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(54) VENDING MACHINE FOR DISPENSING EDIBLE PRODUCTS IN A FLUID STATE

VERKAUFSAUTOMAT VON ESSBAREN PRODUKTEN IN EINEM FLUIDZUSTAND

DISTRIBUTEUR AUTOMATIQUE POUR LA DISTRIBUTION DE PRODUITS COMESTIBLES À L'ÉTAT FLUIDE

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(56) References cited:
EP-A1- 1 972 198
AU-A- 4 612 179
IT-A1- TO20 111 093
US-A1- 2004 118 291
US-A1- 2006 208 002
US-B1- 6 206 278

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EP 3 528 218 B1

Description

Technical Field

[0001] The invention relates to a vending machine for dispensing edible products in a fluid state.

[0002] The invention finds particular application in the dispensing to the public of doses of edible products that are in the fluid state at room temperature. Said products may have a creamy, pasty or semi-liquid consistency, when they are at room temperature, and may consist, in particular, though not exclusively, of sauces and food seasonings.

[0003] The invention is particularly suitable for dispending doses of edible products in the fluid state, having a density between 1000 and 3000 cp (centipoise).

Background Art

[0004] Known edible products of the aforementioned type are commonly used to flavor foodstuffs and include, for example, mayonnaise, ketchup, mustard, various kinds of sauces, tomato sauce, fruit mustard, jams, zabaiones, oils, condiments.

[0005] These edible products are sometimes dispensed to the public in the form of loose foodstuffs to be consumed immediately.

[0006] Manual-type dispensers for edible products are known, which use dispensing devices attached to containers of different shapes and capacities. In general, the dispensing devices comprise small manual pumps, typically lever-operated ones, which are applied to glass jars, buckets or flexible bags, containing the edible product to be dispensed.

[0007] In general, these known dispensers have a series of drawbacks.

[0008] Although the volume of the container may vary according to the amount of product to be dispensed and therefore depending on the intended use, for example in small or large communities, these dispensers still have a reduced capacity for storing food and therefore they do not lend themselves to frequent and prolonged use.

[0009] In addition, manual dispensers do not usually have measures for storing the food substance to be dispensed, which comes into contact with the air, for example through the dispensing conduit. In these cases, the preservation of the food is entrusted to the preservatives present in the product itself and these dispensers are therefore unsuitable, for example, to dispense biological sauces, which are exempt by law from preservatives.

[0010] In general, cleaning and sanitizing of manual dispensers is difficult and sometimes impossible, unless following the complete disassembly of the pumping system and therefore with considerable loss of time.

[0011] In the case of products in which animal proteins deriving, for example, from eggs, milk, meat, fish and their derivatives are present, the difficulty of cleaning substantially precludes the use of these dispensers, as it is impossible to provide consumers with sufficient hygienic guarantees in accordance with the laws in force in the food sector.

[0012] In known devices it is also difficult to precisely define the quantity of product dispensed, said quantity being given by the force applied to the linkage which drives the pumping mechanism and therefore differing from one operator to another and from one product to another. This last drawback also translates into the impossibility of replicating a predefined dosage, a need that is particularly felt when the device is used in a community or in the catering sector.

[0013] For dispensing doses of condiments to be used directly on the purchased food, in the catering sector and in particular in community canteens and fast-food restaurants, small pre-packaged envelopes containing the condiment are currently used.

[0014] However, this practice causes an increase in dispensing costs and product waste, due to the fact that each dose is pre-packaged in a food bag, which therefore can contain an excessive quantity of product for many customers. In addition, envelopes are frequently not used and are destroyed along with uneaten food residues.

[0015] Vending machines capable of dispensing a fluid edible product in the loose state are also known.

[0016] An example of a machine of this type for dispensing liquid products such as syrups, concentrates, milk, cheeses, condiments, sauces, is described in US 7,572,113 B2. This machine includes a peristaltic pump to pump the liquid contained in a bag and deliver it through a nozzle.

[0017] Machines of this kind are, however, complex and expensive and are suitable for use by service personnel, who work on the machine to dispense the desired dose of product, possibly directly onto the already prepared food.

[0018] Furthermore, the cleaning of these machines is cumbersome and, having to be carried out frequently, leads to an increase in operating costs. In addition, the results obtained in the cleaning phase are often not optimal for hygiene.

[0019] The use of these machines by the public in the catering sector involves a series of drawbacks.

[0020] In the first place, the public tends to dispense a quantity of product greater than the quantity that would be dispensed by service personnel, with a consequent increase in product consumption.

[0021] Secondly, the average public is not always capable of operating complex machines, therefore requiring the presence of an operator, and this brings about an increase in machine management costs.

[0022] In known machines of the described type, the use of valves and other organs to interrupt the flow of the product, avoid dripping, etc. makes washing and complete sanitization problematic.

[0023] Currently known machines are mostly suitable for dispensing water, beverages, milk, wine and beer, products which, however, involve hygienic problems of

a completely different nature and in any case less relevant and critical than in the case of dense products, such as condiments and, for example, protein sauces.

[0024] Each element which does not have rounded and blunt shapes and is intercepted by the flow of the edible product can retain parts of the product, which can also be very viscous: think, for example, of a mayonnaise that may have a viscosity (absolute and dynamic) of over 3, 000 cp (centipoise) (3 Pa.s).

[0025] The treatment of products with these viscosity characteristics consequently makes washing and sanitizing of the machine more complex.

[0026] AU 4 612 179 describes a machine for dispensing doses of edible products comprising: a supporting structure, a chamber capable of receiving a container of a product to be dispensed, a dispensing spout from which the doses of the dispensed substance exit, a conduit having one end associated with the container and the opposite end associated with the spout, an electric pump capable of pumping the product from the container towards the spout through the conduit, an electronic control unit for controlling the operation of the pump.

[0027] However, the machine described in the aforementioned document does not solve the problem of how to avoid excessive dispensing of the product by the user. It also has the disadvantage caused by the delayed and unwanted delivery of a certain amount of product, due to dripping from the spout at the end of delivery.

[0028] IT 1408998, in the name of the applicant, describes a machine that overcomes the drawbacks of the known art and solves the aforementioned problems by means of a control circuit, associated with the electronic control unit and programmed to make the pump perform a first, pumping cycle, in which the pump operates to pump the product contained in the container towards the spout, a second, suction cycle, in which the pump operates to suck up at least part of the product remaining in the conduit, and a waiting cycle, in which the pump is inhibited from pumping the edible product.

[0029] A problem associated with the aforementioned dispensing machine derives from the complexity of the washing operations, which must necessarily be carried out when the product container to be dispensed is replaced, for example when it is exhausted, with a new one.

[0030] This problem derives in particular from the fact that known machines of the aforementioned type generally use flexible conduits for dispensing the fluid product. Flexible conduits are advantageous since they can be adapted to the use of peristaltic pumps, associated along the conduit, the organs of which do not come into contact with the product dispensed. This configuration provides advantages in terms of ease of cleaning of the parts of the vending machine, washing of the conduits alone being sufficient. On the other hand, the material of the flexible conduits is not suitable for making the outlet portion of the circuit for dispensing the product. It is therefore necessary to connect the flexible conduit to a rigid nozzle, firmly attached to the structure of the machine. The spout represents the end part of the dispensing circuit and the open front end of the spout defines the outlet opening for the product. In use, in general, the user places a container under the spout to collect the dose of product dispensed. The container can be a vessel or a glass or a plate and can sometimes contain food products, for example foodstuffs ready to be consumed, destined to be seasoned with the product supplied by the vending machine. This circumstance, together with the fact that the container of the substance to be dispensed must periodically be replaced, since it is exhausted, can cause contamination of the spout and the consequent need for thorough washing.

[0031] Document IT TO20 111 093 discloses a vending machine for dispensing edible products in a fluid state.

[0032] A first object of the invention is therefore to obtain cleaning of the product delivery circuit so that the dispensing machine is ready to receive a new container of product to be dispensed without risk of contamination with unwanted substances.

[0033] Another object of the invention is to provide a vending machine for dispensing edible products in the fluid state, which overcomes the aforementioned drawbacks and can be easily washed, allowing compliance with the hygiene standards adopted in the food sector.

[0034] A further object of the invention is to provide a vending machine of the aforementioned type, which allows flexibility of use and is therefore suitable for multiple situations of use, both for service to the public and in the private sector.

[0035] Another object of the invention is to provide a vending machine of the aforesaid type particularly suitable for dispensing doses of edible products in the fluid state having a density of between 1000 and 3000 cp (centipoise) (between 1 and 3 Pa.s).

[0036] A further object of the invention is to provide a vending machine which can be produced industrially at low costs.

Disclosure of the Invention

[0037] The present invention relates to a vending machine for dispensing edible products in a fluid state as defined in the sole independent claim 1.

[0038] Advantageously, the vending machine for dispensing edible products in the fluid state according to the invention does not require substantially frequent washing operations. This result is achieved thanks to the provision of a container and a conduit for delivering the edible product, which avoids contact between the products and other parts of the machine. In this way, when the container must be replaced with a new one, it is also possible to replace the respective conduit with a new one. Moreover, advantageously, the new container full of product and the relative conduit can be supplied in a kit that is easy to transport and install.

[0039] The vending machine for dispensing edible products in the fluid state according to the invention gen-

erally comprises a supporting structure within which at least one seat is defined which is adapted to house at least one flexible container of the product to be dispensed. Optionally, the container may comprise a rigid or semi-rigid outer cladding, for example made of cardboard, which facilitates transport and storage thereof.

[0040] In a preferred embodiment of the invention, the flexible container is a container for foodstuffs, of a type known in the field as a "bag in box", consisting of a flexible bag with a capacity of 1 to 1,000 kg of product, inserted in a cardboard container. An example of a container suitable for the purpose is currently marketed under the Politainer® brand. This type of containers comprises a flexible bag made of plastic material suitable for foodstuffs, for example based on high quality polyolefins, not colored and containing no toxic additives. The bag, when filled, has a substantially cubic or parallelepiped shape and comprises a base provided with an outlet mouth for the product stored in the container. The outlet mouth is preferably provided with a connecting element on which a closure plug, for example a screw cap or a pressure cap, or a complementary fitting for connecting a conduit or a tap can be fitted, through which the product contained in the container is delivered to the outside.

[0041] The seat defined within the supporting structure preferably comprises a supporting base for the container, and side walls. Preferably, the supporting base, or lower base, has a horseshoe shape capable of supporting the periphery of the base of the container, leaving free the central part provided with an outlet mouth for the product contained in the container.

[0042] In addition, according to the invention, preferably the side walls of the seat for the flexible container partially surround the container, so that at least a portion of the side wall of the container is visible outside the seat, so that its filling level can be appreciated, thanks to the fact that the container is made of transparent material or thanks to the fact that the container collapses as it is emptied. The upper base of the seat for the flexible container is, instead, preferably open or possibly equipped with a corresponding openable lid, in order to allow easy replacement of the container housed in the corresponding seat.

[0043] The vending machine according to the invention further comprises a dispensing spout from which the dispensed product contained in the container exits. According to a preferred embodiment of the invention, the dispensing spout is firmly but removably fixed to the supporting structure.

[0044] According to the invention, the fluid product contained in the flexible container housed in the seat inside the supporting structure is transported to the dispensing spout by means of a flexible conduit, cooperating with a pump driven by an electric motor and associated with the supporting structure.

[0045] A first end of the flexible conduit is preferably associated with the container by means of a corresponding fitting which connects the conduit to the inside of the container through the outlet mouth.

[0046] The pump is adapted to create, at predetermined intervals, a throttling slidable along a portion of the flexible conduit. The slidable throttling is capable of imparting prevalence to the fluid carried within the conduit and consequently of pumping the product contained in the flexible container towards the spout. Still according to the invention, the pump is preferably a pump of the peristaltic type.

[0047] The vending machine according to the invention further comprises an electronic control unit for controlling the operation of the electric motor of the pump.

[0048] Preferably, the electronic control unit is housed in a suitable housing defined within the supporting structure.

[0049] The invention is advantageous mainly due to the fact that the dispensing spout comprises a rigid tube which can house an end portion of said flexible conduit.

[0050] Advantageously, thanks to this configuration, the spout is able to house an end portion of the flexible conduit therein. Therefore, according to the invention, the fluid product contained in the container can be carried to the outside, and delivered to the user that may request it, solely through the flexible conduit, which, however, extends through the end portion inside a rigid guide defined by the dispensing spout. The presence of the rigid guide forces the conduit to follow a predetermined optimal path and prevents the conduit from being deformed under the possible thrust exerted by the containers used for collecting the dispensed product and brought each time under the spout by the users of the vending machine.

[0051] Preferably, the rigid tube is made of stainless steel. According to a preferred embodiment of the invention the rigid tube further has a circular cross-section having a diameter no smaller than the outer cross-section of the conduit.

[0052] According to a preferred embodiment of the invention, the dispensing spout comprises a connecting portion provided with means capable of cooperating with corresponding counter-means, firmly associated with the supporting structure. The cooperation between the connecting means provided on the spout and the counter-means provided on the supporting structure allows to removably connect the spout to the supporting structure.

[0053] The vending machine according to the invention has a series of further advantages that will be listed here below.

[0054] The vending machine has high constructive simplicity and low cost and is therefore suitable to meet the needs of a wide market range.

[0055] In the event that the vending machine has to dispense more edible products, each product will be dispensed by a separate dedicated hydraulic circuit equipped with a respective pump and dispensing spout. This feature determines the advantage of keeping edible products separated and reducing the number of components subject to product accumulation and therefore difficult to clean.

[0056] Advantageously, the vending machine according to the invention exploits the capillary effect of the dispensing spout itself and therefore preferably has no block valves for the exiting product.

[0057] Advantageously, the dispensing spout, once removed from the vending machine, can be washed with various means, for example by using hot water and steam without using chemical detergents, thereby avoiding the risk deriving from the possibility that residues of the washing liquid may come into contact with the edible product dispensed to the consumer.

Brief Description of the Figures

[0058] A preferred embodiment of the invention will be described below by way of non-limiting example with reference to the appended figures, in which:

- Fig.1 is a front plan view of the vending machine according to the invention;
- Fig.2 is a side plan view of the vending machine of Fig.1 with front panel closed;
- Fig.3 is a side plan view of the vending machine of Fig.1 with front panel open;
- Fig.4 is a front plan view of the inside of the vending machine of Fig.1 from which the flexible conduits have been removed;
- Fig.5 is a top plan view of the inside of the vending machine of Fig.1 from which two flexible conduits out of three have been removed;
- Fig.6 is a side plan view of the inside of the vending machine of Fig.1 from which the flexible conduit has been removed;
- Figs.7A and 7B are schematic views of corresponding embodiments of the spout.

Description of Some Preferred Embodiments

[0059] Referring to Figures 1 to 6, a preferred embodiment of the vending machine is shown, which has been indicated as a whole with reference numeral 11.

[0060] The vending machine 11 for dispensing edible products in the fluid state comprises a supporting structure 13 in which three seats 15 are defined capable of housing a corresponding flexible container 17 containing a product to be dispensed by means of the vending machine 11.

[0061] A seat 15 defined within the supporting structure 13 comprises a supporting base 15a for the container 17, and side walls 15b,15c, a rear wall 15d and a pair of front wings 15e partially frontally extending in order to hold the peripheral edges of the containers 17.

[0062] In the illustrated embodiment, the side walls of adjacent seats 15 are in common between the seats 15. The base 15a, the side walls 15b,15c, the rear wall 15d and the front wings 15e are made of sheet metal or plastic.

[0063] A corresponding number of spouts 19 are provided for the exit of the product contained in each of the three containers 17.

[0064] A flexible conduit 21 is associated, at a first end 21a thereof, with the container 17 by means of a corresponding fitting 31. The supporting base 15a, or lower base, has a horseshoe shape capable of supporting the periphery of the base of the container 17, leaving free the central part provided with an outlet mouth and a corresponding fitting 31 for the product contained in the container.

[0065] The opposite end 21b of the conduit 21 is associated with the spout 19, as will become more evident from the ensuing description.

[0066] A pump 23 associated with the supporting structure 13 and driven by an electric motor 23a is adapted to create, at predetermined intervals, a throttling slidable along a portion of the conduit 21. The cyclic sliding of the throttling is capable of imparting prevalence to the fluid carried within the conduit 21 and, consequently, of pumping the product contained in the flexible container 17 towards the open end 21b of the conduit 21 associated with the spout 19.

[0067] An electronic control unit 25, comprising a corresponding electronic circuit board and respective printed circuits is provided for controlling the operation of the electric motor 23a of the pump 23.

[0068] According to the invention, the dispensing spout 19 comprises a rigid tube 19a made of stainless steel and having opposite open ends 19b,19c. Advantageously, according to a preferred embodiment of the invention, the spout 19 has a circular cross-section having a diameter "D" substantially equal to the diameter "d" of the outer cross-section of the conduit 21, so that the flexible conduit 21 can be inserted and held by interference fit in the spout 19. Possibly the inner diameter of the spout 19 may be made slightly smaller than the diameter of the conduit 21, which, being made of a compressible material, can be inserted by interference fit into the spout 19. In still further embodiments, the inner diameter of the spout 19 may be made so as to interfere with the outer diameter of the conduit 21 only over a portion of said spout. In this case, the spout may contain, for example, a squashing or narrowing, for holding the flexible conduit 21.

[0069] The spout 19, being adapted to receive therein an end portion 21c of the conduit 21, having a length at least substantially equal to the length of the spout 19, allows exit of the product without the product coming into contact with the surface of the spout 19, which, therefore, does not substantially require internal washing, but only, if at all, external cleaning.

[0070] As can be better appreciated in Fig.7A, the spout 19 comprises a connecting portion 19d provided with means 33 capable of cooperating with corresponding counter-means 35 for removably connecting the spout 19 to the supporting structure 13. According to this embodiment of the invention, said means include a flange 33a extending radially outside the spout 19 and having

holes for the passage of the threaded shafts of screws engaging in threaded bores provided in the supporting structure 13, or in corresponding threaded nuts.

[0071] In an embodiment variant shown in Fig.7B, the end portion 21c of the flexible conduit 21 preferably comprises a proximal end 21d having stop means 21e capable of interfering with the first end 19b, or inner end, of the dispensing spout 19. Thanks to this measure, advantageously, when said stop means 21e are in abutment against said first end 19b of the dispensing spout 19, the flexible conduit 21 extends within the spout 19 over the entire length of the spout, until at least the open end 19c, which is opposite to said first end and from which the dispensed product exits. In a particular embodiment, the stop means 21e may consist of a ring 37 surrounding the conduit 21 and press-fitted on the conduit 21. Alternatively, a mark, for example a colored annular band can be provided on the conduit 21, said mark indicating to the installer the correct position for placing the portion 21c into the spout 19.

[0072] Still referring to Fig.7B, an embodiment variant of the means 33 capable of cooperating with corresponding counter-means 35 for removably connecting the spout 19 to the supporting structure 13 is also illustrated. According to this embodiment variant, the means 33,35 comprise a corresponding quick release coupling of the bayonet-like type.

[0073] Referring again to Figs. 1 to 6, the supporting structure 13 comprises a housing 13a defining therein a chamber 39, separated from the environment outside the vending machine 11 by the wall 41 of the housing 13a. In the shown embodiment, the chamber 39 houses therein three seats 15 for corresponding flexible containers 17. In addition, the pump 23 and the conduit 21 are also housed within the chamber 39 on the horizontal base wall 41d. Preferably, each pump 23 is arranged with the motor 23a under the base wall 41d and with the pump portion above said base wall 41d. Advantageously, this arrangement allows to rationally distribute the parts within the chamber 39 and to separate the electric motors from the region exposed to liquid or semi-liquid products, while also making cleaning of the chamber 39 safer and easier. The dispensing spout 19 communicates the chamber 39 with the environment outside the vending machine 11. According to this preferred embodiment of the invention, the conduit 21 exits said chamber 39 with an end portion 21c extending within said spout 19.

[0074] In this preferred embodiment of the invention, the front wall 41a of the housing 13a is openable, preferably hinged at its lower part, and the counter-means for removably connecting the spout 19 are associated with said openable wall 41a at a corresponding hole 43 for the passage of the tube made of stainless steel 19a defining the spout 19. A rear wall 41e, possibly a removable one, is also provided for closing the chamber 39 at its rear.

[0075] The electronic control unit 25 preferably comprises a microprocessor, a storage unit and a power supply unit and is connected to a visual display 47 as well as to a set of control push-buttons 49 and a set of indicator lights 51. The electronic control unit 25 is programmed to cause the pump to complete a pumping cycle which corresponds to a number N1 of revolutions of the rotor of the electric motor 23a driving the pump 23. For this reason, the pump 23 is provided at its inside with an encoder device arranged to generate an electric signal indicative of the number of revolutions performed by the motor 23a. The pump 23 operates to pump the product contained in the container 17 towards the spout 19. In addition, the pump 23 preferably operates, at the end of the cycle of dispensing the predetermined dose, a suction cycle corresponding to a number N2 of revolutions of the rotor of the electric motor 23. The suction cycle can be obtained by inverting the direction of rotation of the electric motor 23a driving the pump 23. In the suction cycle, at least part of the product that may be present in the end portion of the flexible conduit 21 is sucked up towards the container 17.

[0076] In addition, preferably, the electronic control unit 25 is programmed for carrying out, after each dispensing cycle, a waiting cycle having a duration T1, in which the pump 23 is inhibited from pumping the product contained in the container 17.

[0077] According to the invention, for each product to be dispensed, i.e. for each container 17, a corresponding dispensing spout 19, a corresponding conduit 21 and a corresponding pump 23 are preferably provided, said spout 19, conduit 21 and pump 23 being dedicated solely to a single product and container 17. Furthermore, still according to a preferred embodiment of the invention, the product contained in the corresponding container 17 can be dispensed by acting onto a corresponding push-button 49a,49b,49c provided on the wall 41a of the housing 13a next to the hole 43 from which the corresponding spout 19 protrudes. A label or indicator light or display 51 may preferably be provided next to each push-button 49a,49b,49c in order to indicate the kind of product dispensed through the corresponding spout 19.

[0078] In a preferred embodiment of the invention, the supporting structure 13 comprises panels 41, for example made of wood, metal or plastic, mutually associated so as to form a self-standing structure. At least one of the panels 41 is preferably removable for accessing the inside of the vending machine 11 and in particular the chamber 39, for example for placing or removing the containers 17. In order to make visible the parts of the vending machine 11 that are arranged within the chamber 39, the illustrations of Figs. 4, 5, 6 show a vending machine 11 without the front panel 41a, the top panel 41b and the side pane 41c, respectively. In addition, for the sake of simplicity, the conduit 21 has been shown only in Fig. 5 in association with the container 17 located in the central seat 15. The conduit 21 may, preferably, be part of a refill kit for the vending machine 11. Said kit preferably comprises a container 17 full of the product to be dispensed, a conduit 21 already associated with the container 17 by

means of the fitting 31, and a closing element, for example a removable clip or a cap which prevents the product from exiting the container 17 through the conduit 21 during transport. Alternatively, it will also be possible to provide the container 17 and the conduit 21 separated from each other, and to fit the conduit 21 onto the fitting 31 only when the kit has to be installed on the vending machine 11. In this case, the conduit 21 can be associated with the container 17, for example made as a bag, by means of the fitting 31, preferably of the quick release type, which allows to associate the conduit 21 with a flexible-type container having, in turn, a complementary fitting.

[0079] In the illustrated example, the vending machine 11 defines a corresponding unit provided with three dispensing spouts 19, each of them being associated with a corresponding container 17 through a corresponding conduit 21 associated with a corresponding pump 23. However, embodiments of the vending machine 11 according to the invention are possible in which a single dispensing spout 19 is provided or more than three spouts are provided. In addition, the panels 41 preferably define a supporting structure 13 of the modular type, adapted to be associated with an equivalent structure, for making a complex vending machine 11, equipped with any number of dispensing spouts, for example multiples of three in the illustrated example.

[0080] The dispensing spout 19 preferably has a curved or "L" shape and is preferably oriented downwards when the vending machine 11 is in operation, as illustrated in the figures, and is preferably free, i.e. it has no block valves. According to the invention, indeed, any leakage of the edible product dispensed through the corresponding spout 19 is substantially prevented by the suction cycle of the pump 23. Preferably, outside the housing 13a a collecting region 53 having a grid 53a and a pan 53b, preferably a removable pan, for collecting drops of product that may be dispersed during dispensing through the spouts 19.

[0081] The conduit 21 extends from the container 17 to the dispensing spout 19, preferably in a seamless manner, i.e. without any interruptions of the conduit 21, whereby the edible product flows through the conduit 21 without coming into contact with other parts of the vending machine 11. The conduit 21 is made of an elastic compressible material, which makes said conduit flexible. In addition, preferably, the conduit 21 will be made of a single material.

[0082] Advantageously, according to the invention, the pump 23 will preferably be of the peristaltic type and the conduit 21 will be associated with the pump 23 in a known manner. More precisely, the conduit 21 passes through the moving parts of the pump 23, typically rotary lobes or cams, without these or other parts of the pump coming into contact with the product to be pumped. These moving parts have the purpose of periodically press the conduit 21 so as to create, according to prior art, a pumping effect through said conduit. This kind of peristaltic pumps has proved particularly suitable for intermittent operation for periodical dispensing of doses. In this illustrated embodiment, the peristaltic pump 23 is provided with an openable lid 23b which can be opened in the direction indicated by arrow 23c for placing or removing the flexing conduit 21 into or from the pump 23.

[0083] Still referring to the annexed figures, the operation of the vending machine 11 according to the invention will now be described in greater detail.

[0084] By pressing one of the push-buttons 49a,49b,49c, the circuit controlling operation of a first counter determining starting of the pump 23 for dispensing the product for a predetermined number of revolutions N1 of the motor of the pump 23 is closed. The push-button 49a,49b,49c will preferably be of the internally lit type for facilitating identification thereof by the user and will preferably have a different color depending on the edible product to be dispensed.

[0085] The starting of the pump 23 as a consequence of the pressure on one of the push-buttons 49a,49b,49c causes pumping of the product contained in the container 17 through the conduit 21 and dispensing, through the spout 19, of an amount of product contained in the container which will be proportional to the number of working cycles of the pump 23.

[0086] For example, a number of revolutions N1 of the motor 23a may correspond to the dispensing of approximately 35 gr of product through the corresponding spout 19.

[0087] The electronic control unit 25 is preferably programmed for controlling, at the end of the cycle of revolutions N1, i.e. at the end of the dispensing of the product, a cycle of starting of the pump 23 in a direction opposite to the pumping direction. This causes suction of at least part of the edible product present between the pump 23 and the spout 19 and forming a residue that might exit the spout 19, for example by gravity, even when the pump is not operating. Advantageously, this measure prevents undesired leakages of product out of the spout 19 and guarantees more cleanness and hygiene for the vending machine 11, thus reducing product waste, and therefore allows to save money.

[0088] The number of revolutions N2 of the motor 23a of the pump 23 for the suction cycle may be for example about N1/10.

[0089] A controller 27 is also preferably programmed to control, at the end of the cycle of revolutions N2, therefore at the end of the cycle of sucking the product, a timer which has the purpose of inhibiting operation of the pump over a predetermined time T1. Advantageously, this measure prevents consumption of an excessive amount of product, due to the repeated demand by a user of the vending machine. Indeed, in the event that the vending machine is used to dispense edible products "on free service", i.e. without paying any consideration (for example in diners, company canteens, self-service restaurants), by dispensing a few grams of product for each dose (30 - 50 g) control of the dose itself will be obtained

simply by adjusting the number of revolutions N1. In addition, preferably, if a plurality of dispensing spouts 19 and corresponding conduits 21 are present, the operation of the pump 23 associated therewith will also preferably be inhibited by the electronic control unit 25.

[0090] At the end of the inhibiting cycle with the duration T1, the pump 23 is again ready to dispense a new dose of edible product from the container 17 associated therewith and can therefore be actuated through one of the push-buttons 49a, 49b, 49c for dispensing a further dose of the same edible product. Said push-buttons may, for example, correspond to the delivery of a first sauce = mayonnaise, a second sauce = rice mayonnaise and a third sauce = ketchup.

[0091] Although the vending machine according to the invention has been described with reference to a configuration in which three different types of products to be dispensed are provided, it will nevertheless be possible, still in accordance with the same inventive principle, to provide vending machines for dispensing a greater number of products, or even a single product. In the latter case, in particular, though not exclusively, the vending machine can be made modular, so as to allow a combined vending machine to be obtained for any number of products by mutually associating a sufficient number of modules.

[0092] When an edible product is to be dispensed which must be stored at a temperature lower than ambient temperature, the corresponding container 17 and the dispensing circuit comprising the conduit 21 can be cooled, for example up to about +8°C, by means of Peltier cells. On the other hand, if a lower temperature is required, typically between 0 and +4°C (for example in the case of so-called fresh products, typically sauces), it will be necessary to use a cooling machine equipped with a compressor.

[0093] In the example, a vending machine 11 has also been described provided with containers 17 placed aboard the machine, which therefore lends itself to not too high dispensed quantities, for example to containers 17 for about 10 kg of product.

[0094] When the vending machine 11 is intended for an environment in which consumption is higher, for example to dispense products contained in large-volume containers, typically from 100 to 1000 kg, the container 17 will preferably be placed outside the vending machine 11, for example in another room (a conditioned warehouse, a refrigerated store, etc.) connected by means of a suitable conduit 21 to the room where the vending machine 11 is located. Certain parts of the vending machine, such as the pump 23 and the conduit 21, must obviously be suitably sized. The principle of operation of the vending machine will, however, remain substantially the same.

[0095] If the edible product is dispensed through the vending machine 11 upon payment of a consideration, the vending machine 11 may be equipped with a coin validator or equivalent, a small load cell, a controller of the cell itself and a receipt emitter with report on the dispensed dose: weight, type of product, price, etc.

[0096] Furthermore, by reading a carrier, such as a receipt, by means of a small optical scanner and a PLC that manages reading thereof, the vending machine can dispense the desired product. It is also clear that a magnetic stripe reader and corresponding card, a microchip reader, etc., or an Ethernet network can be used to give consent, for example by the cash desk, to the dispensing itself, after the consideration has been paid. For this purpose, the vending machine 11 can be equipped with a switching apparatus 57 connected to the electronic control unit 25. Moreover, in rooms where electrical wiring is problematic, the vending machine may be equipped with a WiFi system that performs, even remotely, the above operations.

[0097] Advantageously, the vending machine according to the invention does not provide for washing cycles for cleaning the conduits for dispensing the edible product, thanks to the fact that the conduits carrying the product are replaced together with the flexible container, and thanks to the fact that the product never comes into contact with fixed parts of the vending machine, i.e. with parts that are not intended to be replaced together with the container.

[0098] A set of push-buttons 49, in the illustrated example seven push-buttons 49d, 49e, 49f, 49g, 49h, 491 are also provided close to the visual display 47 for programming the electronic unit 25 and, consequently, the functions and working cycles of the vending machine 11.

[0099] By keeping the push-button "menu" 49d pressed for a time t1 (for example: t1=3 sec), the displaying function of the minimum stock, i.e. of the minimum quantity of product below which the electronic control unit 25 is programmed to emit an optical or acoustic alert signal, corresponding to the signaling of the almost exhausted container (bag), is activated on the visual display 47.

[0100] The electronic control unit 25 is programmed to vary the minimum quantity by acting on the push-buttons "+" and "-" 49e,49f. Further pressing on the push-button "menu" allows, by subsequent pressing on the push-buttons "+" and "-", to inhibit or enable the alarm.

[0101] Further pressing on the push-button "menu" allows, by subsequent pressing on the push-buttons "+" and "-", to adjust the duration of an acoustic signal emitted by a buzzer, when any programming push-button 49 is pressed. A zero duration corresponds to the inhibition of said acoustic signal.

[0102] Further pressing on the push-button "menu" allows, by subsequent pressing on the push-buttons "+" and "-", to enable or disable the request for a password in order to start the function of replacing the exhausted container (bag).

[0103] In a preferred embodiment of the invention, the password is stored in the storage unit associated with the electronic unit 25 and corresponds to a predetermined sequence of push-buttons 49. Access to this func-

tion is preferably protected by a password known only to the authorized personnel and stored in the storage unit, for example corresponding to pressing some push-buttons 49 in a predetermined sequence.

[0104] The function allowing replacement of the container of the product to be dispensed, either because it is exhausted or almost exhausted, or because dispending of another product is desired, can preferably be accessed by means of a password known only to the authorized personnel.

[0105] The settings menu allows to change some functional parameters of the vending machine.

[0106] In particular, it is possible to vary the duration of the interval in which dispensing is inhibited. A time t1 = 0 corresponds to the programming that allows continuous dispensing, useful when the vending machine is used in a private environment, for example in a kitchen.

[0107] The settings menu further comprises a function of setting the options for each dispensed product. The main functions allow the Name Change of the product on the visual display 47, the quantity of product to be dispensed expressed in number or revolutions N1 of the electric motor 23a of the pump 23, the number of revolutions N2 of the motor 23a of the pump 23 for the inversion function, the capacity of the flexible container (bag) present in the vending machine (default = 5 Kg).

[0108] The refill function of the container (bag) requires pressing of the push-button "Refill" 49g for three seconds and subsequent selection, by means of the push-buttons "Product1", "Product2", "Product3" 49h,49i,49l, respectively, of the product whose container is to be replaced: the instructions to be followed appear on the display, namely:

- open the front panel 41a of the vending machine 11;
- remove the container 17, if present, from the corresponding seat 15 and pull the conduit 21 out of the pump 23, by opening the lid 23b of the pump, and out of the spout 19;
- place a fresh container 17 into the free seat 15;
- connect the conduit 21 to the pump 23 and the spout 19;
- close the front panel 41a;
- dispense until the product exits te spout 19;
- press the push-button 49g "Refill" for ending the operation and clear the counter of dispensed doses, which is incremented upon each pressing of one of the push-buttons 49a,49b,49c.

[0109] The vending machine as described and illustrated is capable of numerous variants and modifications falling within the same inventive principle.

Claims

1. Vending machine (11) for dispensing edible products in a fluid state, comprising:
   - a supporting structure (13);
   - at least one seat (15) defined within the supporting structure (13) and adapted to house at least one flexible container (17) of the product to be dispensed;
   - a dispensing spout (19) from which the dispensed product contained in the container (17) exits;
   - a flexible conduit (21) having one end associated with the container (17) by means of a corresponding fitting (31) and the opposite end associated with the spout (19);
   - a pump (23) associated with the supporting structure (13) and actuated by an electric motor (23a), said pump being adapted to create, at predetermined intervals, a throttling slidable along a portion of the conduit (21), said throttling being capable of imparting prevalence to the fluid carried within the conduit (21) and consequently of pumping the product contained in the flexible container (17) towards the spout (19);
   - an electronic control unit (25) for controlling the operation of the electric motor (23a) of the pump (23), **characterized in that** the dispensing spout (19) comprises a rigid tube (19a) which receives with interference fit an end portion (21c) of said flexible conduit (21) and **in that** the end portion (21c) of the flexible conduit (21) extends within the dispending spout (19) over the entire length of said dispensing spout, thus preventing contact of the spout (19) with the product carried by the conduit (21) .

2. Vending machine according to claim 1, wherein said dispensing spout (19) comprises a tube made of stainless steel with opposite open ends (19b,19c) and having a circular cross-section with a diameter ("D") no smaller than the diameter ("d") of the outer cross-section of the conduit (21).

3. Vending machine according to claim 1 or 2, wherein said spout (19) comprises a connecting portion (19d) provided with first means (33) capable of cooperating with corresponding counter-means (35) for removably connecting the spout (19) to the supporting structure (13).

4. Vending machine according to claim 1 or 2 or 3, wherein the end portion (21c) of the flexible conduit (21) comprises a proximal end (21d) having stop means (21e) capable of interfering with a first end (19b) of the dispensing spout (19), so that, when said stop means (21e) are in abutment against said first end (19b) of the dispensing spout (19), the flexible conduit (21) extends within the spout over the entire length of the spout, until at least the end (19c), which is opposite to said first end (19b) and from which the dispensed product exits.

5. Vending machine according to any of the preceding claims, wherein the means (33) capable of cooperating with corresponding counter-means (35) for removably retaining the spout (19) firmly associated with the supporting structure (13) comprise a quick release coupling.

6. Vending machine according to claim 5, wherein said quick release coupling comprises a bayonet-like coupling.

7. Vending machine according to any of the preceding claims, wherein the supporting structure (13) comprises a housing (13a) defining therein a chamber (39), separated from the environment outside the vending machine (11) by the walls (41) of the housing, said chamber housing therein said at least one seat (15) for the flexible container (17), the pump (23) and the conduit (21), and wherein the dispensing spout (19) communicates the chamber (39) with the outer environment and wherein the conduit (21) exits said chamber with an end portion extending within said spout (19).

8. Vending machine according to claim 7, wherein at least one of the walls (41) is openable and wherein the counter-means (35) for the removable connection of the spout are associated with said openable wall.

9. Vending machine according to any of the preceding claims, wherein the electronic control unit (25) comprises a microprocessor, a storage unit, a visual display, at least one control push-button (49) and a supply unit, and wherein said electronic control unit is programmed to cause the pump to complete a pumping cycle which corresponds to a number N1 of revolutions of the rotor of the electric motor (23a) and in which the pump (23) operates for pumping the product contained in the container (17) towards the spout (19), a suction cycle which corresponds to a number N2 of revolutions of the rotor of the electric motor (23a) and in which the pump (23) operates for sucking at least part of the product that may be present in the end portion of the flexible conduit (21), and a waiting cycle which has a duration T1 and in which the pump (23) is inhibited from pumping the product contained in the container (23).

Patentansprüche

1. Verkaufsautomat (1) zur Ausgabe von essbaren Produkten in einem flüssigen Zustand, mit:

- einer Trägerstruktur (13),
- wenigstens einem Sitz (15), der in der Trägerstruktur (13) ausgebildet und dafür ausgelegt ist, wenigstens einen flexiblen Behälter (17) des auszugebenden Produkts aufzunehmen,
- wenigsten einem Ausguss (19), durch den das in dem Behälter (17) enthaltene Ausgabeprodukt austritt,
- einer flexiblen Leitung (21), die ein dem Behälter (17) mittels einer entsprechenden Anschlussstücks (31) zugeordnetes Ende aufweist und deren gegenüberliegendes Ende dem Ausguss (19) zugeordnet ist,
- einer Pumpe (23), die der Trägerstruktur (13) zugeordnet ist und von einem elektrischen Motor (23a) betätigt wird, wobei die Pumpe dafür ausgelegt ist, in vorgegebenen Intervallen eine Drosselung zu erzeugen, die entlang eines Abschnitts der Leitung (21) gleitet, wobei die Drosselung dazu in der Lage ist, Bewegung der in der Leitung (21) enthaltenen Flüssigkeit zu bewirken und folglich das in dem flexiblen Behälter (17) enthaltene Produkt zu dem Ausguss (19) zu pumpen,
- einer elektronischen Steuereinheit (25) zum Steuern des Betriebs des Elektromotors (23a) der Pumpe (23), **dadurch gekennzeichnet, dass** der Ausguss (19) ein starres Rohr (19a) aufweist, das einen Endabschnitt (21c) der flexiblen Leitung (21) als Presspassung aufnimmt, und dass der Endabschnitt (21c) der flexiblen Leitung (21) sich in dem Ausguss (19) über die gesamte Länge des Ausgusses erstreckt, wodurch Kontakt des Ausgusses (19) mit dem von der Leitung (21) getragenen Produkt verhindert wird.

2. Verkaufsautomat nach Anspruch 1, wobei der Ausguss (19) ein Rohr aus rostfreien Stahl aufweist, das sich gegenüberliegende offene Enden (19b, 19c) aufweist und einen kreisförmigen Querschnitt mit einem Durchmesser ("D") hat, der nicht kleiner als der Durchmesser ("d") des äußeren Durchschnitts der Leitung (21) ist.

3. Verkaufsautomat nach Anspruch 1 oder 2, wobei der Ausguss (19) einen Verbindungsabschnitt (19d) aufweist, der mit ersten Mitteln (33) versehen ist, die mit entsprechenden Gegenmitteln (35) zusammenwirken können, um den Ausguss (19) abnehmbar mit der Trägerstruktur (13) zu verbinden.

4. Verkaufsautomat nach Anspruch 1 oder 2 oder 3, wobei der Endabschnitt (21c) der flexiblen Leitung (21) ein proximales Ende (21b) aufweist, das Stoppmittel (21e) hat, die mit einem ersten Ende (19b) des Ausgusses (19) zusammenwirken können, sodass, wenn die Stoppmittel (21e) an dem ersten Ende (19b) des Ausgusses (19b) anliegen, sich die flexible Leitung (21) in dem Ausguss über die gesamte Länge des Ausgusses erstreckt, bis zu wenigstens dem

Ende (19c), das dem ersten Ende (19b) gegenüberliegt und aus dem abgegebene Produkt austritt.

5. Verkaufsautomat nach einem der vorstehenden Ansprüche, wobei die Mittel (33), die mit entsprechenden Gegenmitteln (35) zusammenarbeiten können, um des Ausgusses (19) abnehmbar in fester Verbindung mit der Trägerstruktur (13) zu halten, eine Schnellverschlusskupplung umfassen.

6. Verkaufsautomat nach Anspruch 5, wobei die Schnellverschlusskupplung eine bajonettartige Kupplung umfasst.

7. Verkaufsautomat nach einem vorstehenden Ansprüche, wobei die Trägerstruktur (13) ein Gehäuse (13a) aufweist, das eine Kammer (39) definiert, die von der äußeren Umgebung des Verkaufsautomaten (11) durch Wände (41) des Gehäuses getrennt ist, wobei die Kammer wenigstens einen Sitz (15) für den flexiblen Container (17), die Pumpe (23) und die Leitung (21) enthält, und wobei der Ausguss (19) die Kammer (39) mit der äußeren Umgebung verbindet und wobei die Leitung (21) aus der Kammer austritt und mit einem Endabschnitt in den Ausguss (19) hineinragt.

8. Verkaufsautomat nach Anspruch 7, wobei wenigstens eine der Wände (41) geöffnet werden kann und wobei die Gegenmittel (35) für die abnehmerbare Verbindung des Ausgusses der Wand, die geöffnet werden kann, zugeordnet sind.

9. Verkaufsautomat nach einem der vorstehenden Ansprüche, wobei die elektronische Steuereinheit (25) einen Mikroprozessor, eine Speichereinheit, eine visuelle Anzeige und wenigstens eine Steuertaste (49) und eine Versorgungseinheit aufweist, und wobei die elektronische Steuereinheit dahingehend programmiert ist, die Pumpe einen Pumpzyklus, der einer Anzahl N1 von Umläufen des Rotors des Elektromotors (23a) entspricht und in dem die Pumpe (23) arbeitet, um das in dem Behälter (17) enthaltene Produkt zu dem Ausguss (19) zu pumpen, einen Ansaugzyklus, der einer Anzahl N2 von Umdrehungen des Rotors des Elektromotors (23) entspricht und in dem die Pumpe (23) dahingehend arbeitet, dass wenigstens ein Teil des Produkts, das in dem Endabschnitt der flexiblen Leitung (21) vorhanden sein kann, angesaugt wird, und einen Wartezyklus, der eine Dauer T1 hat und in dem die Pumpe (23) daran gehindert wird, das in dem Behälter (23) enthaltene Produkt zu pumpen, durchlaufen zu lassen.

Revendications

1. Distributeur automatique (11) pour distribuer des produits comestibles dans un état fluide, comprenant :

- une structure de support (13) ;
- au moins un siège (15) défini au sein de la structure de support (13) et adapté pour loger au moins un contenant flexible (17) du produit à distribuer ;
- un bec verseur (19) d'où sort le produit distribué contenu dans le contenant (17) ;
- un conduit flexible (21) ayant une extrémité associée au contenant (17) au moyen d'un raccord correspondant (31) et l'extrémité opposée associée au bec (19) ;
- une pompe (23) associée à la structure de support (13) et actionnée par un moteur électrique (23a), ladite pompe étant adaptée pour créer, à des intervalles prédéterminés, un étranglement pouvant glisser le long d'une portion du conduit (21), ledit étranglement étant capable de conférer une prévalence au fluide porté au sein du conduit (21) et par conséquent de pomper le produit contenu dans le contenant flexible (17) vers le bec (19) ;
- une unité de commande électronique (25) pour commander le fonctionnement du moteur électrique (23a) de la pompe (23), **caractérisé en ce que** le bec verseur (19) comprend un tube rigide (19a) qui reçoit avec ajustement serré une portion d'extrémité (21c) dudit conduit flexible (21) et **en ce que** la portion d'extrémité (21c) du conduit flexible (21) s'étend au sein du bec verseur (19) sur toute la longueur dudit bec verseur, ce qui empêche un contact du bec (19) avec le produit porté par le conduit (21).

2. Distributeur automatique selon la revendication 1, dans lequel ledit bec verseur (19) comprend un tube réalisé en acier inoxydable avec des extrémités ouvertes (19b, 19c) opposées et ayant une section circulaire avec un diamètre (« D ») non inférieur au diamètre (« d ») de la section extérieure du conduit (21).

3. Distributeur automatique selon la revendication 1 ou 2, dans lequel ledit bec (19) comprend une portion de raccordement (19d) pourvue de premiers moyens (33) capables de coopérer avec des contre-moyens (35) correspondants pour raccorder de façon amovible le bec (19) à la structure de support (13).

4. Distributeur automatique selon la revendication 1 ou 2 ou 3, dans lequel la portion d'extrémité (21c) du conduit flexible (21) comprend une extrémité proximale (21d) ayant des moyens d'arrêt (21e) capables d'interférer avec une première extrémité (19b) du bec verseur (19), de telle sorte que, lorsque lesdits moyens d'arrêt (21e) sont en butée contre ladite pre-

mière extrémité (19b) du bec verseur (19), le conduit flexible (21) s'étend au sein du bec sur toute la longueur du bec, au moins jusqu'à l'extrémité (19c), qui est opposée à ladite première extrémité (19b) et d'où sort le produit distribué.

5. Distributeur automatique selon l'une quelconque des revendications précédentes, dans lequel les moyens (33) capables de coopérer avec des contre-moyens (35) correspondants pour retenir de façon amovible le bec (19) associé fermement à la structure de support (13) comprennent un raccord rapide.

6. Distributeur automatique selon la revendication 5, dans lequel ledit raccord rapide comprend un raccord de type à baïonnette.

7. Distributeur automatique selon l'une quelconque des revendications précédentes, dans lequel la structure de support (13) comprend un logement (13a) définissant à l'intérieur une chambre (39), séparée de l'environnement à l'extérieur du distributeur automatique (11) par les parois (41) du logement, ladite chambre logeant à l'intérieur ledit au moins un siège (15) pour le contenant flexible (17), la pompe (23) et le conduit (21), et dans lequel le bec verseur (19) fait communiquer la chambre (39) avec l'environnement extérieur et dans lequel le conduit (21) sort de ladite chambre avec une portion d'extrémité s'étendant au sein dudit bec (19).

8. Distributeur automatique selon la revendication 7, dans lequel au moins l'une des parois (41) peut s'ouvrir et dans lequel les contre-moyens (35) pour le raccordement amovible du bec sont associés à ladite paroi pouvant s'ouvrir.

9. Distributeur automatique selon l'une quelconque des revendications précédentes, dans lequel l'unité de commande électronique (25) comprend un microprocesseur, une unité de stockage, un afficheur visuel, au moins un bouton-poussoir de commande (49) et une unité d'alimentation, et dans lequel ladite unité de commande électronique est programmée pour amener la pompe à accomplir un cycle de pompage qui correspond à un nombre N1 de tours du rotor du moteur électrique (23a) et dans lequel la pompe (23) fonctionne pour pomper le produit contenu dans le contenant (17) vers le bec (19), un cycle d'aspiration qui correspond à un nombre N2 de tours du rotor du moteur électrique (23a) et dans lequel la pompe (23) fonctionne pour aspirer au moins une partie du produit qui peut être présent dans la portion d'extrémité du conduit flexible (21), et un cycle d'attente qui a une durée T1 et dans lequel la pompe (23) est empêchée de pomper le produit contenu dans le contenant (17).

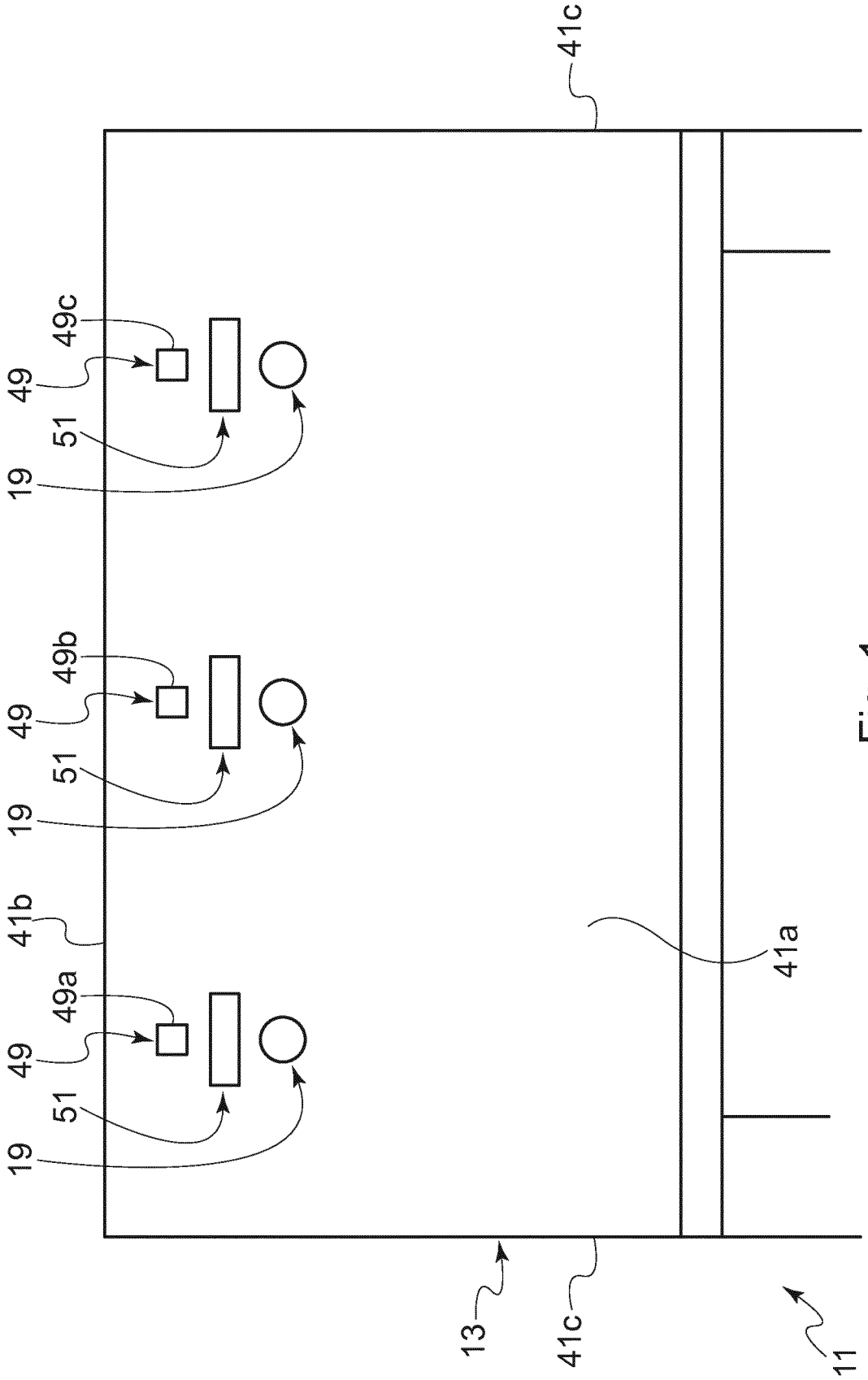


Fig. 1

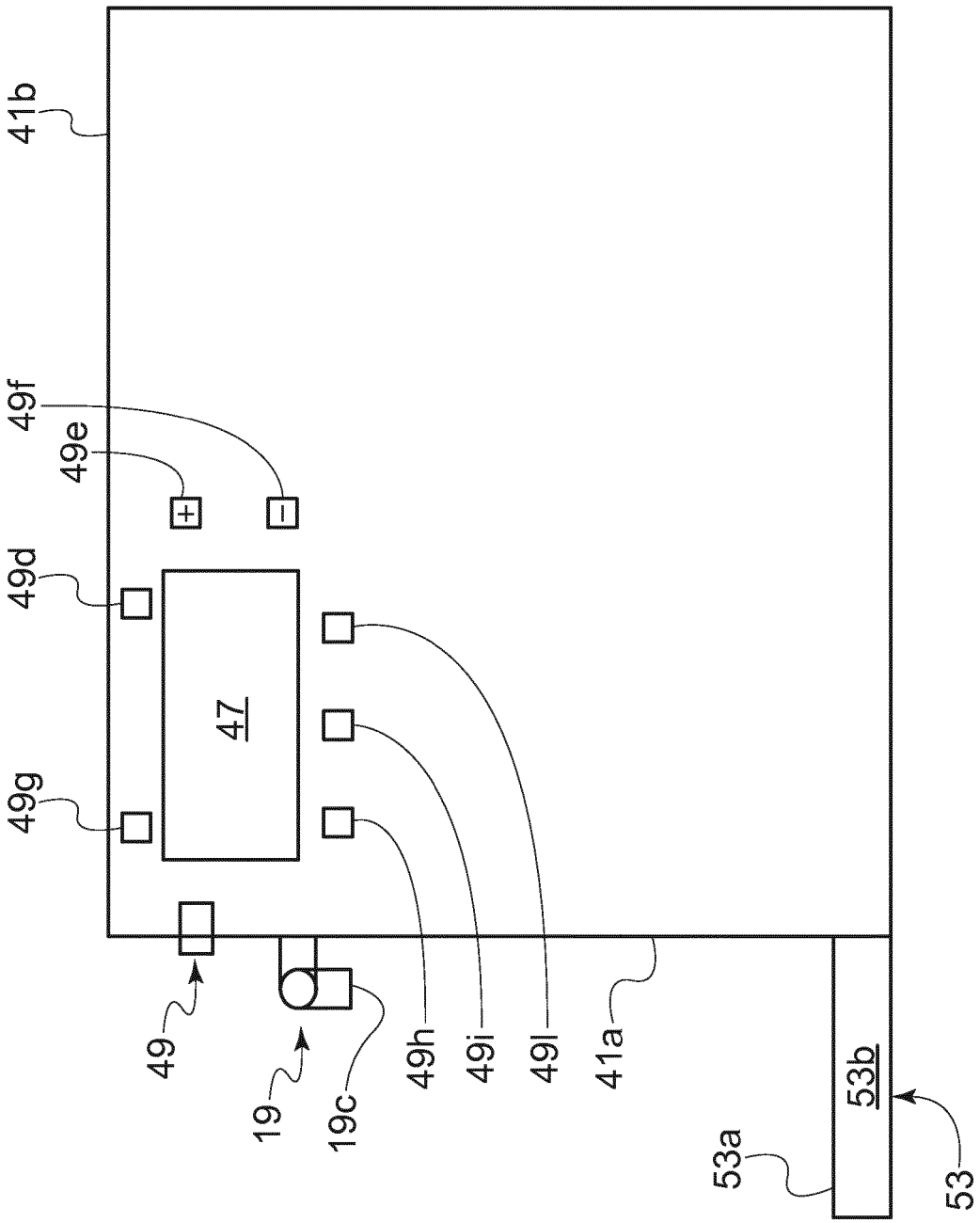


Fig. 2

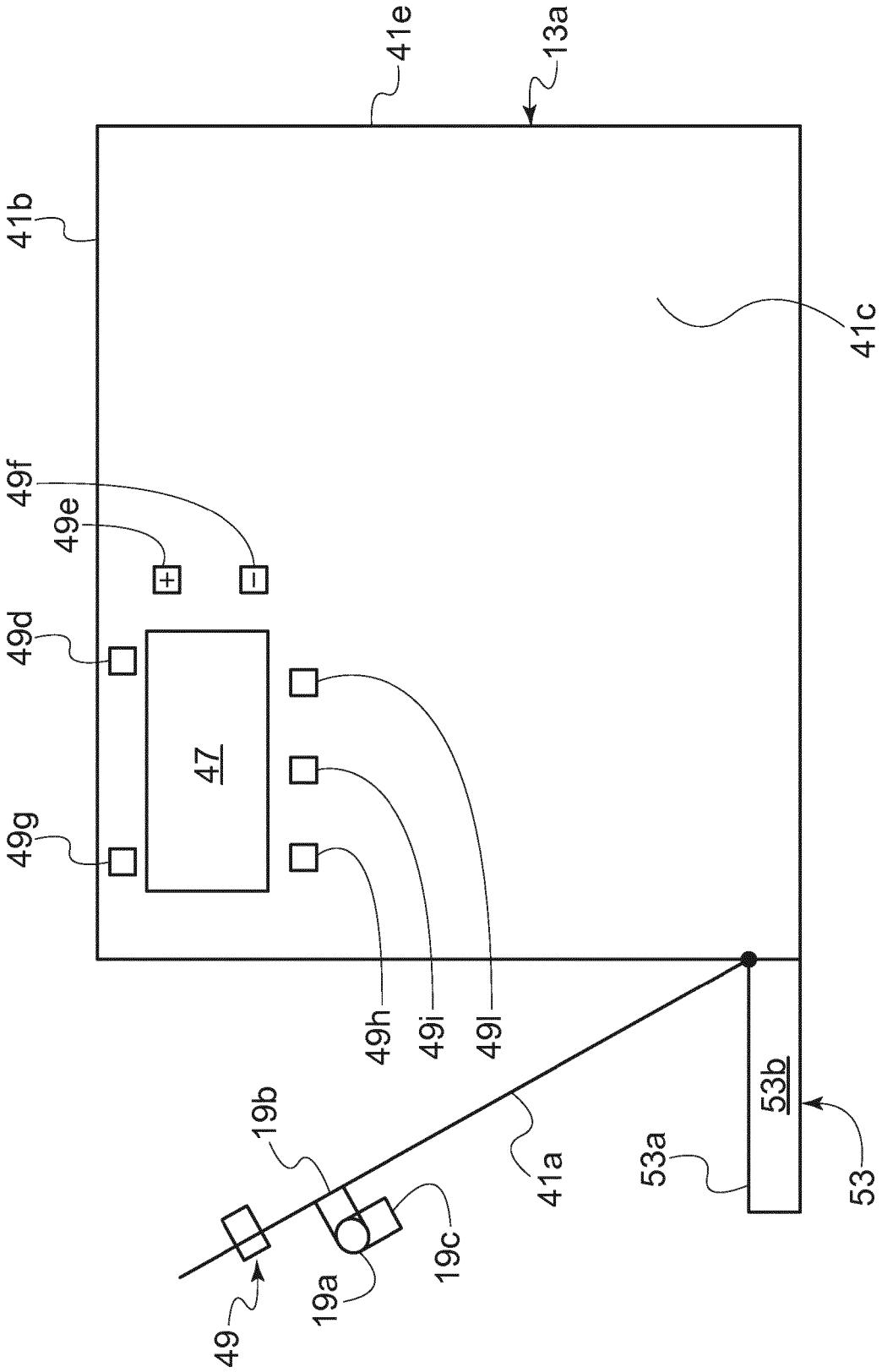

41e
13a
41b
41c
49f
49e
49d
47
49g
49h
49i
49l
19b
41a
53b
53a
53
19c
19a
49

Fig. 3

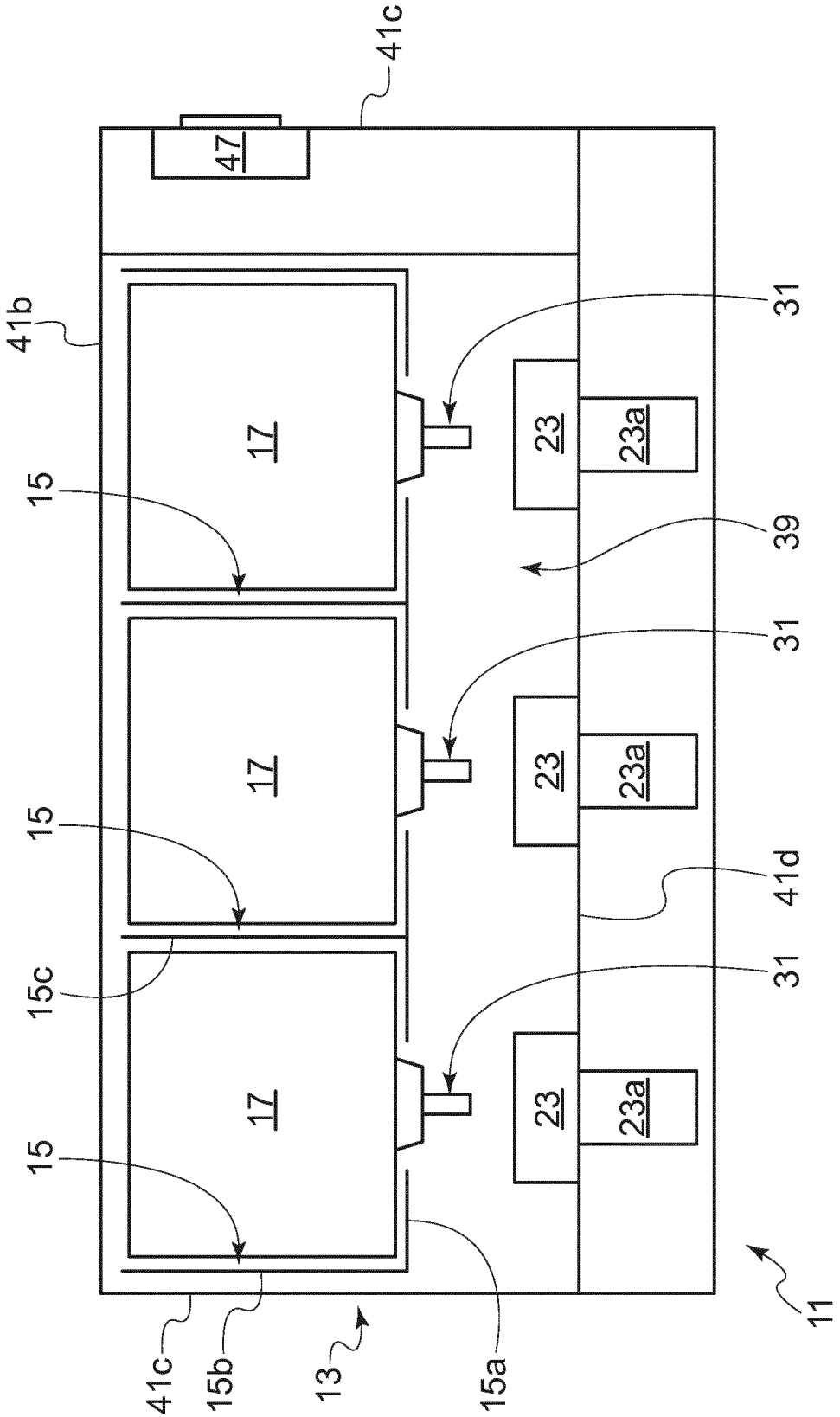

41c
47
41b
31
17
15
23
23a
39
31
17
15
23
23a
41d
15c
31
17
15
23
23a
11
41c
15b
13
15a

Fig. 4

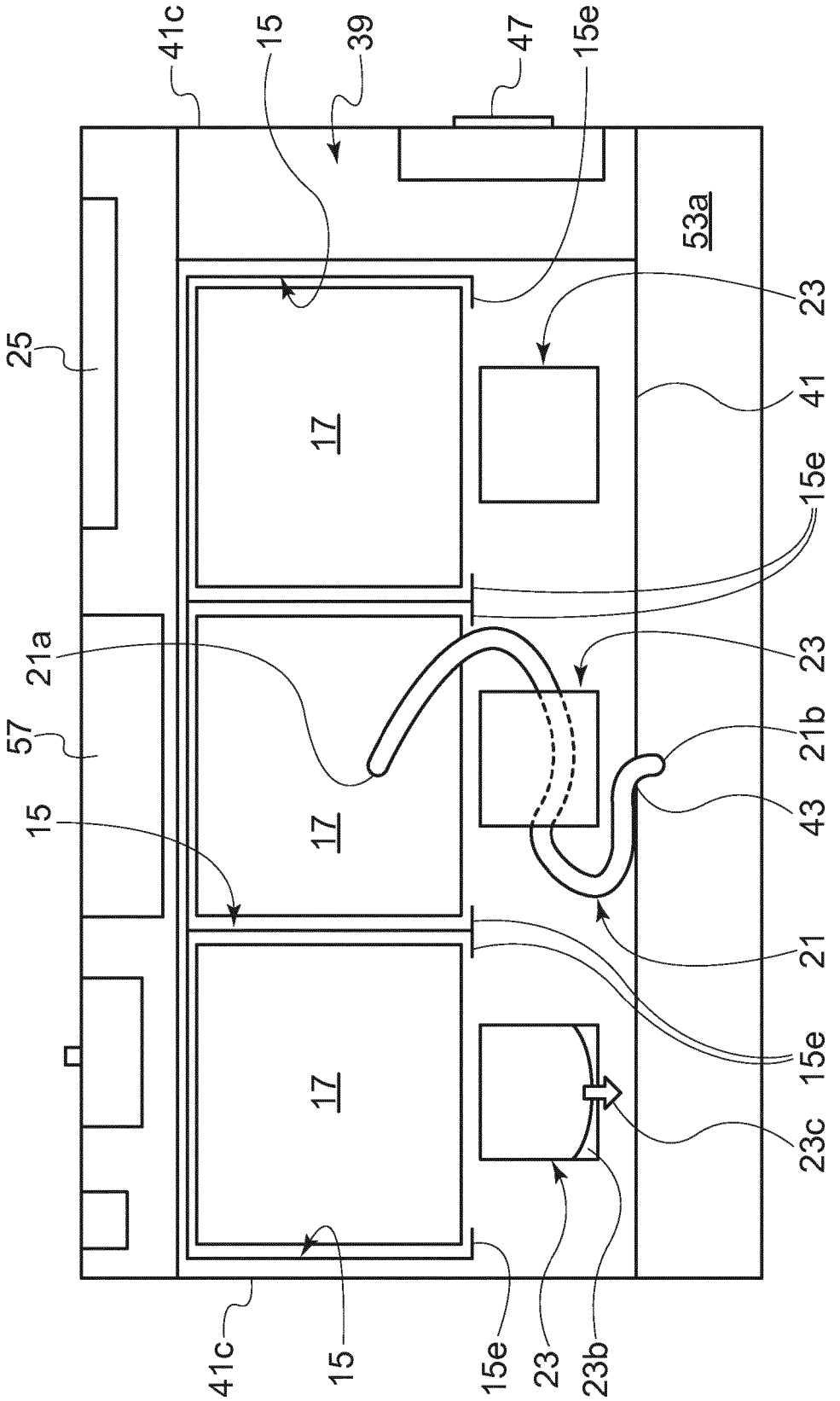

41c
15
39
47
15e
53a
25
23
41
17
15e
21a
23
57
21b
43
15
17
21
17
15e
23c
41c
15
15e
23
23b

Fig. 5

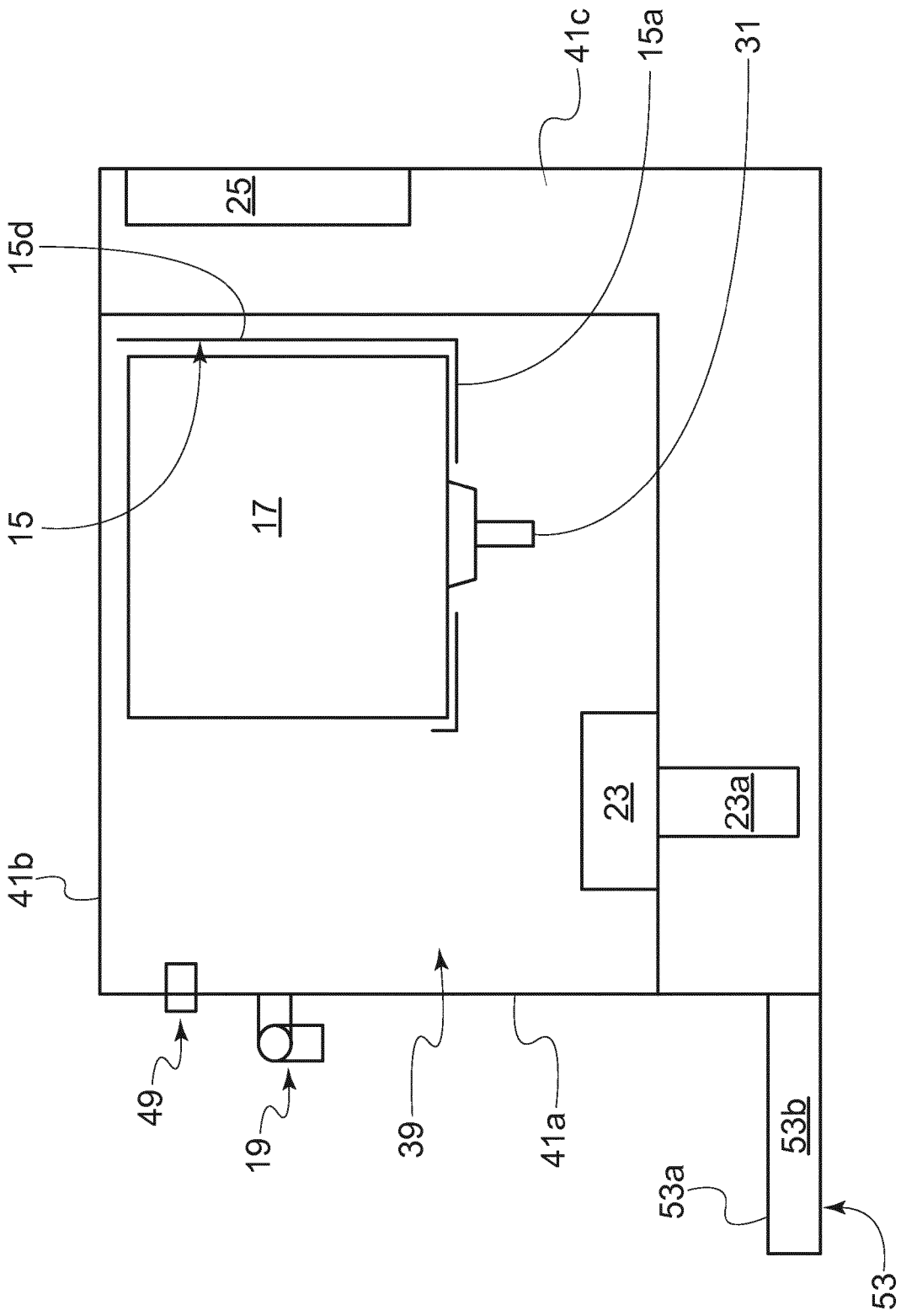


Fig. 6

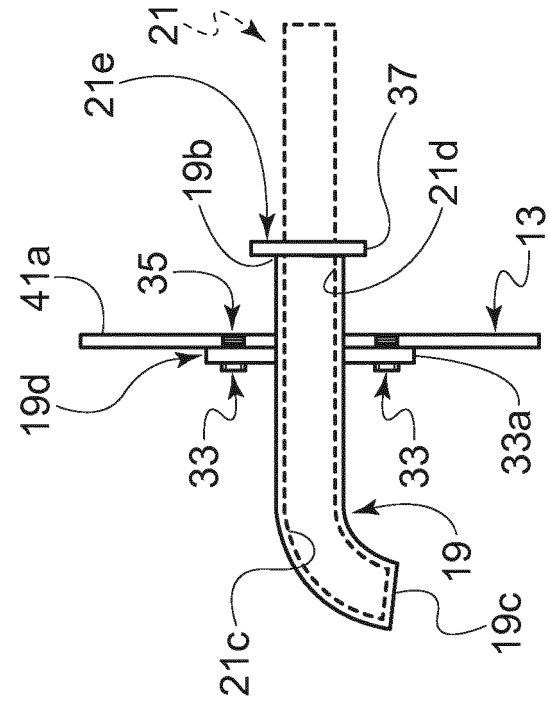

21
21e
37
19b
21d
13
41a
35
19d
33
33
33a
19
21c
19c

Fig. 7B

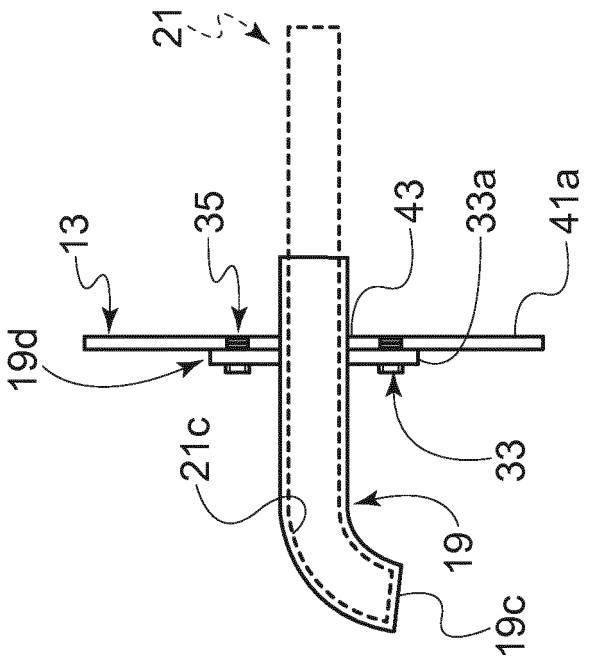

21
13
35
43
33a
41a
19d
21c
33
19
19c

Fig. 7A

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 7572113 B2 **[0016]**
- AU 4612179 **[0026]**
- IT 1408998 **[0028]**
- IT TO20111093 **[0031]**