage unit (8) for storing used mop covers (6) is assigned to the main body (2).

5. The cleaning robot as claimed in one of claims 1 to 4, characterized in that the mop covers (6) are reusable.

6. The cleaning robot as claimed in one of claims 1 to 4, characterized in that the mop covers (6) are designed as disposable items.

7. The cleaning robot as claimed in one of claims 1 to 6, characterized in that the mop cover (6) is equipped with communication means (9) for communicating with the cleaning robot (1).

8. The cleaning robot as claimed in one of claims 2 to 7, characterized in that the main body (2) is assigned a transport device (10) which transports mop covers (6) from the first storage unit (7) to the receiving unit (5) and/or from the receiving unit (5) to the second storage unit (8).

Date reçue/ date received 2021-12-22

9. The cleaning robot as claimed in one of claims 1 to 8, characterized in that the mop cover (6) is held in a form-fitting manner on the receiving unit (5).

10. The cleaning robot as claimed in one of claims 1 to 9, characterized in that the mop cover (6) and the receiving unit (5) have a fixing means (11).

11. A cleaning system (17) comprising a cleaning robot (1) as claimed in one of claims 1 to 10 and a base station (13), wherein the base station (13) is equipped to receive a first store (14) of mop covers (6).

12. The cleaning system as claimed in one of claims 1 to 11, characterized in that the cleaning robot (1) is equipped to remove at least one mop cover (6) from the first store (14) and to supply it to the receiving unit (5) and/or to the second storage unit (8).

13. The cleaning system as claimed in claim 11 or 12, characterized in that the base station (13) has a second store (15) for receiving used mop covers (6).

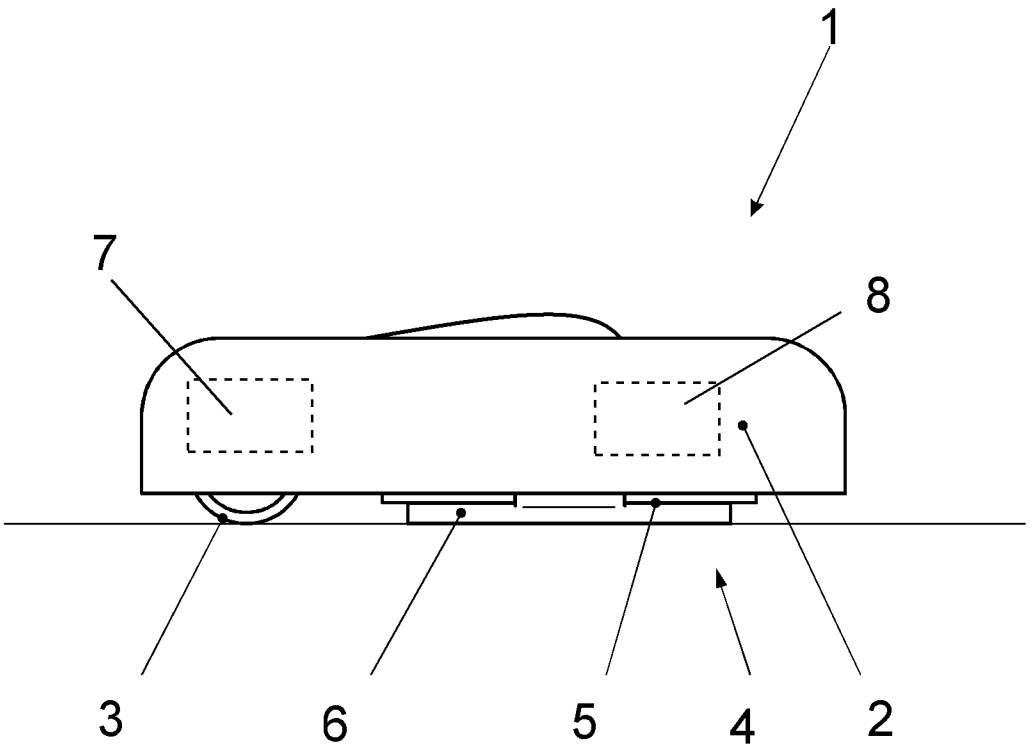
14. The cleaning system as claimed in one of claims 11 to 13, characterized in that the base station (13) has a pretreatment device (16) for the pretreatment of mop covers (6).

15. The cleaning system as claimed in claim 14, characterized in that the pretreatment device (16) is configured to apply a cleaning agent, which is matched to the forthcoming cleaning task, to a mop cover (6), to the mop covers (6) arranged in the first storage unit (7) or to the mop covers (6) arranged in the first store (14).

16. The cleaning system as claimed in claim 14 or 15, characterized in that the pretreatment device (16) comprises a spray device.

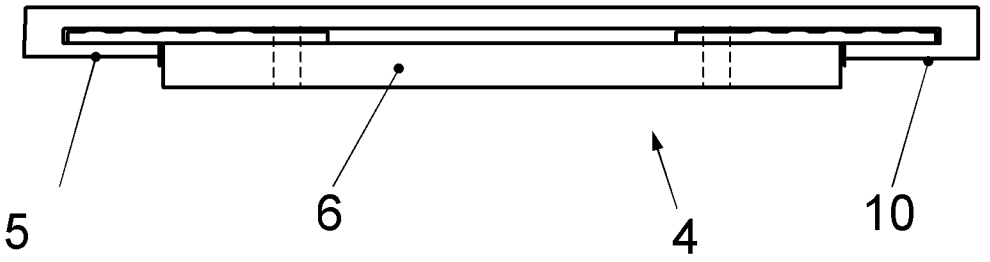
17. The cleaning system as claimed in one of claims 11 to 16, characterized in that the base station (13) has an aftertreatment device (18) for the aftertreatment of mop covers (6).

Fig. 1



Date reçue/ date received 2021-12-22

Fig. 2



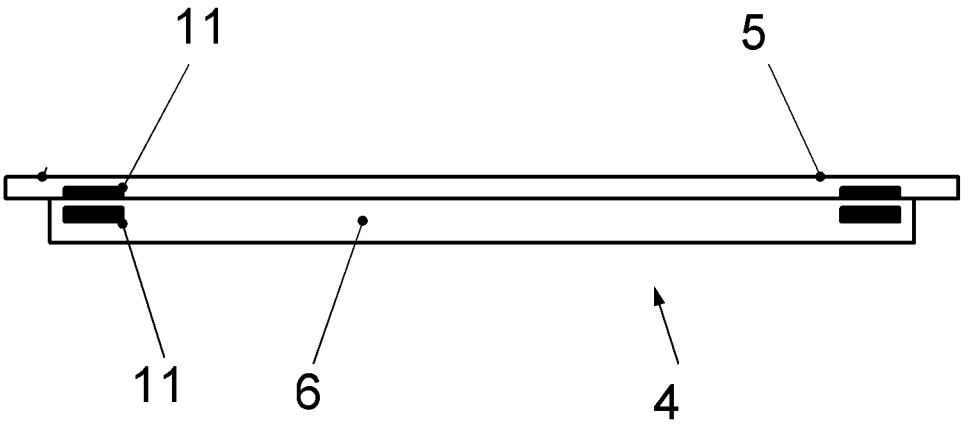
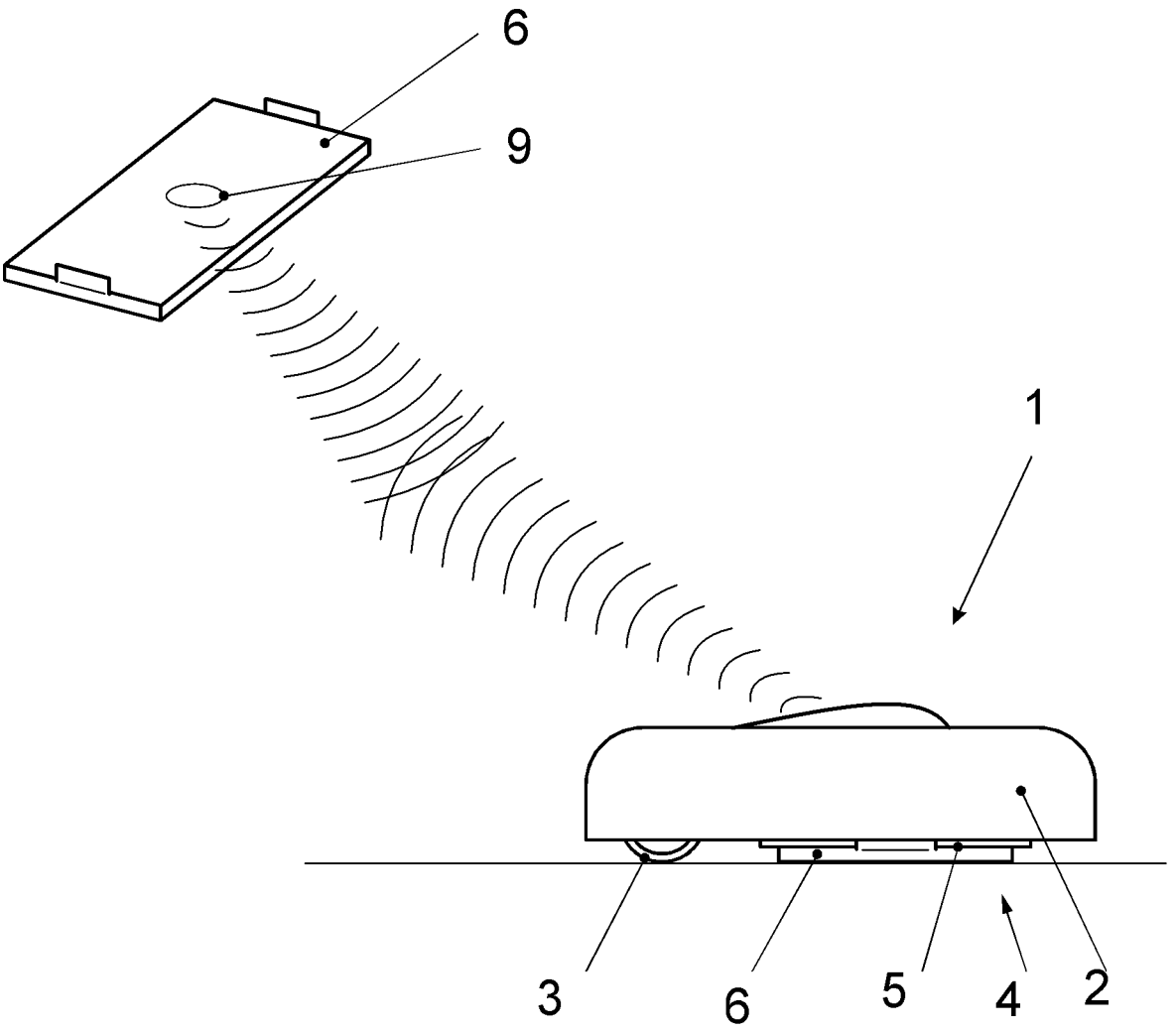
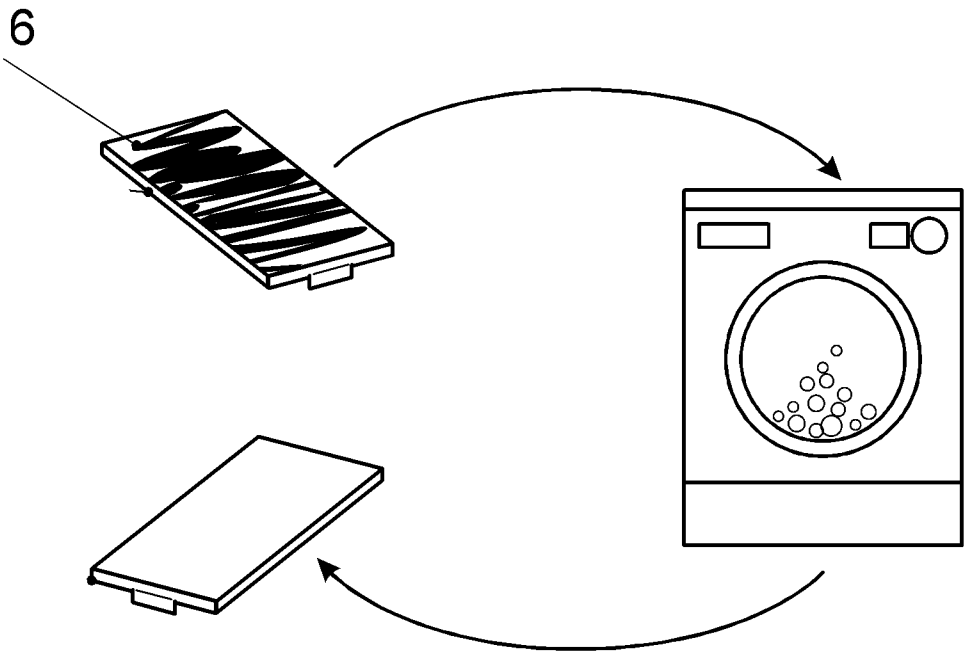


Fig. 3



Date reçue/ date received 2021-12-22

Fig. 4



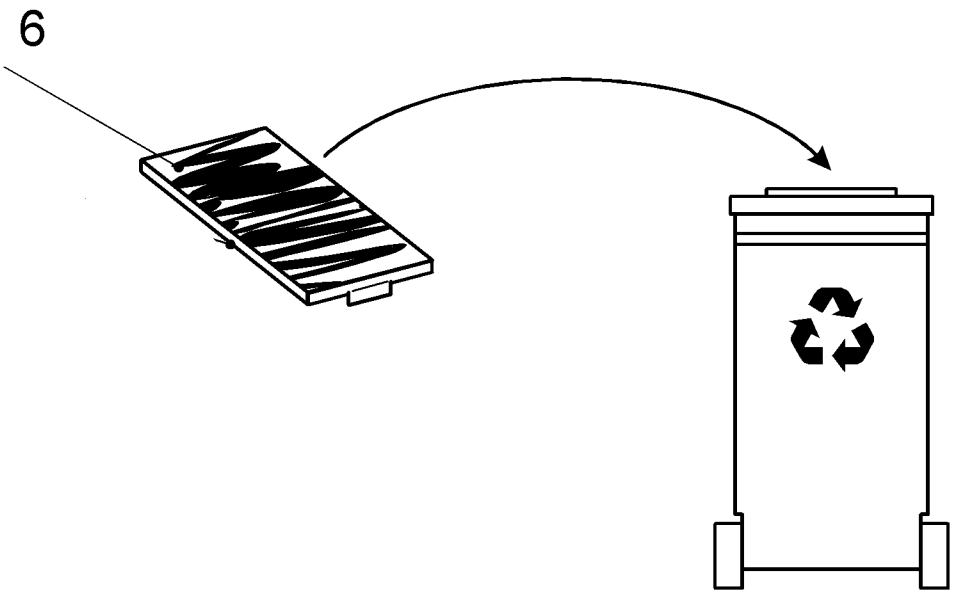


Fig. 5

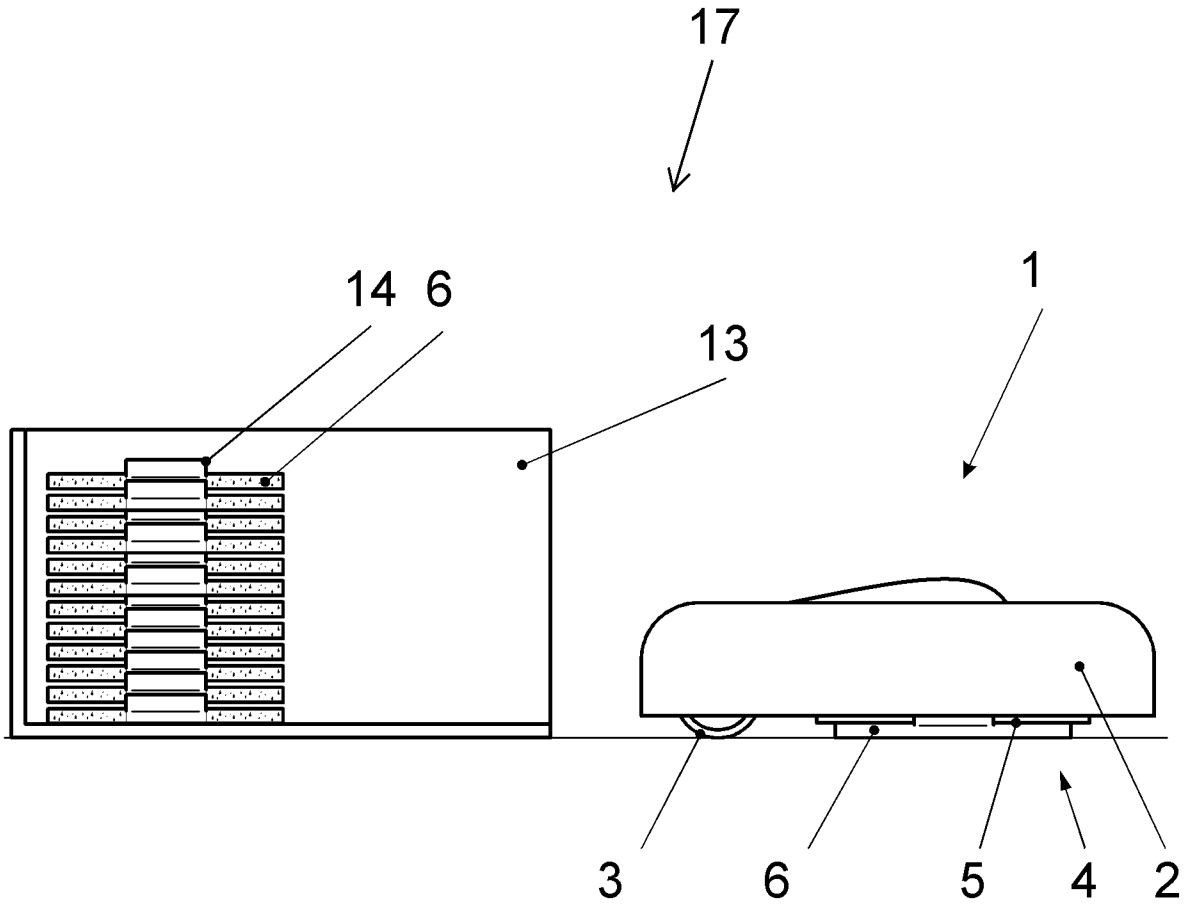
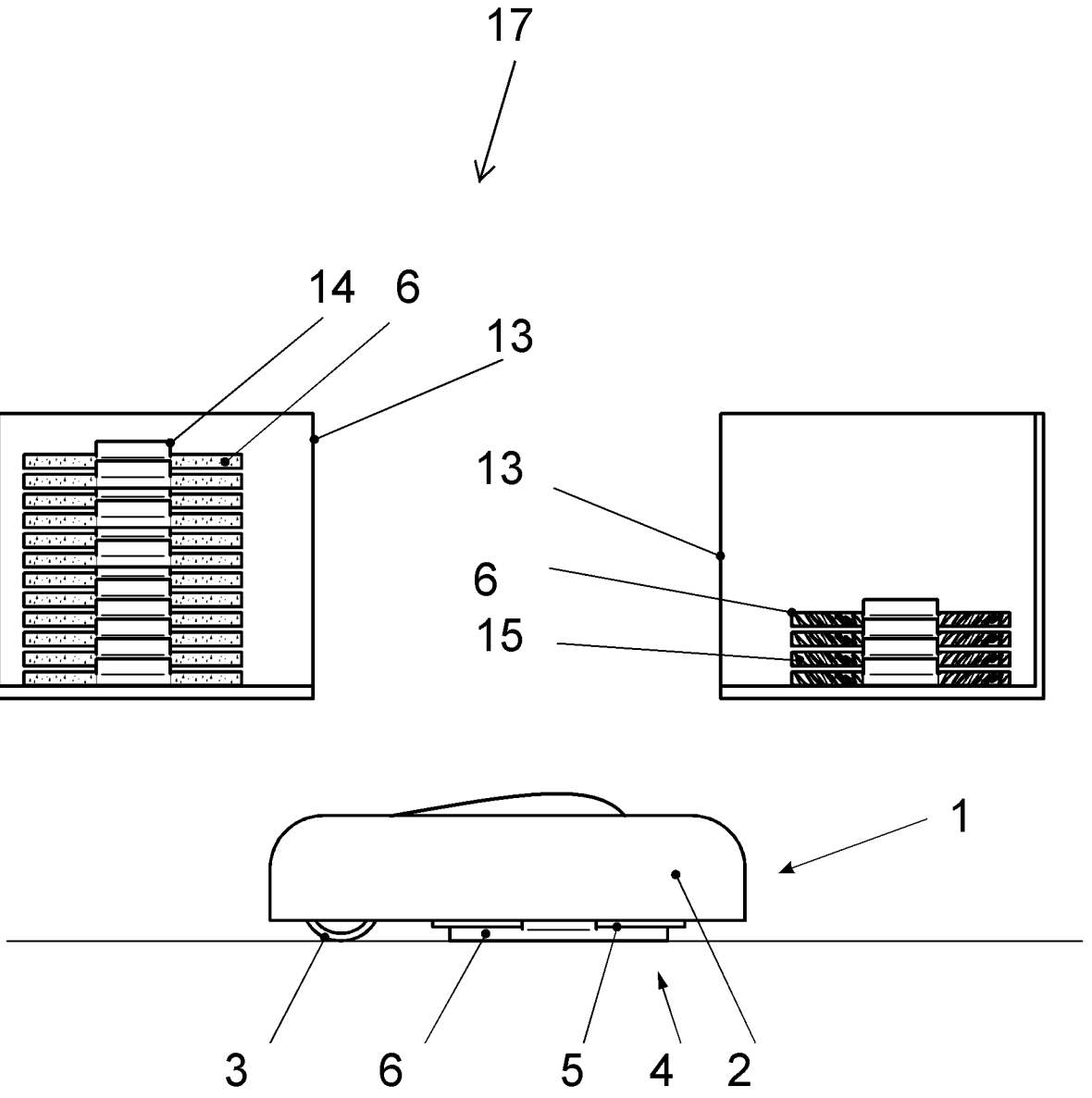


Fig. 6



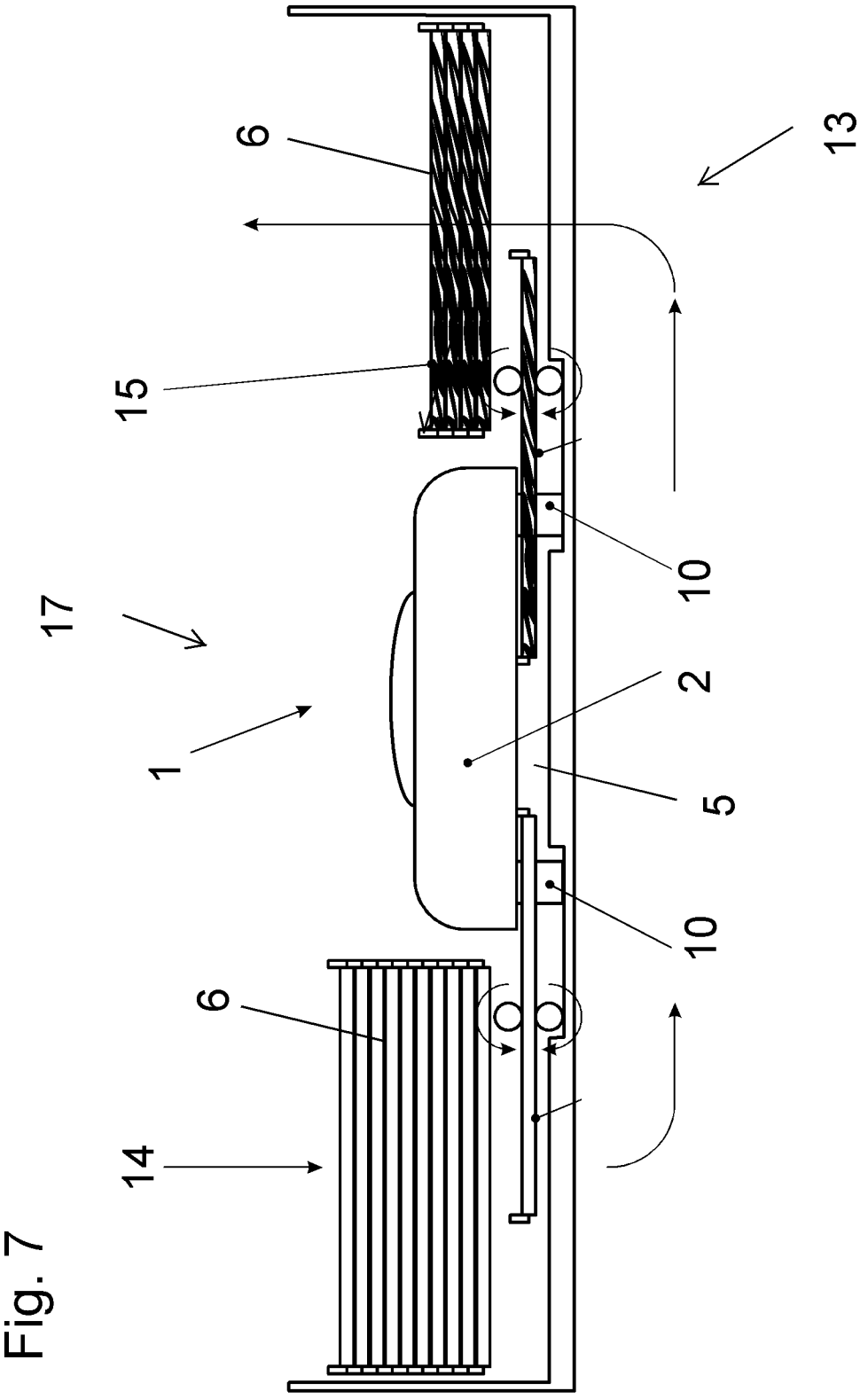
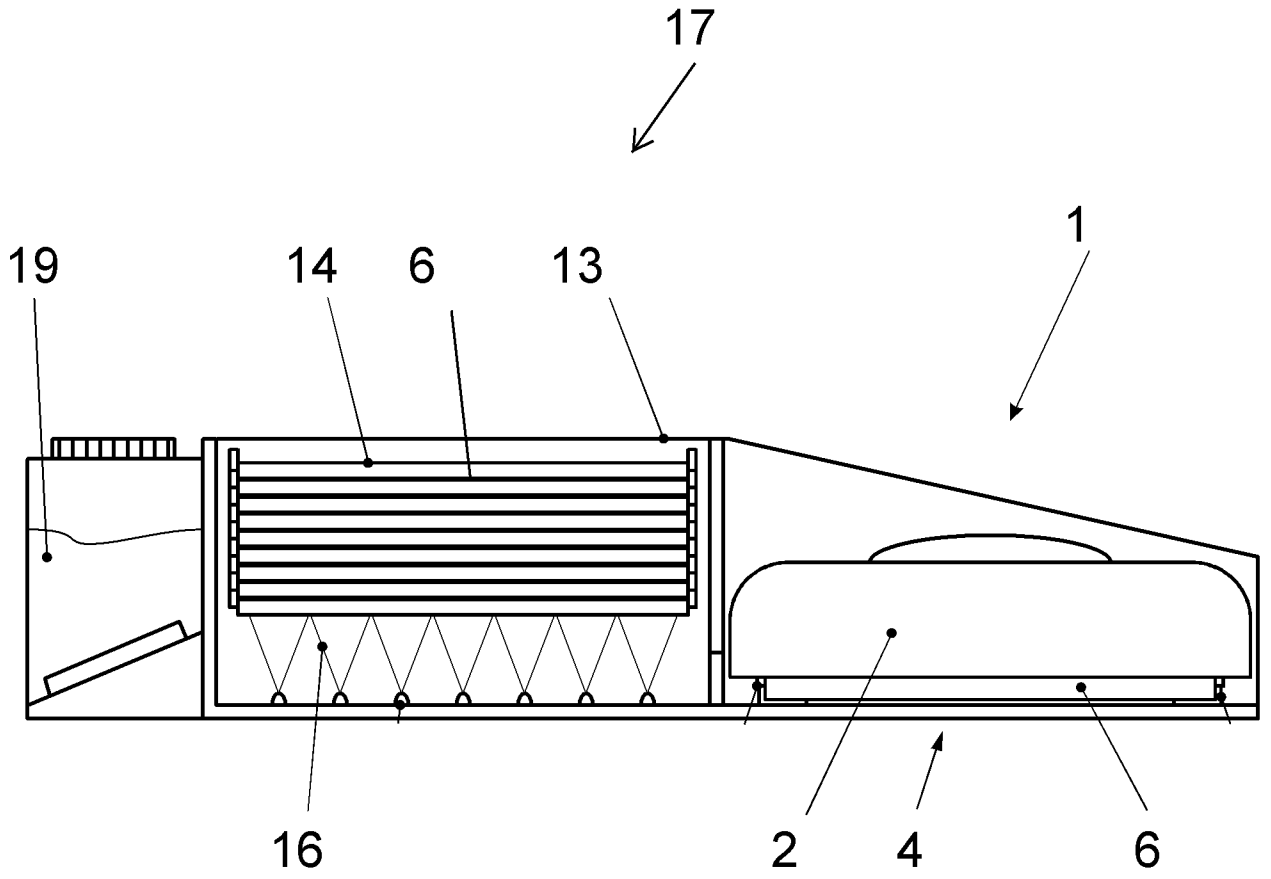


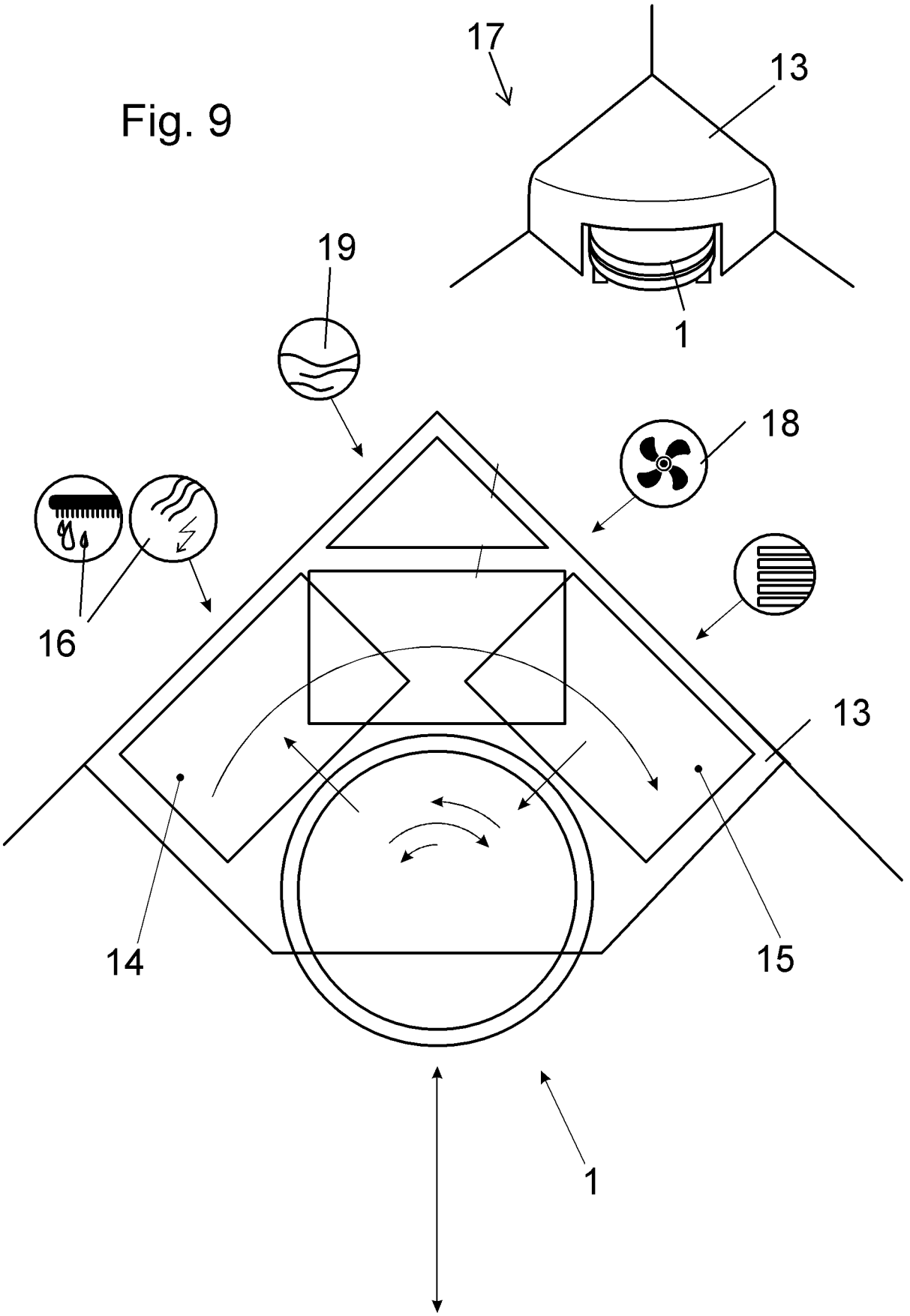
Fig. 7

Fig. 8



Date reçue/ date received 2021-12-22

Fig. 9



Date reçue/ date received 2021-12-22

Fig. 7