Food Chain System (FCS) - Original description translation below:

AUTOMATED FOODSTUFF DISTRIBUTION WITHOUT THROWAWAY PACKAGINGS

The basic idea behind the invention is the efficient avoidance of waste from disposable packaging. This comes mainly from the retail trade.

Most of the packaging waste is "won" from the food and beverage trade after the contents have been consumed! Is it possible to do without this "profit"? Yes, this is possible if everything that has not been eaten or drunk is regularly returned to the source, e.g. the supermarket. However, given the quantity and variety of food purchased, this presupposes that the process of sale must take place without gaps in closed circles, which requires a new concept, henceforth called Food Chain System.

Overview of the situation in the past, today and with the Food Chain System, as presented here:

- In prehistoric times: there was "self-service", (searching, picking, hunting, cooking by oneself), leftovers such as bones, ashes, but no garbage.

- Today: self-service in the supermarket, searching, paying, carrying food home, cooking yourself = large-scale packaging waste is produced worldwide.

- Food chain system: order on the Internet, carry home food without packaging, purchase account is debited, switch on cooking job, serve food, any minor leftovers remain in the system and are further treated there = no waste is produced.

Cooking machines means new technology, less work; that, and many more describes the invention of this system.

State of the art:

The invention relates to food, which in families always needs "people at the stove", today as in ancient times, when the open fire was the stove. The modern "stove" (state of the art) today is the "Thermomix" of the company Vorwerk, i.e. the electronically "guided cooking", the human being is constantly present.

The traces of the first cooks in the plastic-free nature can be found today only the archaeologists. But we now find the modern "plastic trace in nature" with the naked eye and nose caused by the packaging of food, which has become a heavy burden on the biosphere. There are also "Unpackaged" stores, but they have too few customers; the handling in the store is questionable at Covid-19 times.

The henceforth called "Food Chain System "or "System" avoids any disposable packaging and, based on automation and digitalization, offers to each of its customers who stops briefly at a point of sale, henceforth called "Fresh Food & Service Center 1", all the ingredients for meals or ready meals ordered by him via Internet with the henceforth called "shuttle trolley 2". Its contents are processed ready for consumption by an affordable automatic cooking machine, which replaces the kitchen equipment, henceforth called "Roto Chef 3", or another device.

Advantages: Reusable containers are used thousands of times in an automated way, there is no need to search for goods on the shelves, queue at the checkout, park and unpark, monitoring the pots; there are no plastic bags, paper advertisements, shopping lists, receipt slips, the meal takes place on time, fresh and ready at home.

Roto Chef 3 cleans itself, including the tableware, and takes care of the recycling of the smallest waste; you are relieved! Each dispensed action or item is an economic advantage that can be converted into time and money, as well as the dispensed collection of packaging waste with insufficient recycling. Not to forget the socio-economic component, the stress reduction.

The biggest winner of the application of this novelty is the environment.

Here are the advantages that will become clear in the course of the description below:

1) The search to the shelves, the packing and unpacking of the goods, packaging costs are eliminated, there is no waste;

2) The turnover of fresh goods is faster, Fresh Food & Service Centers (1) need only a fraction of the area of a supermarket, virtually no parking, heating and cooling energy is saved,

3) Any desired information, digitally recorded, is audio visually available by clicking in a language of choice, communication is bilateral, individualized, data storage, electronic billing, calorie information, nutritional information, portion price, consumption recommendations, etc., everything is possible!

The processing and the sale of food, individually and on a wide scale with the help of artificial intelligence and data networking with digitalized medicine allows to make the diet healthier.

4) High hygiene standards, no hand touches the goods,

5) important in pandemic times, crowds are avoided, individualized food is health oriented:

6) there is more space in the kitchen, less noise, additional cleaning aids, order is simplified,

7) many cleaning tasks are automated,

8) Higher flexibility due to local processing of goods in Fresh Food & Service Center 1 and most accurate individual distribution.

Brief description: Fig. 1 shows schematically what happens today from the supermarket to your plate, and Fig. 2 how you can save approx. 60 minutes in the Food Chain System with its above-mentioned components 1, 2 and 3. At the producer P receives the goods packaging V (black arrow, Fig.1) then all arrives with the truck to the supermarket SM and to the shelves, waits for the customer, who spends with parking and unparking, paying, here about 30 minutes. He needs another 30 minutes at home to unpack the ingredients, dispose of packaging, divide ingredients, mix and prepare ready to plate. This generates carton and plastic waste and a few food scraps (arrows VM and E), the recycling of which is quite problematic. In the Food Chain System (Fig. 2), everything is sorted by machine, and only the smallest amount of foil residue is produced at the customer's and, separately from this, small amounts of food residue, which is returned in an orderly manner (dotted line arrows) by shuttle trolley 2 to Fresh Food & Service Center 1 (part of the system) and recycled; nothing is thrown away! To the Fresh Food & Service Center 1 (market with counting, weighing and portioning machines) the unpacked goods arrive with the truck in wholesale quantities from the producer P. The customer has ordered via Internet (e.g. as a recipe number) the ingredients of a dish and gets these on arrival at a free delivery point (stop sign) to the car with the shuttle trolley 2 directly to the hands. Four small arrows in the Fresh Food & Service Center 1 symbolize separating and dosing devices, which distribute the wholesale goods in many small portions according to the wish of each customer, which together with transfer aids fill up the shuttle trolleys 2. So, the customer can bring the ordered ingredients with a short stop to the delivery point (stop) of the shuttle trolley 2 home, to Roto Chef 3 (point in the semicircle arrow) dock, which brings from it the ordered food up to the plate.

The kitchen: if one follows the way of the food from production up to the plate of the consumer, one finds out that up to the purchase in the supermarket usually today the very most processes are industrial and rationalized. This is followed by a period of lying on the shelves; after the purchase, the rest is quite slow because everything is done by hand. The customer often must interpret difficult-to-read information on the packaging, relying on knowledge of the language in which it is written. Afterwards, packaging, slips of paper, and paper brochures are disposed of in the trash. There is no automation at the customers, cooking robots, which relieve them are unknown, although they are quite feasible with moderate expenditure. The modern kitchen is full of kitchen appliances with noisy electric motors, everything with cables, plugs, accessories, and much more. The investment is considerable, the degree of use and the life of the appliances are low, because the repairs are expensive in view of the variety of brands (if possible, at all); the new purchase produces electrical waste.

With the purchase, any connection between the market and the customer ceases; customer loyalty is weak without interaction.

In times of austerity and threat of pandemic, a large part of the population eats at home, buys fresh or suitable products and processes them by hand. An analysis of eating habits and a quantitative individual record of the food consumed, which would allow a medical assessment, do not exist today.

Opportunities of digitalization: In the food chain system, each ingredient of an order has a digital format and its evaluation, which respects the (voluntary) biogenetic data of the customer, can lead to indications for the optimization of his diet.

The evaluation can be done autonomously by a program based on artificial intelligence, without the need for a doctor, during the ordering process, and can be accompanied, if necessary, by tips such as "For weight loss, the digi-doctor recommends eating grapes instead of dates; in our offer there is the variety 'blue queen' with valuable flavonoids, which will also save you money!" .

Task: The abolition of the above-mentioned disadvantages as the task of the invention is the redesign of the individual food supply from the purchase to the consumer's plate through the development of a holistic supply system (Food Chain System) with consequences such as the elimination of disposable packaging, the increase in the quality of supply also in terms of health and the reduction of housework.

Solution: solving the above task requires an inseparable mix of innovations in retail, logistics, kitchen technology and automation. This is based on the interaction of the above three, (1, 2, 3) spatially separated units of the food chain system, which is described here with technical details as a system only to the extent that experts can recognize and implement the economic feasibility of the project. The goal can be achieved by the simultaneous application of automation on the seller's side as well as on the buyer's side. In the food chain system, the individual processes for each customer from purchase to the consumer's plate are guided more quickly along short paths.

Transfer tools: For the food to arrive from the Fresh Food & Service Center 1 to the customer's house, the shuttle trolley 2 is used, which is the carrier of the various transfer aids. Instead of the reusable transfer tools Ta and the disposable transfer aids Tb, these two types are used, on the basis of which, if necessary, concrete versions are created, which are well adapted to the food to be transferred; in concrete terms, these are given a suitable designation and an item number (Pos.), e.g.: Reusable transfer tools Ta interchangeable tubes Ta = pos.22) and disposable transfer tools Tb, (e.g. small capsules Tb = pos.26, bags Tb =pos. 27<medium sizes)> and large volume balloons Tb =pos.24). A special form of transfer tools Ta are various boxes or liquid containers which can be easily cleaned and reused and are used to transfer bulky objects or liquids without the aid of disposable packaging and, if necessary, can be attached and detached outside the shuttle trolleys 2. To stock the transfer aids or the shuttle trolleys 2, it is necessary to set up automated points of sale, (called Fresh Food & Service Center 1 by us). These distribute the fresh goods based on each order with dosing devices, counting, weighing and portioning machines and a sorting unit, to provide the customers with exactly the required assortment in the desired, quantities and optimum freshness. The transfer to the customer takes place with the shuttle trolley 2, as described in detail below. This ensures the orderly, continuous transfer of the delivered goods and the return of the reusable transfer tools Ta and any leftovers from the opened disposable transfer tools Tb, as well as the leftover food.

With the shuttle trolley 2, not only the above-mentioned transfer tools Ta and Tb are returned, but also any leftover food is brought back for the purpose of further use, so everything is 100% recycled.

Roto Chef 3 brings the replacement of the customer's current kitchen equipment, away from household chores towards automation, (with hand control capabilities if desired) with an affordable and versatile automatic cooking machine, (called Roto Chef 3 by us), which must be compatible with the shuttle trolley 2.

The Roto Chef 3 replaces the existing kitchen equipment and brings:

- the concentration of the necessary energies in a compact energy center 31, which can be housed inside it.

- Concentration of the processing operations found in a kitchen into as few multifunctional process rooms as possible.

- Extension of the automation for the self-cleaning of the Roto Chef 3 (simple cleaning after each cycle, intensive cleaning as needed, delivery of the cleaning materials with the shuttle trolley 2 combined with cleaning functions of the customers' dishes,

- Modernization center of the technical equipment of the shuttle trolley 2, the Roto Chef 3 and the Infobank 4, as well as serving as an information, consulting and training center for customers, interested parties and as a public portal, a place for the exchange of ideas for the clientele, a reception point for suggestions for improvement, associated business or the establishment of branch offices.

- Ensuring sustainability by introducing upgrade and service repair logistics of Roto Chef 3 through Fresh Food & Service Center 1 (principle = all from one source) to ensure smooth operation of the automation chain, i.e. model maintenance and upgrading.

- Use of sound suppressing materials, such as composite sheet in the construction of Roto Chef 3.

Mixed and secondary markets: The information system, called Infobank 4 by us, uses the Internet, thus saving paper and ensuring modern accounting including data management.

To avoid waste and in the interest of sales and profitability, the very well-equipped automated base of Fresh Food & Service Center 1 will be used a lot to serve customers who do not eat at home.

The Fresh Food & Service Center 1 can individually deliver snacks, beverages or meals via delivery services in adapted shuttle trolleys 2 according to system-compliant orders, e.g. for employees of large companies, on time for the breakfast or lunch break for institutions, authorities or schools. For this, Roto Chef 3 or other cooking robots would have to be installed in the Fresh Food & Service Center 1, which optimally fulfill the special purpose.

To attract customers into such market segments, Fresh Food & Service Center1 employees should be tasked with market development. Even with such variations, the objective of the invention is fulfilled because no disposable packaging is needed, and all leftovers are returned and recycled.

Public Displays: To reach the wide audience outside the Chain Food System customers, appropriately large public displays will be placed in the immediate vicinity of the customer base, showing in real time, with the means of modern communication, the current Food Chain offer.

The focus is on newly arrived goods, special offers, etc. and is presented via running images, short films, running text strips, thus informing possible new customers in a paperless manner. The audience can use an easy to use, large keyboard or touch screen for a short time e.g. a repeat of what is played, enter their own email address for more info, submit applications as a new customer etc.

Freshly squeezed drinks without admixtures are virtually unheard of in mass distribution today, due to their very limited shelf life; individually blended drinks or smoothies are virtually non-existent. In these cases, the Food Chain System allows such variants to be produced economically, which also brings greater flexibility in the distribution of fruits from which juices are obtained. The interested customer only needs to place an order in the system (if necessary, it is even easier to repeat it), specify which ingredients and desired admixtures up to medically prescribed substances he expects and specify the pick-up time. In this way, Fresh Food & Service Center 1 can also meet individual requests.

Handling of beverages or pasty media: How environmentally harmful beverage packaging is, especially PET bottles, can be seen in the miles of "plastic carpets" on the world's oceans. The Food Chain System relies on automation; because beverage bottles or yogurt cups were designed to be handled by hand, a solution had to be found that was compatible with both. The shuttle trolley 2 as a box is designed to carry and return the two categories of transfer tools Ta and Tb, where Ta are purpose-designed reusable containers, (e.g. interchangeable tubes Ta, =pos.22) that are cleaned after each use; they solve almost without wear a large part of the problems of the packaging-free transfer and have for this the necessary diversity of variants.

. The transfer tubes Ta =Pos. 22, e.g. made of glass, ceramics, plastics or metals (stainless steel), as tube pieces easy to clean, closed airtight with lid 23 or drop 23', are used for transfer of the portioned food. As mentioned above, mostly large-volume special forms of reusable transfer toolsTa can be used for any liquids or media. If necessary, they can be reused with heat-insulating properties, (e.g. with a double wall like a thermos flask) until they are physically worn out. Because, for example, bulk products, vegetables, fish, meat, pastes, liquids, pasta, water, milk, oil or ketchup, mustard, yogurt, butter or additives to be finely dosed such as spices, salt or flowers have very different properties and dimensions, the variety of transfer tools must be large; because of the practicality will often be better to resort to disposable transfer tools Tb, (in different variants). These are ultra-light, 100% recyclable, single or chain-linked disposable wrappers made of PET film, biodegradable or edible film, which are cut open and then recycled for the purpose of emptying vending machines, but are also suitable for opening by hand. These should replace the bulky PET plastic bottles and cups intended for hand operation. The disposable transfer tools Tb, also designed for hand use as a single piece or torn from the "chain", can be virtually totally emptied by squeezing and reduced as recyclable scraps almost to the solid volume of the original material. The floating plastic islands, a real plague of the ocean biosphere, consist mostly of the bulky PET bottles which could disappear via the detour of a better solution. What these bottles originally had as their content, drinks or pastes, humanity can enjoy with less effort of plastic via simple solutions suitable for vending machines. The transfer tools Tb can be held by hand, opened and, if necessary, drunk empty or half empty, hung in the refrigerator or stowed away to save space. The disposable transfer tools Tb, (e.g. small capsules Tb =Pos. 26, pouches Tb =Pos. 27<medium sizes)> and large volume balloons Tb =Pos.24) are supplied, with exceptions, by a flexible connection from the original film as machine-compatible yard goods, see Fig. 3, Tb = pos. 27. For this purpose, between the individual transfer tools Tb, e.g. small capsules Tb = pos. 26, pouches Tb = pos. 27, and balloons Tb = pos.24 each have a flattened tear-off zone (predetermined breaking point 271, for example with the aid of a perforation), so that they can be separated from one another more easily; there can also be an outlet 272 at one corner which can be opened by tearing off, which allows a bag Tb = pos. 27, for example, to be emptied cleanly by hand or by mouth. The two types of transfer tools Ta and Tb are built in such a way that they can serve many contents with few shapes. These orientation examples show it, with the (pos. indicating any ordinal number), e.g., interchangeable tubes Ta =pos.22 and disposable transfer tools Tb, (e.g., small capsules Tb =pos. 26, pouches Tb =pos. 27<medium sizes)> and large-volume balloons Tb =pos.24). The balloons Tb =Pos.24 are suitable for bulky goods e.g. like lettuce, flowers or shellfish. They are also 100% recyclable, can be with or without inert gas filling, as single pieces or linked. All disposable transfer tools Tb. are gripped by the Roto Chef 3 for the purpose of emptying by a gripper at the top and pulled over a cutting device, which slits them at the bottom so that their contents fall at a predetermined place. The film scraps are moved further by a pusher so that they can be sorted, collected and compressed for recycling purposes. If larger quantities are required, a number of cells are opened until the necessary quantity is reached.

In this way, liquids, pastes or powders can be dispensed hygienically as discrete quantities. Some of the most common packaging, the yogurt pot or the PET bottle, can also be replaced in this way by a hand-held and automatic machine-suitable wrapper of medium size, referred to here as "Bag Tb =Pos. 27". These have volumes of e.g. 50 to 500 cm^3 per unit and chained together they look like a "sausage chain".

The designations e.g. small capsules Tb =Pos. 26, pouches Tb =Pos. 27<medium sizes)> and large volume balloons Tb =Pos.24 only indicate size as a guide.

Manufacturing technology is available and leans on known from packaging, electronic, pharmaceutical or assembly technology. The preferred material is PET film (or tubing), 10-36µm thick approved for food, or biodegradable film. The desired type of transfer aid Tb made of PET film, tubing or semi-finished products can be produced at the Fresh Food & Service Center 1, filled up, then provided with a QR code, for example, and thus made ready for shipping. The bags Tb =Pos. 27 are suitable for a special design due to their handiness and the large application spectrum, which allows them to be consumed in stages and stored closed in the meantime. Fig. 3 shows a top view of the middle category of "pouches" with a cell capacity of approximately 50 to 500 cm^3.

When first used, these bags Tb =Pos. 27, (e.g. filled with cream), are partially emptied through the tear-off corner as desired, then the flat discharge opening is sealed by squeezing a few millimeters behind the outlet opening with the

aid of a special clip, like a paper clip. The bag Tb =Pos.27 can then be hung on a hook from this clip or from the hanging hole 273, which is located at the adjacent corner of the bag, to save space. Should one have, for example, in the refrigerator or elsewhere a row of such hooks (or a row with these special clips), it is thus possible to have perfect, air-tight and space-saving storage for the repeated use of the bags.

Space and cost advantages: Example: instead of the 1.5 liter PET deposit bottle (0.25€), which weighs 30g, has a 2g screw cap made of HDPE and a colorful sticker, it is possible to take a cheaper, approx. 0.8 m long "chain", made of 8 pieces of interlinked, transparent bags Tb = Pos. 27, each with 200 cm³ content, which weighs only 8 g when empty and is automatically fed to the 100% recycling. An imprinted QR code describes the contents, the pouch subdivision allows more economical portioning, the "chain" can also be individually bent to save space. The PET bottles for approx. 1600 l content, (=8000 glasses of beverage) result empty in a waste volume of approx. 2 m³, which weighs approx. 33 kg; 8000 bags Tb =Pos. 27, empty weighing approx. 8 kg, need only a third of the PET quantity for the same beverage content. They also have the advantage that 8 discrete quantities of water can be taken. Emptied, the 8000 bags Tb =Pos. 27, each only about 8x10x 0.01 cm in size, fit into a 10 L collection bucket. These can be collected with a vacuum cleaner, if they have not been rolled up more densely beforehand in an automated way, which facilitates recycling.

Such a "bag Tb, = Pos.27 also has the advantage that pasty contents can be emptied up to approx. 1% loss perfectly by squeezing out, clearly better in comparison to the tubes, cups or glasses, which are disposed of today with more residual contents. These, supplied in interlinked form, can be emptied by the Roto Chef 3 according to the desired quantity by slitting, or separated via the predetermined breaking point, then opened by hand or between the front teeth at the tear-off area, unloaded into a (biodegradable) cup or sucked out. They are also otherwise easy to transport in any shopping bag.

The Fresh Food & Service Center 1 is an automated, hybrid food point of sale (unit with counting, weighing and portioning machines) with service functions, which has material components "hardware", but with the help of the operating staff and computer equipment performs many complex functions to ensure the success of the food chain system. Compared to previous sales methods, where the information flow was one-sided from the sales side, the Fresh Food & Service Center 1 allows and encourages communication that is not only through the customers' orders. The customer's Roto Chef 3 sends self-diagnostic messages to Fresh Food & Service Center 1 so that it can be serviced or updated as needed. The latter is the hub of the entire food chain system, where all suppliers big, small and customers pass. The Fresh Food & Service Center 1, as a near central service unit, provides for the monitoring, maintenance and updating of all technical equipment for customers, if necessary, on a lump-sum basis under a service contract. It is assumed that the Fresh Food & Service Centers 1 are in population centers of the area, also at least for the beginning as part of a supermarket. Among other things, they replace the producer's packing stations for food, which are no longer needed, and give the ordered goods to the customers in an orderly sequence, without their own packaging, for the purpose of further processing until they reach the dining table.

It is therefore a mechanized supermarket with a digital ordering and PR department.

The Shuttle Trolleys 2 brought by customers (which replace the shopping cart) are refilled, exchanged, or picked up here according to orders. The Fresh Food & Service Center 1 is thus a largely automated, newly created retail outlet that sells common groceries without disposable packaging, paper advertising, or shopping bags, roughly in the quantity and variety of a supermarket, but without the time-consuming search for shelves. A quick stop at the automated handover point is sufficient. The Fresh Food & Service Center 1 will likely initially be set up next to an existing supermarket and will have two separate entrances: one of which is for walk-in customers next to the supermarket entrance. The main entrance (Shuttle Trolley 2 traffic), however, will be on a two-lane, partially covered road, where the changeover points for Shuttle Trolley 2 are located on the driver's side. Customers will stop there to hand over the Shuttle Trolley 2 (empty) or pick it up (loaded) without even getting out.

To ensure this happens without any confusion, the customer identifies immediately upon stopping (e.g., with a memory card, facial recognition, RFID, or QR code). This causes a hatch opposite them to open, releasing their Shuttle Trolley 2, ready for pickup. This trolley arrives at the customer after identification using a conveyor belt, roller

conveyor, or self-driving vehicle. To prevent customers from making detours to the Fresh Food & Service Center 1, customer groups can form to facilitate deliveries:

- Employees of large companies use company-owned parking spaces; there, collect vehicles can park the Shuttle Trolley 2 next to customers' cars, allowing them to drive home non-stop.

- In coordination with the Fresh Food & Service Center 1, smaller, customer-oriented branches could be set up, while retaining all the benefits of the system.

Existing courier, parcel, or social services could also establish delivery arrangements with the Fresh Food & Service Center 1. Filter programs in Infobank 4 should allow customers to be addressed by group or individually through messages or receive only targeted information based on their previous ordering behavior to simplify analysis. Ultimately, this results in increased sales and increased profits for the food chain system. With a smaller footprint, less foot traffic, the absence of refrigerated shelves, and rapid product turnover, the sales-related energy costs of the food chain system are lower than those of current retail spaces. In the food chain system, the customer can obtain any information they require from Infobank 4 at any time without paper or wasting time; the salesperson saves paper. For example, the customer can access all the information they are familiar with from previous retail, illustrated with a clear, legible representation of the product, in the language of their choice. In case of confusion regarding the ingredients, which can often arise, the customer can click on the relevant number (e.g., preservative E 123 here) or the wording to receive a clear explanation of the properties of this ingredient. If desired, the customer can configure Infobank 4 to store data about their orders for an extended period, which can then be used, for example, by their doctor to analyze their eating habits.

Each customer will thus have a personalized order file that they can manage and customize themselves. Hygiene is ensured by automated handling. In addition to the advantages mentioned above, data processing offers extras such as calorie calculation, recommendations, long-term nutrition monitoring, real-time notifications about the arrival of new products, and convenient billing. The Food Chain System, with the Fresh Food & Service Center 1, significantly modernizes the food retail industry. This can be done by accessing a Food Chain app. With their smartphone, the customer always has everything at hand: audiovisual information, voice commands, translation, etc., thus optimally adapting the delivery to life. The Fresh Food & Service Center 1 includes:

- 1A) Counting, weighing, and portioning machines, into which all food items are individually poured for each order into reusable, Ta, and disposable transfer aids. Human assistance may also be necessary in exceptional cases.

- 1B) Loading machines, which mark the filled Ta and Tb transfer aids, e.g., with a QR code, allocate them to the respective shuttle trolley 2 in an orderly manner, and process them.

- 1C) Unit of commercial kitchen equipment, which ensures the pre-preparation of food items for faster processing, which are then portioned and ready for final processing by the Roto Chef 3.

- 1D) Internal transport equipment such as conveyor belts, roller conveyors, or driverless mini-transport vehicles, which immediately deliver your shuttle trolley 2 to the arriving customer. These also manage other internal traffic between different stations and accept the shuttle trolleys 2 delivered from outside.

- 1E) a checking, receiving and sorting unit, which sorts and checks the contents of the incoming shuttle trolleys 2 and prepares them for further use or recycling. Cleaning and replacement station for transfer aids, dishes, crockery, system plates, etc., so that customer service runs smoothly and without the need to individually complain about minor malfunctions. This maintenance is part of an accompanying service.

- 1G) - A computer-based real-time information, communication, ordering, and billing system, Infobank 4, ensures that all parts of the system are coordinated and continuously improved. The Roto Chef 3 computers, especially those located at the customer or affiliated company, are also closely linked to Infobank 4. This ensures that the necessary information and communication are always updated. All automated machine processes are controlled by a sequence controller 311, allowing remote diagnosis, remote control, condition analysis, and maintenance. Each

individual sequence controller 311 must have sufficient channels to allow each process step to start, accompany, or end a process. This is especially important for temperature control of cooking processes.

- 1H) - Customer-friendly product information: The Food Chain System offers a vast amount of information of all kinds from the Infobank 4, something that was not possible in the previous commercial relationship with customers. Thanks to modern media via smartphones, apps, laptops, tablets, or local displays 42 (mounted on units of the Food Chain System) and large public displays, modern written or audiovisual communication is created, which can also resolve any problems that may arise in real time. With these tools, customers and the public can be informed much more easily and comprehensively, as desired. The tedious reading of the poorly printed information on the old packaging or the expensive paper information is no longer necessary. Furthermore, due to the proximity and the fact that customers visit the store frequently, the Fresh Food & Service Center 1 can also maintain direct, personal contact with the responsible staff there, which clearly leads to the development of better operations to the satisfaction of both parties. This is important in the initial phase of the project until customers adapt to or become accustomed to the new technology. This allows for much better involvement of customers because their suggestions can be saved in Infobank 4 at any time for evaluation purposes. Extras: The fresh Food & Service Center 1 (with internet café and PR room) can also serve as a kind of local portal, mediating services between various producers, small businesses, and the customers of the food chain system, thus acting as a kind of information broker – a local electronic bulletin board.

The shuttle trolleys 2 carry removable electronic memory cards 41, into which orders are read, which determine the contents of one or more types of shuttle trolley 2. Center 1 also serves as a meeting point for direct buyer-seller dialogue, where audiovisual information is presented and interactive training takes place. This can also include third-party services that can be handled during the customer's short stay there, thus saving additional trips and completing as many tasks as possible in one location "from a single source." For this purpose, the fresh Food & Service Center 1 can have a point for improvement suggestions, where customers can present special requests, which are then positively addressed by this point on a case-by-case basis. The Shuttle Trolley 2 serves more than just as a customer shopping cart. It is essential for automation and has a decisive effect; the customer no longer needs to search the shelves; the hygienic, automatic filling of the Shuttle Trolley 2 according to a recipe takes only seconds! The customer is also shown the prices of the ingredients and the final total, printed out if necessary. When filling in the Shuttle Trolley 2, a specific placement order is maintained by machine power, because the mechanical removal by Roto Chef 3, in order to fulfill the recipe, must also follow this placement order; this eliminates the need for more complicated electronic identification with all its consequences. Shuttle Trolley 2 typically reaches the Roto Chef 3 after a short transfer time, carried by the customers themselves (e.g., on the way to and from work) or delivered by other means, possibly refrigerated for longer transfer times. The customer attaches the shuttle trolley 2 to the side of their Roto Chef 3 and slides it into a locked position until it is clearly (e.g., audibly) docked, which puts the Roto Chef 3 into standby mode until the start button is pressed. The precise positioning of the shuttle trolley 2 on the Roto Chef 3 allows for precise removal of the ingredients in the desired order, which is, in fact, the most important, very simple "mechanical" information. Further information is contained in memory card 41, which is attached to the shuttle trolley 2 and can be read or changed by all vending machines and by the customer. The shuttle trolley 2 must therefore accommodate sufficient transfer tools Ta and Tb for customers who purchase different quantities. Therefore, there must be shuttle trolleys 2 in different sizes, e.g., A, B, C. There are ones for single households, right up to large families or institutions. The shuttle trolley 2 should also have additional space, inside or outside, for example, to accommodate a custom-assembled pizza, cake, or other frequently requested items. The shuttle trolleys 2 must meet the requirement of being compatible with both the filling device of the Fresh Food & Service Center 1 and the removal device of the Roto Chef 3. These basic requirements must be observed during design. The “mechanical” identification is achieved by the design of the transfer box 21, which allows a comprehensible placement of the teansfer tools Ta and Tb, whether in recesses (nests) or based on the fixation in a belt. Shuttle Trolley 2 consists of standardized transfer boxes 21 with racks 25 and custom-built teansfer tools Ta and Tb (see above), which dock with loading and unloading machines at the Fresh Food & Service Center 1. After the transfer, the filled shuttle trolleys 2 dock at Roto Chef 3, where the transferred ingredients are automatically removed from the teansfer tools Ta and Tb, taking the placement order into account. The capital letter after the

number 2 indicates a variant of Shuttle Trolley 2 (A B,... X, - which includes suitable teansfer tools Ta Tb). After the ingredients have been removed, the previously used teansfer tools Ta can be returned, and the film residues from the transfer aids Tb are stored in a recycling compartment, with any food leftovers being placed in a reuse compartment. This cycle repeats as needed, without anything ever being thrown away.

Figure 2 shows a simplified version of how this logistics system works, compared to supermarket shopping in Fig. 1.

The shuttle trolley 2 consists of:

- 2a) Standardized carrying box 21, lightweight and handy instead of a "shopping basket," with convenient dimensions and docking openings, with centering pins and flaps or lids, (telescopic) handles, wheels, etc., which facilitate transfer and positioning. In addition, the carrying box 21 has a separately operated returns compartment where leftovers can be stored for recycling, which are then returned to the Fresh Food & Service Center 1 as soon as possible. The carrying boxes 21 also have a refrigeration connection so that the freshness of the ingredients can be maintained for a longer period if necessary.

- 2b) Reusable teansfer tools Ta supplied by Fresh Food & Service Center 1, as well as disposable transfer aids Tb (e.g. Tb = items 24, 27, and 26) as described above. The use of the Food Chain System teansfer tools Ta and Tb guarantees 100% reuse, e.g. B. the interchangeable tubes as teansfer tools Ta = Item 22 or recycling the plastic residues from transfer aids Tb.

- 2c) The racks 25 are conveniently shaped holders or compartment belts that accommodate the reusable teansfer tools Ta and the disposable transfer aids Tb.

- 2d) Memory card 41, which stores all necessary information. The shuttle trolleys 2 ensure the following functions:
- 2e) Secure short-term storage for the transfer of ordered ingredients to the Roto Chef 3, so that it can remove the available ingredients from the position in the rack 25 without any risk of confusion.

- 2f) The return transfer of the cleaned or uncleaned teansfer tools Ta, the film remnants of any leftover food, or other system-compliant small items back to the fresh Food & Service Center 1.

- 2g) Entry of new orders or relevant notes on the memory card 41.

The Roto Chef 3 is a machine (an automatic device) whose task is to process the ingredients of a dish brought by the shuttle trolley 2 according to the recipe using suitable forms of energy and then clean itself along with the dishes used at the table.

It is an automated unit that converts customer orders into control signals and implements them via electromechanics as work steps in the cooking process.

The special design of this machine will be described as briefly as possible:

The food from the shuttle trolley 2 is placed in orderly fashion in work vessels 36 and prepared according to the recipes using appropriate energy and movements, called actuators 38, which originate from an energy center 31. For this purpose, the work vessels 36 are fixed to pivoting supports, hereinafter referred to as swivel shields 35, which are rotated approximately half a revolution around the x-axis. After the cooking process has been completed, the work vessels 36, including the swivel shield 35, are unloaded from the cooking area to a discharge point by this main movement. For a better understanding of the detailed description below, see Fig. 4: The Roto Chef 3 is in a room measuring approximately 2x2x1 m (width x height x depth). The necessary energy sources are generated in a energy center 31, which is attached to the floor of the kitchen. Attached to the top of the energy center 31along the central axis X is the machine's axial tubular main bearing, called the sliding sleeve bearing 32. This ensures the positioning accuracy of all movements inside the Roto Chef 3 and provides the coaxial bearing for the sliding sleeves 33, which slide precisely against one another like telescopic tubes and can move freely relative to one another. In the same way, the radially projecting gripper arms 331 attached to them move as shown in Fig. 4 without drive components or tools 37 to be attached to them. On the outside, at the two tubular extremities of the sliding

sleeve bearing 32, are two bearing rings 351. Attached to their ends are L-shaped support arms 352, the ends of which, facing away from the central axis X, are fixed to swivel shield 35 and swivel shield 35'.

This arrangement ensures that the swivel shield 35 can be driven clockwise 180 degrees along a circular arc from the left starting position (0°), so that they arrive from the left of the central axis X to its right side. This allows the swivel shield 35 to pick up objects from the left half of the machine (called the cooking section KS) and transport them to the right side (called the finishing section FR). The swivel shields 35 are designed to perform large movements with the work vessels 36. The gripper arms 331 are primarily intended to perform smaller positioning movements as well as secondary movements such as mixing, shaking, and rotating.

The necessary placement of work vessels 36, tools 37 and other accessories can be carried out by the drive mechanism through the mutual movements of the swivel shield 35 and the gripping arms 331 in the sense of preparing a meal. The gripper arms 331 can be equipped with grippers or other devices, for example, so that only one gripper arm is needed to grip and move an object. It is also possible to move two gripper arms 331a and 331b synchronously, so that they clamp, rotate, or otherwise move an object together to transport objects from one point to another.

Function: The Roto Chef 3 removes the ordered food from the shuttle trolley 2 in a predetermined order and prepares it according to a recipe. It is designed for families, and to be affordable, it would have to be mass-produced, and it also had to withstand the rigors of a family with children. The recipes that Roto Chef 3 prepares should be adapted to automated preparation without compromising flavor. The Roto Chef 3 replaces virtually all existing kitchen appliances, saving space, and is practically quiet and energy-efficient; it also offers additional functions and options.

The heart and engine of the Roto Chef 3 is the well-encapsulated drive and energy center 31, located centrally approximately below the main bearing of the swivel shield 35 (central axis x).

In front of the energy center 31, beneath a panel that looks like a piece of furniture, is the technical complex behind various doors or flaps of various, purpose-built types and a clearly visible display 42 with a keyboard, adjustment knobs, connections for computers, printers, etc., which houses the Roto Chef 3's technology, including work vessels 36, tools 37, and accessories. A hand washing and drying automat 325 with wastewater extraction is freely accessible, as are other useful features, such as a hand dryer or a Mini sink, coffee machine, and drinks dispenser, see Fig. 5. What happens behind the closed door of the Roto Chef 3 can be shown on display 42. The customer can pause as desired, adjust parameters, reprogram, or simply let the machine complete its program to fill the prepared plates. Roto Chef 3 is designed to prepare small meals for families, but also for smaller businesses, to cook simple to complex recipes depending on the equipment.

Its main function is to remove the sorted ingredients from the shuttle trolley 2 based on the specifications on the memory card 41, process them, and then clean itself along with the used dishes, which have been placed in the same cleaning area. The most important components of the Roto Chef 3 are arranged around the energy center 31 (supplier of the energy actuators 38). The shuttle trolley 2 can be docked on the left side, and the finished meal can be removed on the right, see Fig. 5.

With the docked shuttle trolley 2, the ingredients arrive in rows, preferably arranged in lines, such as interchangeable tubes Ta = item 22, small capsules Tb = item 26, bags Tb = item 27, and balloons Tb = item 24. These are mechanically emptied into the Roto Chef 3's work containers 36 in a predetermined order; doing this manually would be too cumbersome.

Roto Chef 3 completes the cooking cycle, so you receive the ordered meal just in time, without your hand having to touch the ingredients. The energy center 31 enables functions such as heating, roasting, cooling, moving, mixing, pumping, etc., to utilize the work vessels 36 near the processing chambers effectively and as quietly as possible. The Roto Chef 3 requires additional drives to move the local rotation and/or rotation/sliding movements for the sliding sleeves 33. Mixers are indispensable in the kitchen, requiring motors with a corresponding design. At least

two such drives, one high-speed, the other low speed, are necessary. Of course, a multitude of small tools for mixing, grinding, cutting, kneading, etc., not to mention individually, can be connected to their shafts.

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- 3a) - Power supply, single-phase or three-phase, approximately 4-8 kW, and conversion modules,

- 3b) - Heat, which can be accessed from all available sources on site, including waste heat via a heat sink,

- 3c) - Cold from a powerful source down to approximately -20 °C,

- 3d) - Steam, saturated or under slight pressure, 0.5 to 1.5 bar,

- 3e) - High-flow vacuum, like a vacuum cleaner,

- 3f) - Lower-flow vacuum down to approximately -0.9 bar for vacuum sealing and pre-drying of residues, etc.

- 3g) Compressed air up to approximately 8 bars,

- 3h) - High-pressure water up to approximately 120 bars,

- 3i) - Cold water, hot water connection as usual,

- 3j) Exhaust air and wastewater connection as usual.

It is useful to equip each of the actuators 38 mentioned here with automatic or manual controls for auxiliary devices, clearly visible displays, or measuring devices. The availability of all these energy forms in a household will certainly lead to the development of various auxiliary devices requiring such energy over time.

Roto Chef 3's energy center 31 should be equipped with small automations (e.g., pressure- or temperature-controlled valves) to ensure balanced energy use. Heating, grilling in work (grate) vessels 36, or pyrolysis cleaning can be controlled electrically with high precision.

Energy Use:

- Compressed air is very useful for removing hidden dirt in numerous places and corners with short bursts of air. A small network of pipes with strategically placed openings and a solenoid valve are sufficient for this. Furthermore, compressed air can be used to move or power foaming, pulverizing, various pneumatic grippers, compressed air cushions, clamping elements, compressed air cylinders, doors and flaps, locking mechanisms, manual compressed air, brooms, etc.

- Steam: Using steam, you can achieve higher temperatures for pressure cooking in a double-walled cooking pot with a pressure lid, achieve normal cooking with rapid heating at 100°C, and, with the help of a control system, set

any lower cooking temperature. With an additional hose, you can also steam clean nearby areas, soak residual dirt, sterilize jars, moisten, regulate humidity during baking, steam cooking, operate tools, etc.

- Cold water, compressed air,/water, hose; A cold water buffer tank of several liters is connected to the cold-water line. This water supply is usually quite cold because it is flushed through each time cold water is drawn. This enables it to absorb some heat energy from the "warm side" of the refrigeration unit or air compressor, for example. Cold or hot water can be used under high pressure in small quantities for cleaning purposes, e.g., as a so-called "dirt blaster." This allows Roto Chef 3 to rinse away most food and ingredient residues, which are then fully collected with a shredded pre-drying process. These residues can be recycled via the Fresh Food & Service Center 1 for pet food or composting without leaving any chemical or detergent residue.

If a final rinse is necessary at all, it could be performed with a very small amount of detergent sprayed on, followed by a short high-pressure rinse.

The high-pressure water can be connected to a cleaning hose 323 with a rinse water suction system, up to several meters long, via an external connection. To drain the wastewater, a vacuum line must be run parallel to the high-pressure hose; in this case, this is designed as a coaxial protective hose around the high-pressure water hose. We will refer to this arrangement as cleaning hose 323 and use it for cleaning with compressed air or steam. The effect of the outer hose is always the same: the recirculation of dirt or water particles using the vacuum. To avoid the need for complicated hose adjustments when switching between the three-cleaning media mentioned, a four-way valve 324 is provided, the outlet of which is connected to the inner hose. The three inlets of this valve are each connected to high-pressure water, compressed air, or steam generator. There is also a position in which all three supply lines and the vacuum connection are closed. This allows for easy switching between the three cleaning modes. Various interchangeable nozzles can be attached to the end of this cleaning hose 323. The standard nozzle for all three cleaning types is likely to be a rotating nozzle for the "dirt blaster" fluid jet, surrounded by a funnel-shaped suction cup that ends with a sealing ring brush. This is an extra accessory that replaces much more than a bucket and a mop. -Vacuum: A vacuum source, such as a vacuum cleaner blower, is also necessary for pre-drying residues or vacuuming packaging films. This vacuum source can also be used with hand washing and drying automat 325, which helps save a considerable amount of paper towels. Vacuum also allows drying or cooking at a low, very constant temperature. A lightweight suction hose can be attached to the vacuum source to remove crumbs, residues, moisture, etc., directly or down the drain within a radius of approximately 2-3 m.

- Hot water: Hot water is provided by a small standby boiler for the integrated tea and coffee maker 326 or other purposes. The waste heat from the refrigeration processes and other nearby heat sources, such as waste heat from the air compressor, motors, etc., is concentrated in the energy center 31. It makes sense to dissipate this waste heat via the used cold water, so that the air conditioning system will use less electricity.

Better management of this energy over the years can be worthwhile. The waste heat from closely spaced heat sources can be bundled using heat pipes and directed outside to a heat sink, such as cold water or air flow, which benefits the comfort in the kitchen and the apartment. Heat pipes can also be used to balance the heat.

- Cooling + Appliances: The "cooling" function is somewhat more complex. Today, it is achieved with small cooling units built into very large cabinets (refrigerators), with power consumption proportional to the volume of these appliances. A relatively empty refrigerator means energy waste, while a relatively full one means an additional worry with monitoring best-before dates. It is expected that with the spread of the food chain system, the need to keep large quantities of food in the refrigerator will decrease, while customer demands will simultaneously increase. Opening a large refrigerator frequently for small items consumes more energy and thus heats up the environment more. But nobody would want to go without a refrigerator! Energy center 31 allows a new approach to this problem. Thanks to this cooling source, ice cream or ice cubes can also be produced in a processing room. - Cooling + Appliances: The "cooling" function is somewhat more complex. Today, it is achieved with small cooling units built into very large cabinets (refrigerators), with power consumption proportional to the volume of these appliances. A relatively empty refrigerator means energy waste, while a relatively full one means an additional worry with monitoring best-before dates. It is expected that with the spread of the food chain system, the need to keep large

quantities of food in the refrigerator will decrease, while customer demands will simultaneously increase. Opening a large refrigerator frequently for small items consumes more energy and thus heats up the environment more. But nobody would want to go without a refrigerator! Energy Center 31 allows a new approach to this problem. Thanks to this cooling source, ice cream or ice cubes can also be produced in a processing room. The energy center 31 will also be connected to a cooling chamber 327 and a cooling pack, which can replace the large, conventional refrigerator in most cases. Lightweight, not-too-long plastic pipes with thermal insulation can also be connected to this, which leads via a pump to a small heat (cold) exchanger. If this heat exchanger is placed in a cooling box or transfer box 21 (of the shuttle trolley 2) without its own cooling source and the small circulation pump on the energy center 31 for the coolant (e.g., a water-glycol mixture) is started, a larger container is available as a refrigerator for the duration of this pump's operation, which, with cooling packs, is also useful for short trips or outdoors.

- The Thermo-Pressbox 34, located above the sliding sleeve bearing 32 at a comfortable chest height, is a multifunctional device that also replaces an oven. It is a very well-through, thermally insulated box of sufficient strength with appropriate seals, which serves as a multifunctional space for the widest temperature and pressure ranges.

It allows for a wide variety of (even previously unknown) food treatments, which originate from the energy center via heat or cold sources, microwaves, or power-controlled heating elements. The heat or heat exchange sources are built into the non-stick coated walls or into the base of the appliance. The Thermo- Pressbox 34, with its programmable temperature and pressure control, combined with the introduction and circulation of gaseous media or the generation of smoke, allows for a variety of culinary creations, including bread baking, steam cooking, steam baking, long-term grilling, and even freezing.

By programming a temperature profile lasting several hours and generating smoke from wood, such as holm oak, you can easily replicate what an Argentinian grill master achieves just as slowly. Loading and unloading is done from the front, and its door can be opened, closed, or recessed into the side walls depending on the desired function or a transition to automatic operation. Depending on the function to be performed, the door can be designed to be practical, interchangeable, if necessary, with one or two panels, and with single or double glazing. For more advanced requirements, the door can also be replaced with another one containing functional components. It is evident that the loading or unloading of the Thermo- Pressbox 34 can also be carried out mechanized via sliding sleeves 33 with gripping arms 331. The location above the energy center 31 also makes it advisable to equip it with special functions, allowing various temperatures to be set within this enclosed and thermally insulated chamber, from freezing temperatures to high pyrolysis, temperature, or short-term flame-treating. In its function as an oven, the Thermo-Press- box 34 can incorporate all the features known from the current state of the art. Likewise, various pressure levels or media can be set or injected within this chamber, and its proximity to the Roto Chef 3 cleaning area suggests that automated cleaning is also possible if its door is moved aside (where it can also be cleaned). Cleaning can be carried out using one or more media, such as high-pressure water, (lye), steam, and even ultrasound. Therefore, the Thermo-Pressbox 34 should have a sufficiently dimensioned drain on the right side, which can also be switched to allow the introduction of other media from the outside via a specially designed valve system. With appropriate parameters, the Thermo-Pressbox 34 can also be used as a drying, freezing, fermenting, or even smoking chamber.

The energy center 31 offers all the necessary options, including a freely adjustable temperature control system equipped with multiple measuring points. Temperature control for multiple processes in Roto Chef 3 should be connected to a central microprocessor-based temperature control system, with multiple signals transmitted to an evaluation unit from multiple points where temperature sensors are installed. The adjustable parameters for temperature, pressure, etc. appear as setpoint and actual values on the large display and allow for the precise application of practically most common cooking methods.

The energy center's adjustable actuators 38 provide numerous opportunities to develop your own recipes, which are easily repeatable thanks to the memory function. We define the areas in which work vessels 36 a, b ... and specific tools 37 a, b, c are kept for processing the ingredients as the cooking section KS, which should have a certain protective effect against splashes, spills, etc. with partition walls. To separate the movements of the required work

vessels 36 and tools 37, they should move along defined paths and be stopped or parked in predetermined positions as required. The paths on the left represent the cooking section KS, and the paths on the right belong to the finishing section FR. All treatments of the ingredients are possible here, i.e., roasting, grilling, baking, flambéing with gas, stewing, steaming, deep-frying, blanching, poaching, etc. This means that almost any movement of the food, e.g., turning, mixing, shaking, rotating, vibrating, spinning, is possible with versatile drives and, depending on the requirements, specific tools. Cold treatment must also be possible to prepare cold dishes. For this purpose, the processing spaces must be thermally separable by fixed or movable parts. This also results in good sound insulation, especially when composite sheets with special sound-absorbing properties are used.

Dimensions and contents: Within a room with a width (B) of approx. 200 cm, a height (H) of approx. 200 cm and a depth (D) of approx. 100 cm, the Roto Chef 3 operates with energy center 31, work vessels 36, tools 37, gripper arms 331 and energy actuators 38, whereby “parking spaces” for such objects are available where possible, so that a lot of space in the kitchen can be used for other purposes. This space houses the mechanical drive assembly, which allows several work vessels 36, tools 37, or energy actuators 38 to be moved easily and simultaneously. For this purpose, several gripper arms 331 a, b.. (2 to 10) are moved simultaneously and independently of one another in such a way that we can precisely and repeatably position the components described above in this environment for the purpose of processing the ingredients. Located at the bottom center of the space is the energy center 31, which can supply all energies and fluids (defined here as actuators 38) that are important for cooking, dishwashing, and additional services. The drive technology that allows this type of positioning consists of gripper arms 331 that extend radially outward from the direction of the central axis x and are attached to concentric sliding sleeves 33 that slide over one another and are rotatable, so that each of these sliding sleeves 33 can transmit an angular position and a coordinate along the central axis x to its gripper arm(s). Only a brief description of their operation can be discussed here. The central component of the kinematics of the machine is the sliding sleeve bearing 32, the main bearing for the precise positioning parts, which also allows rotational movements of the sliding sleeves 33. This design allows for a wide variety of variants because the sliding sleeves 33 and the gripper arms 331 are easily interchangeable. This slidinsleeve bearing 32 also allows the swivel shield 35 to be mounted on the outside. The outer ends of the gripper arms 331 are designed, depending on their task, so that they can carry the objects to be moved. Radially adjustable gripper arms 331c are available as needed, which can grip objects at greater axial distances. The sliding sleeves 33 of the various gripper arms 331 consist of precisely sliding tube segments (telescopic tubes) that simultaneously guide and support each other, see Fig. 4. The direction and stability of this common central axis x of all tube segments is ensured by the sliding sleeve bearing 32.

The position of the end of a gripper arm 331 is defined by its angular position, its radius, and the position of its sliding sleeve 33 along the central axis x. Thus, objects can be moved or precisely placed using the gripper arms 331 (including fixing devices). The grippers are end pieces of the gripper arms 331 as connecting links to the above-mentioned working vessels 36, tools 37, etc. These must be constructed in a functional manner so that they allow the desired mobility of the work vessel (swivelling or rotating). In order to perform these functions, the gripper arms 331 of actuators 333, not shown here, must be positioned. A drive outside the sliding sleeves 33, i.e. directly on the gripper arm 331, is particularly suitable for rapid shaking movements (stirring) of a lighter work vessel 36. The sliding sleeve 33 of a gripper arm 331 can be longer or shorter; a long sliding sleeve 33 can protrude from both sides of the sliding sleeve bearing 32 and in this case, it can have a gripper arm 331 on each side. The sliding sleeve 33 together with the gripper arms 331 can be driven in the following different modes:

- Direct drive at one of the outer ends of the sliding sleeve 33, both for the rotational movement and for the longitudinal displacement from a drive source, such as a E.g. stepper motor, gear motor or motor via synchronous belt, etc.

- Direct drive at an inner end of the sliding sleeve 33 (within its cross-section). This means that two sliding sleeves 33 on the left and right with the same cross-section, which may be supported internally or externally by another sliding sleeve, can have their opposite ends coupled to or uncoupled from one another with or without rotational play via a positive-locking design through axial movement. This means that the driven sliding sleeve 33 on the right,

when coupled, drives the other sliding sleeve 33 on the left with the same or a smaller angle, whereby a desired angle of rotation can be set on the driven sliding sleeve. The gripping arms 331 can, for example, be provided with

grippers 333 (e.g., suitable gripping pliers) or devices so that, for example, only one gripping arm is necessary to grip and move an object. It is also possible to move work vessels 36 or even larger objects via coordinated movements of several gripping arms 331 because these gripping arms 331 or their ends, which are equipped with additional mechanisms, can move independently of one another.

Two or more gripper arms 331a b, ... can come towards each other and pick up objects from two sides, clamp them, rotate them or otherwise move them and transport them from one point to another if the drive motors control the gripper arms 331 on defined paths, see Fig. 4. The simplest way is to move or rotate an object along the central axis x; If the object is clamped, this can be determined by the current consumption of the motors. The longitudinal displacement or rotation is achieved by controlling the corresponding motors, whose movements for the longitudinal or rotational directions can even overlap; a similar situation occurs with the cheapest printer.

It is also conceivable that one of the gripper arms ends with an electric screwdriver that can turn fastening screws in both directions. How such objects can be optimized for this machine has long been state of the art and is easily found in literature; it will therefore not be discussed further here. Less well known are the mechanically simple impulse holding magnets with a magnetizable core, which is alternately magnetized and demagnetized by short, strong pulses. Their advantage is that the actuation energy is not provided via trailing cables, but rather by wiping contacts in predetermined positions. If the various tools and other parts cannot be grasped "blindly," the movable objects can be identified using an embossed QR code (alternatively RFID), which is dishwasher-safe and contains information about the respective object, its parking space, and its location. To carry out the cooking process, the actuators 333 (not shown) of the corresponding sliding sleeves 33 are actuated to move the work vessels 36 and the tools 37 into the working position and secure them there. The variety of tools 37 that can be used by the Roto Chef 3 is very large; we will mention only a few of them, such as foamers, mixers, choppers, dough kneaders, and spice shakers. Many tools are familiar from today's kitchen and can be conceptually optimized for Roto Chef 3, allowing for fewer, better-quality motors, possibly with adapters, to handle more drive tasks, thus combining them with automation to create the new tools 37. These tools, in conjunction with the work vessels 36, should carry out the necessary work prescribed by a recipe and are brought or attached to the work vessels 36 from case to case. Pots, and much more: Work vessels 36 are the pans, pots, various baking pans, etc., as known up to now, but designed for automation. These work vessels 36 must have features to ensure compatibility with the gripper arms 331 and other tools; these are tasks for the designer. Here, we will describe a few items that are not common. In other cases, to ensure the precise temperature setting of the food being cooked, the heat (cold) should penetrate as evenly as possible from all sides. This is best achieved with double-walled work vessels 36 and the circulation of a medium (water, refrigerant, steam) between the walls.

A vessel (pot) of this type is made of stainless steel, for example, and consists of an inner and outer pot with an empty space of a few millimeters between them. Between them, a gas vacuum or a liquid can be filled and emptied as needed using at least one connection piece. If there is a vacuum in the space between the two, it has the properties of a Dewar flask, i.e. it is heat-insulating. This double-walled work vessel 36 can be used in a variety of ways, both within the automated interior of the Roto Chef 3 with manual or automated operation, and also as a vessel outside of it, where it can be heated with appropriate energy flows from the energy center 31 over a very wide temperature range, e.g., for ice cream production or at higher temperatures above 100 degrees Celsius as a pressure cooker. In this case, this work vessel 36 should be provided with a pressure-tight lid. An additional handle allows the work vessel 36 to be operated manually. Experts know how to connect the components together. To carry out the cooking process, the drives of the corresponding sliding sleeves 33 receive power to operate or secure the work vessels 36 and the tools 37. The filled work vessels 36 then receive the necessary amounts of heat and movement, corresponding to the respective cooking process, thanks to the energy center 31. Because the more sophisticated versions have more work vessels 36 of different types with associated tools 37, these are attached to the swivel shield 35 using an automated, detachable fastening device.

A relatively simple fastening device that can be used almost anywhere is an electrically magnetizable pulsed holding magnet, which can be fixed and released using short electrical pulses. The grilling work vessel 36 is a type of stainless-steel wire cage into which the food is placed mechanically or manually. To ensure even grilling, this cage is slowly moved in front of a heat radiation source located on the Vario hotplate 39. The swivel shield 35, mounted around the central axis x and coordinated with the movements performed by the gripper arms 331, can replace the actions of a cook; we will describe only the most important functions here. Precise positioning allows the gripper arms 331 to grip or place the grilling work vessels 36 or tools 37 with pinpoint accuracy. How this is done is up to the designer, depending on the specific task. The swivel shield 35 performs rotary movements that follow a cylinder's circumference, and their purpose is to hold and transport the grilling vessels 36, tools 37, and other items. For complex tasks, the two swivel shields 35 can be controlled so that they operate independently of each other; For simple tasks or smaller portions, you can work with just one swivel plate; for larger portions, you can control them synchronously or even connect the two swivel shields 35 together so that they act as one. The preferred material for the swivel shield 35 is iron or an alloy, which allows a wide variety of objects to be attached to its inner or outer surface by magnetic adhesion.

The simplest Roto Chef 3: A swivel shield 35 carries two work vessels 36 a b on the inside (permanently fixed or removable), which are necessary for the Roto Chef 3 to fulfil its most important functions. Cooking takes place in the start (park) position, for which the action of the actuators 38 on the work vessels 36 a b must be ensured by the energy center 31 for the respective energy type. The duty cycle of the various actuators 38 depends on the recipe specifications; These are specified by the sequence controller 311 so that all components of the dish are ready at approximately the same time. In the start position, the upper edge of the swivel shield 35 lies just below the unloading level of the docked shuttle trolley 2, so that the orderly unloading of the ingredients in the work vessels 36 can take place via this upper edge at approximately table height. While still in the start position (0°), or after leaving this position during movement, or in various positions until reaching the cleaning position (with the opening facing downwards), further actions can be performed on the work vessels 36, their accessories, or tools 37 a, b, such as removing the lid, attaching or removing the mixer, etc., which can be particularly important for ambitious chefs. Should the need arise to position the swivel shields precisely at intermediate positions between the start and cleaning positions, it is possible to attach various sensors to the cylinder circumference, which the back of the swivel shield 35 passes through. These sensors respond and thus trigger the sequence controller 311. In the start position, the upper edge of the swivel shield 35 lies just below the unloading level of the docked shuttle trolley 2, so that the orderly unloading of the ingredients in the work vessels 36 can take place via this upper edge at approximately table height.
These sensors respond and thus trigger the sequence controller 311 to carry out the desired action.
With the swivel shield 35 beyond the approximately 150° position (i.e. in the finishing area), the work vessels 36 should be emptied after rotating clockwise using suitable containers or plates. After emptying, the swivel shield 35, together with the work vessels 36, tools 37, etc., can be cleaned.

Underneath are the dishes used at the dining table, which can be cleaned together with the swivel shield 35, work vessels 36, and tools 37. (Dishwasher function) Suitable racks should be installed in this area to ensure the correct position of the dishes for cleaning with water or steam. Like the pots on the stove, the work vessels 36 lie on a solid Vario hotplate 39, on which the energy (heat) sources can be replaced or adjusted as needed. We use the term energy in a general sense; e.g., an induction coil interacting with a pot suitable for induction contains a heat source; other types of energy, such as B. cold or mechanical energy (shaking, turning), can therefore be integrated into the Vario hotplate 39 and should be connected to the energy center 31 when setting up such a configuration.

With the work vessels 36 on the Vario hotplate 39, cooking is carried out almost as usual. If some work vessels 36 also require a second energy source or are supplied with energy away from the Vario hotplate 39, this is done via a separate connection with a movable line, which is led to the energy center 31 via the shortest or most economical route and, if necessary, via a plug connection 351. For the cooking process, only the ingredients must be unloaded into the work vessels 36 in the intended order, which can be done if necessary, with the help of one or more gripper arms 331 and tools 37 (if emptying by tilting the exchangeable tubes Ta = Item 22 is not sufficient). In the starting position on the left (angle of rotation = 0), the necessary work vessels 36 a b, ... are attached horizontally with the

opening or surface facing upwards to the upper edge of the swivel shield 35, so that in this starting position they lie on the Vario hotplate 39. In this position, they are filled with the ingredients ordered according to the recipe by emptying the docked pendulum trolley 2. They are also located opposite the respective tools 37 a, b, c ... or actuators 38 a, b, ..., which perform the necessary operations (stirring, mixing) or energy inputs (heating, cooling, etc.), thus cooking takes place. Here, the swivel shield 35 is intended to be sufficient to support only a few essential work vessels 36. The simplest form of kinematics is therefore to permanently mount the necessary work vessels 36 (e.g., 1 to 6) on a cylinder segment or a rod. In the simplest case, the work vessels 36 only require the energy supplied by the fixed Vario hotplate 39. At the end of the cooking process, a drive performs the 180° clockwise rotation of the swivel shield 35, if necessary, in stages, which leads to the emptying of the work vessels 36. Often, this does not even require the gripper arms 331 to be moved.

High-end features: The sophisticated versions of the Roto Chef 3 offer the option of interrupting the cooking programs at any time. The current parameters are clearly visible on display 42 and can be precisely adjusted, making this a useful feature for advanced cooks. If new creations are created, they can be saved and repeated, if necessary, in automatic mode. This also applies to the sophisticated variant with mechanically interchangeable work vessels 36 and tools 37, which offers the advantage that, as required, the individual work vessels 36 can be removed from the swivel shield 35 in other positions, either by hand or using a mechanized device, thus expanding the preparation options. Fixing devices that allow certain degrees of freedom could further expand the movement and unloading options. As long as the swivel shield 35 is in the start position or an intermediate position, which remains until before the start of unloading of the work vessels 36, various ingredients can be added or further processing such as mixing, stirring, etc. can be carried out. When rotated to approximately 180 degrees, the work vessels 36 are with the opening facing downwards, meaning they unload automatically or with assistance. Compared to the basic version of Roto Chef 3, the high-performance version, which includes the Thermo Pressbox 34, offers significantly more combination possibilities, allowing you to create almost any complicated recipe with the most demanding of tastes. To heat food, the serving plates can be placed on the Vario hotplate 39 and heated using the appropriate program.

Additional fixed or mobile heating surfaces can also be provided, where heat transfer can be selected using one of the conventional methods, even steam condensation, or by induction. This also applies to the sophisticated variant with mechanically interchangeable work vessels 36 and tools 37, which offers the advantage that, as needed, the individual work vessels 36 can be removed from other positions on the swivel shield 35, either by hand or a mechanized device, thus expanding the preparation options. When positioned at approximately 180 degrees, the work vessels 36 are with the opening facing downwards, thus unloading automatically or with assistance. Serving plates can even be heated using a magnetic insert on a table with induction coils. Both the Thermo Pressbox 34 and other working vessels 36, as well as the various actuators 38 of the energy center 31, require precise temperature control. Therefore, it is advisable to have a temperature control system equipped with a sufficient number of measuring points and adjustable as required. This should be connected to a central temperature control system with a microprocessor and to the sequence controller 311, so that the parameters required for the respective processes can be set and precisely controlled at the numerous measuring points where sensors are installed. The parameters to be set regarding temperature, pressure, etc., appear as setpoint and actual values on the large display, allowing precise application of both familiar and innovative cooking methods.

Cleaning: It is recommended to clean the Roto Chef 3 and the dishes used for cooking as quickly as possible, while any remaining residue is still soft. It seems prudent to subject the Roto Chef 3 to a short pre-rinse with a powerful high-pressure water jet (“dirt blaster”) immediately after removing the finished food. Any residue remains on a sieve and can be used for pet food. After approximately 15 to 45 minutes, the tableware can also be placed in special racks in the finishing room FR, where it can also be briefly pre-rinsed; any residue is then conveyed to the sieve. Now, cleaning can begin, after the food residue has been conveyed from the sieve toward shuttle trolley 2. A finely sprayed degreaser follows, which, after being absorbed, is removed with high-pressure water or steam. This marks the end of the cooking and eating cycle. This allows cleaning processes to be carried out with minimal amounts of water and energy. The usual number of dishes after a meal is limited here, so the dishwashing room can be relatively small, so it can be placed downstairs next to the energy center 31. If there is

more crockery, additional cleaning cycles can be started manually. Carriers and racks can be guided into the finishing room FR, where the dishes are emptied and cleaned, using inexpensive rollers and rails. To prevent splashes and odors, the cleaning area should be shielded with partitions or covers.

Small portions of dishwashing detergent and cleaning aids can also be delivered regularly via shuttle trolley 2 and automatically dispensed. When the swivel shield 35 rotates to the left in a semicircle to the start position, the food and film waste from the balloons Tb, = Item 24, are collected in a recycling compartment on shuttle trolley 2. Only a small amount of wastewater flows to the drain below; film waste and "clean" food waste are separated and sent to the central recycling center at Fresh Food & Service Center 1.

The Infobank 4 with the appropriate computer equipment, which is distributed among the various units of the Food Chain System, is practically the brain of the entire system and can, depending on the case, be designed for just one system unit or, in the case of a chain of stores, also as the Infobank 4 central unit. The Infobank 4 should be viewed as a dynamic factor that contributes significantly to the system's success, thus prioritizing customer interests and maintaining and shaping their satisfaction as high as possible.

To this end, especially in the initial phase, the most active and creative participants should form a relaxed creative club to further develop the food chain system. This should include Infobank 4 programmers, who, together with chefs, continuously adapt the most popular recipes to the Roto Chef 3's mechanical functionality, taking customer experience into account. It is important that the entire system, despite its complexity, be easy to use, because customers are not specialists, but ordinary people. Therefore, the programs and operating menus should be presented as simply and intuitively as possible on displays 42. Touchscreens can be used as appropriate. The control modes of the Roto Chef 3 computer and other devices should also be as simple to use as, for example, a modern washing machine with rotary knobs for program selection or possibly via touchscreens like a smartphone. The customer card, which some supermarkets already issue to customers, will be replaced within the Food Chain System with a memory card 41, which primarily transmits orders to the Fresh Food & Service Center 1. Using this card or via email, the Fresh Food & Service Center 1 can also inform customers about newly arrived goods, special offers, etc., or inquire about which improvements are most frequently requested or which other services external to the Fresh Food & Service Center 1 can access for notifications. Naturally, all financially relevant details regarding prices, special conditions, daily or monthly statements, etc., are stored on this memory card 41, which can therefore also be printed or statistically analyzed.

Structure, tasks: Each customer is assigned an individualized "information triangle," the common feature of which is that the "base" of these triangles is shared and located in the Infobank 4. The Roto Chef 3 computers are therefore part of this triangle. All devices, from the Roto Chef 3 to the Shuttle Trolleys 2 to the Fresh Food & Service Center 1, are connected via compatible interfaces, so that, for example, the memory card 41 located on the Shuttle Trolleys 2 can record registered quantities, costs, expiration dates, dates, etc. Each customer has their own files, where they manage their preferences and archives. Linking the Roto Chef 3 computer to other computers in the company is a natural fit. It makes sense, for example, to connect the house computer here because a kitchen equipped this way already has many data lines, which can be used to view other relevant house information such as room temperatures, fuel levels, theft and fire protection, deadline monitoring, etc., almost every day. The easily visible display 42 of the Roto Chef 3 also serves to monitor expiration dates for food and supplies, which is supplemented and updated with the help of the house computer based on online purchases and orders. A search program should be built into the Roto Chef 3 computer that allows the operator to select the best way to achieve a desired result from the multitude of options. The third link in the information triangle is at least one memory module located in the shuttle trolley 2, where the memory card 41 used as a customer ID can also be inserted for updating purposes. The exchange of information between the system units takes place directly and/or via the memory card 41, to which both the customer and the seller have different access; that is, the customer can enter his order there, possibly with special requests, which are then automatically forwarded to the information bank 4 and for execution to the Fresh Food & Service Center 1 (seller), so that the parties involved receive the necessary information simultaneously. Given people's creative instinct, it makes sense to develop recipe creation software with a very practical goal: to provide creative customers with a tool to create healthy recipes of their own choosing. To do this, their taste

preferences are entered into the computer, considering their biogenetic data, nutritional science, and the capabilities of the Roto Chef 3 technology. The computer then calculates recipes, variations, or drink mixes that the customer can order and prepare at home using the Roto Chef 3.

Filter programs should allow customers to be addressed by group membership or even individually through messages, for example, based on their previous ordering behavior. Recipes are organized and numbered according to a clear system, e.g., in the form of an Excel spreadsheet, where the updated price of the "standard portion" is listed in different columns, along with cooking time, calorie content, fat content, etc. Dividing the properties into columns allows the customer to sort recipes according to a specific criterion, simplifying their search by simply entering the recipe number to place an order, possibly with a multiplication factor for smaller portions (e.g., x 0.75) or a multiplier of 3 for 3 regular portions.

Entry systems: Orders can be placed and changed at any time until confirmation or discussed with the Fresh Food & Service Center 1 consultant. The order is placed via mobile phone or computer and sent as an email to the Fresh Food & Service Center 1. There, it is placed in a "digital queue," where waiting or service times are calculated and any unavailable products are displayed, along with possible substitutes. The customer must agree to this and, if necessary, provide additional information about where and when they can pick up Shuttle Trolley 2; they will then receive confirmation from Fresh Food & Service Center 1.

This also uses memory card 41 as a receipt and can make suggestions for the shopper, e.g., with special offers for the upcoming period.

To better identify the unpackaged products with the products previously purchased by the customer, the displays should show images of the "old" supermarket packaging when reading the memory card 41. However, by clicking on any component, any information appears in the desired language and font.

Memory card 41, home screen, example: After launching the fresh Food & Service Center 1 app, a home screen appears, presenting the various operating modes for selection, e.g.,

Daily status; >shuttle trolley 2, Daily Information:

Customer's shopping list

Orders (daily, weekend, holiday orders)

Last week's purchases

Recipes

>Recipe library

Recipe entry, daily recommendations, seasonal information (asparagus, for example)

Change mode

Food storage, fresh produce, new products, special offers

Product ratings

Contents of the Shuttle Trolley 2

Special circumstances (seasonal availability, price changes) should be communicated to customers in real time. Separate alerts should be provided, for example, for ingredients that have expired, low stock levels, Roto Chef 3 malfunctions, delivery delays, unavailable items, replacement recommendations, etc.

Food and Health: By accessing the database, customers can view their eating habits over time and notes on their health, make personal comments, and enter blood pressure, stomach upsets, unusual symptoms, and weight.

Patent claims

1 System for the automated distribution of food portions based on digitized individual orders, characterized by the following features:

a) The redesign of individual food supply takes place from the purchase of primary goods up to the consumer's plate without action of human hands.

b) This requires the use of the following three units:

c) The Fresh Food & Service Center 1 is an automated, hybrid food sales outlet (unit with counting, weighing, and portioning machines) with service functions that ensures the sustainability of the system by introducing upgrade, service, and repair logistics for the Roto Chef 3.

d) The shuttle trolley 2, see Fig. 2, takes on the function of a shopping cart and transfers the raw food ingredients delivered by the Fresh Food & Service Center 1 to the Roto Chef 3 in accordance with a placement sequence, shuttling cyclically between the units mentioned above and below, with any leftovers being returned to the Fresh Food & Service Center 1 in an orderly manner and recycled,

e) The Roto Chef 3 replaces the previous kitchen equipment and is an automated machine whose task is to cook the food ingredients delivered by the shuttle trolley 2 according to the recipe using appropriate forms of energy and then to clean itself together with the tableware used at the table.

f) No disposable packaging is required to operate the system.

g) All system processes, including billing, are coordinated digitally, with the relevant data stored and evaluated for nutritional purposes by networked electronic computing units in a paperless manner.

2 Distribution system for food according to claim 1, characterized in that the delivered food portions are automatically and orderly prepared and delivered to the consumer by a third unit, hereinafter referred to as Roto Chef 3, or in a special version thereof, ready for consumption according to specifications.

3 Food distribution system (food chain system) according to claim 1, characterized in that its Fresh Food & Service Center 1 unit has the following features:

3.1 It is an automated counting, weighing, and portioning unit for incoming goods, which portions the ingredients with a sorting unit that completes the preliminary receiving containers, called transfer tools 221, 222, which has taken over the individual portions from the previous unit, seals them in reusable transfer tools 221 and envelops the transfer tools 222 with air or protective gas, marks them according to customer orders, and places them in the shuttle trolleys 2, whereby the use of the above-mentioned means ensures that this type of distribution is carried out without environmentally harmful products or waste.

3.2 Has an internal transport system with conveyor belts, roller conveyors, or vehicles that brings the processed shuttle trolleys 2 to the arriving customers and receives the shuttle trolleys 2 arriving from outside,

3.3 Has an inspection, acceptance, and sorting unit that organizes and inspects the contents of the arriving shuttle trolleys 2 and prepares them for further use or recycling.

3.4 Has a food preparation section that performs actions on food so that it is best suited for further processing or consumption by the customer.

3.5 All products sold or further processed here are distributed exclusively in transfer tools 221, 222, without leaving behind any environmentally harmful products or waste.

3.6 Infobank 4, a branched electronic connection and coordination center between all units and participants in the Food Chain System, which allows customers to place and manage orders using familiar electronic channels, evaluates all information relating to the movement of goods, payment transactions, individual customer billing, and regularly checks the functioning of the customer's own Roto Chefs 3, whereby,

3.7 the information from the delivered ingredients is evaluated together with the customer's biogenetic data in a nutritional medicine computer program, using artificial intelligence if necessary, in order to help the customer optimize their eating habits via messages,

3.8 serves as a service, exchange, repair, and modernization center for the technical equipment of the shuttle trolleys 2, the Roto Chef 3, and the Infobank 4, as well as an information, consulting, and training center for customers and interested parties, and as a public portal, a place for customers to exchange ideas, a place to receive suggestions for improvement, affiliated businesses, or the establishment of branch offices.

4 Food distribution system (Food Chain System) according to claim 1, characterized in that the transfer of portioned food, beverages, or meals from the Fresh Food & Service Center 1 to the Roto Chef 3 or to other systemic end consumers and the return of the reusable transfer tools 221 and other recyclable residues always takes place with the aid of a shuttle trolley 2 designed as required, which has the following features:

4.1 It consists of standardized carrying boxes 21 with docking openings, positioning and centering pins, flaps, lids, handles, wheels, return compartments, cold connections, and removable outer compartments, and includes

4.2 Interior racks 25 in any suitable design, which divide the interior of the carrying box 21 for the used transfer tools Ta and Tb as required,

4.3 Reusable transfer tools Ta, which in a specific design are referred to, for example, as exchange tubes 221 = pos. 22, which are returned after cleaning,

whereby these transfer tools 221 are purpose-designed, easy-to-clean, lockable reusable containers made of glass, ceramic, plastic, or metal,

4.4 Disposable transfer tools 222 (such as small capsules 222 = pos. 26, bags 222 = pos.27, balloons 222 = pos. 24), which are ultra-light, 100% recyclable, single or chain-like disposable containers made of thin PET, biodegradable or edible films, which can be separated by vending machines or directly by hand via a predetermined breaking point and opened by tearing off an unformed spout, which are returned to the system as film residues when empty,

5 Food distribution system (food chain system) according to claims 1, 2, 3, 4, characterized in that its unit, hereinafter referred to as Roto Chef 3, is a cooking machine that prepares ready-made meals from ingredients, thereby replacing the previous kitchen equipment, wherein the ingredients

are placed in an orderly manner in working pots 36 and cooked according to the recipes used with suitable energies and movements called actuators 38, which originate from an energy center 31, wherein the working pots 36 are fixed to carriers that can be swiveled by approximately half a turn around the x-axis, hereinafter referred to as swing shields 35, so that after the cooking process is complete, the working pots 36 together with the swing shields 35 are unloaded from the cooking station KS to an unloading station by their rotation through this main movement, which has the following features:

5.1 It is an automated, computer-controlled unit in which customer orders are converted into control signals and processed, and which implements the work steps of the cooking process and self-cleaning via electromechanics.

5.2 As a closed, self-cleaning unit, it largely renders the appliances and tools currently used in the kitchen superfluous and has a horizontal central axis X as a spatial reference.

5.3 whereby the necessary forms of energy, also referred to as actuators 38, are generated in an energy center 31, which

is housed in a sound-insulating structure for the purpose of energy-saving integration, namely: power connection and conversion modules, heat and heat sink (waste heat), cold, steam, vacuum, compressed air, high-pressure water, cold water, exhaust air, wastewater, and that,

5.4 within this energy center 31, the energy losses, e.g., heat/waste heat, which arise during the provision of the actuators 38, e.g., via heat pipes, are interlinked in such a way that the waste heat generated on site, for example, is partially minimized via cold water/wastewater pipes, and

5.5 along the central axis X, the sliding sleeve bearing 32 is positioned as the main bearing, which serves externally as a bearing for the swing shields 35 and internally as a guide and bearing for the telescopic tube-like sliding sleeves 33, so that the longitudinal and rotational bearing of the latter is secured, wherein these consist of precisely sliding pipe segments (telescopic tubes) and that,

5.6 radially extending gripper arms 331 are attached thereto, wherein the grippers 333 as end pieces of the gripper arms 331 transfer movements to the working pots 36, tools, 37, (objects), etc., whereby the grippers 333 should engage with the object to be moved by their own executing movement, whereby disengagement, i.e., the release of the above-mentioned object, is usually effected by targeted rotary or sliding movements in the opposite direction,

5.7 whereby the swing shields 35 mainly perform the movement of the working pots 36 and tools 37 over a wide area and the gripper arms 331 perform smaller movements for the placement and arrangement of the objects involved in the cooking processes,

5.8 whereby these mechanical devices are used to perform unloading and collection operations to and from the shuttle trolley 2, such as emptying the transfer tools Ta, cutting and squeezing the transfer tools Tb in the working pots 36, collecting the foil residues, and rearranging the tools 37,

5.9 whereby, with the aid of these mechanical devices and the tools 37 or actuators 38, the cooking cycle is controlled via the sequence control 311, and

5.10 the finished dishes are unloaded via a semicircular movement of the swing shields 35 together with the working pots 36 into the finishing chamber FR, and then,

5.11 the working pots 36, tools 37, tableware, etc., used in the cooking process, which are located in the finishing chamber FR or have been placed there, are subjected to a pre-rinse with a high-pressure water jet “dirt miller” to collect any food residues on a sieve, whereby complete cleaning is carried out by the action of several actuators 38 in order to perform drying after the final rinsing, whereby the Roto Chef 3 has the following additional units for the fulfillment of demanding functions,

5.12 the Thermo-Pressbox 34, a thermally insulated box developed from an oven for positive or negative temperature and pressure ranges with circulation of gaseous media,

5.13 and double-walled working pot 365 with options for filling the intermediate space using one of the available actuators 38, and

5.14 magnetic fixing modules for moving parts in the form of impulse latching magnets, which are electrically attached or detached, and

5.15 external devices such as cooling or warming boxes, vacuum dryers, which are operated by the actuators 38 and, if necessary, are connected via a circulation pump 363, and

5.16 that the cleaning equipment for the immediate vicinity consists of a change over four-way valve 324 for actuators 38, which, for example, directs an internal hose for actuators 38, such as water, steam, or air via adapted, known cleaning nozzles to the cleaning target, these nozzles being surrounded by a suction nozzle which, with the aid of vacuum, is guided via an external hose and removes the dirt particles, and that

5.17 The operative panel BO of the Roto Chef 3 has an exterior casing like a piece of furniture and a visible or easily accessible touchscreen or display with a keyboard, adjustment knobs, connections for computers, printers, etc., and also has a hand washing machine and useful items such as a mini sink, coffee and beverage machine, and access to the refrigerator, dishwasher, food dispenser, additional connections, etc.

6 Food distribution system (Food Chain System) according to claims 1, 2, 3, 4, 5, characterized in that the information, coordination, and control of all its units is carried out by a modern computing center and database, called Infobank 4, which is based on artificial intelligence if required, in cooperation with the customer-oriented Roto Chef 3 computer, which serves the following tasks:

6.1 Each customer's own Roto Chef 3 computer is part of an individual “information triangle,” with which it updates and processes data from the Infobank 4 for each individual customer with or without their cooperation and contains their personal file, from which, if necessary, it provides the necessary data from the shuttle trolley 2 and the memory card 41 as the third components of the information triangle,

6.2 so that the Roto Chef 3 converts the recipes from the digital form via the sequence control 311 into performance signals, which activate the actuators 38 in the necessary sequence, so that the parameters for the necessary cooking processes are set and the meals are ready on time, whereby the proper functioning of the Roto Chef 3 is checked by regularly remotely querying the function parameters and corrected in good time in the event of deviations, and

6.3. that the entire activity of the food distribution system (Food Chain Systems) is carried out via the Internet, whereby the input systems are current everyday electronic communication devices such as mobile phones or computers, which communicate in both directions with the Fresh Food & Service Center 1 in words, icons, and images, and are initiated by customer orders, which are confirmed after consultation with the Fresh Food & Service Center 1 and, as long as there are no change requests, are released for execution, and that when the order function is opened, the customer is regularly offered the opportunity to read the latest information about the product range, prices, special offers, individualized recommendations, and new products, and

6.4 A recipe library is part of Infobank 4, where recipes from different sources and ingredients, as well as descriptions of the properties of the deliverable goods, are stored in digital form in such a way that they can be easily displayed in tabular form or found individually based on desired criteria, whereby, when the library is accessed, a start screen with the most frequently visited items appears in words or, if applicable, as icons or images.

6.5 Recipe creator software designed to meet the individual wishes of customers, taking into account their biogenetic and medical data, nutritional science, and the capabilities of Roto Chef 3 technology, which, after the customer's preferences have been entered, calculates recipe variations or beverage mixtures that the customer can order and execute.

6.6 The mobile memory card 41 serves as a customer ID and carrier of internal communication between all three units of the Food Chain System for coordination, verification, or as proof, and is “parked” in the shuttle trolley 2 and updated with each new order or change.

6.7 In addition to the usual commercial attributes, the Info 4 software also warns customers when food is about to expire and interprets signals from sensors within the Roto Chef 3 in such a way that the customer and the Food Chain System maintenance team are warned in good time if malfunctions occur or updates are necessary.

6.8 and that the Info 4 database maintains public displays that serve to inform and educate old and new customers and are also equipped with convenient, easy-to-use communication devices for this purpose.

C.L. Nov.26, 2025.

Fig.1

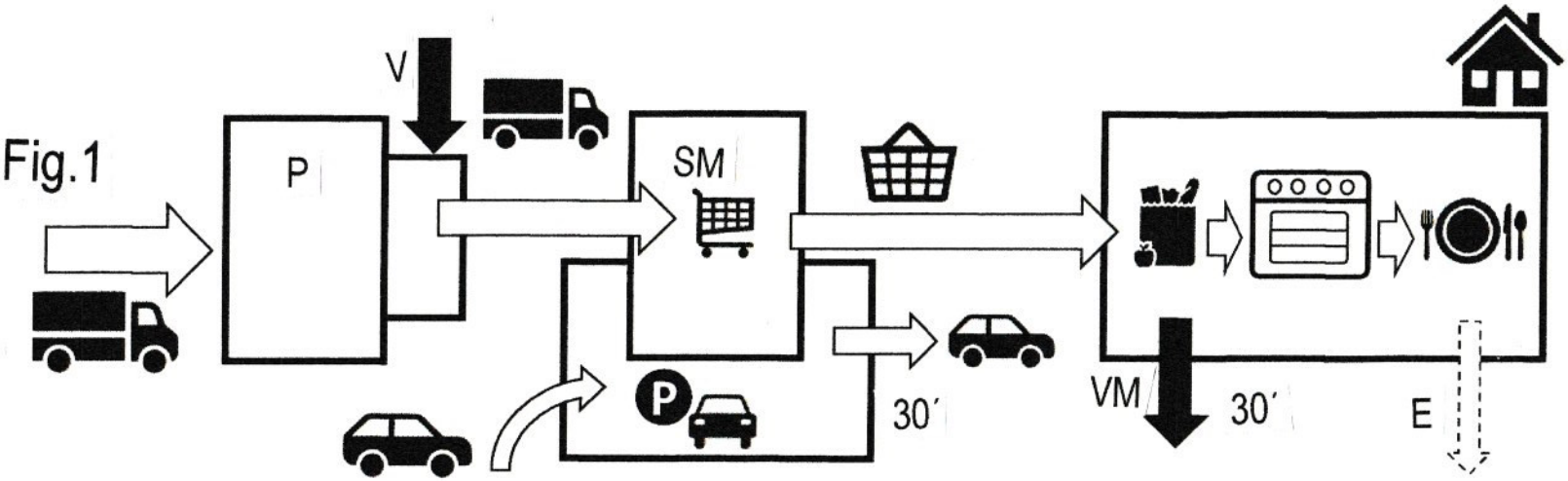
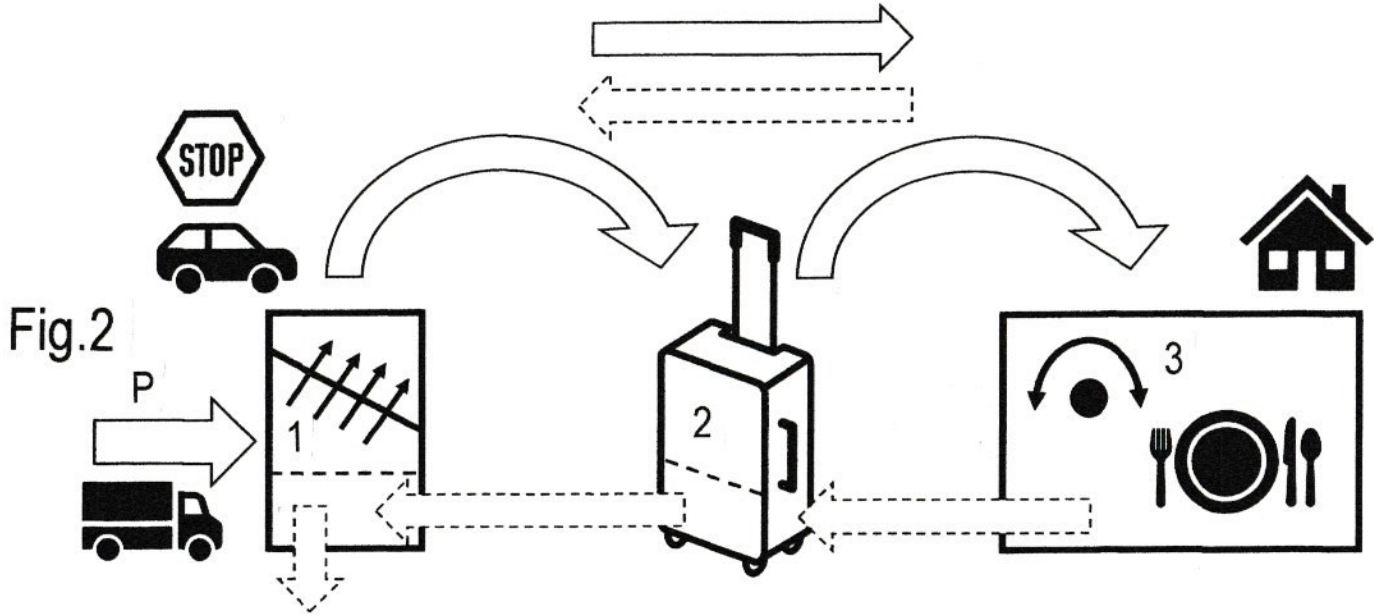


Fig.2



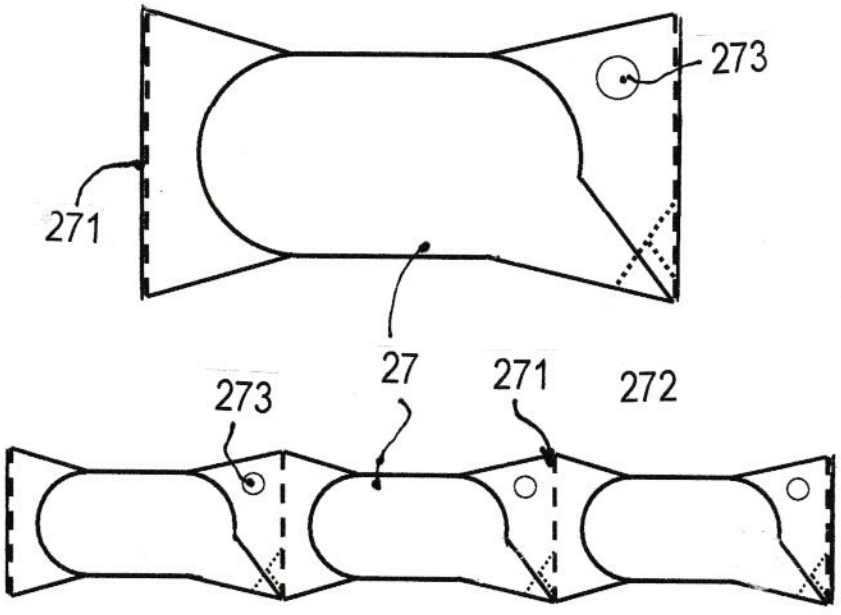
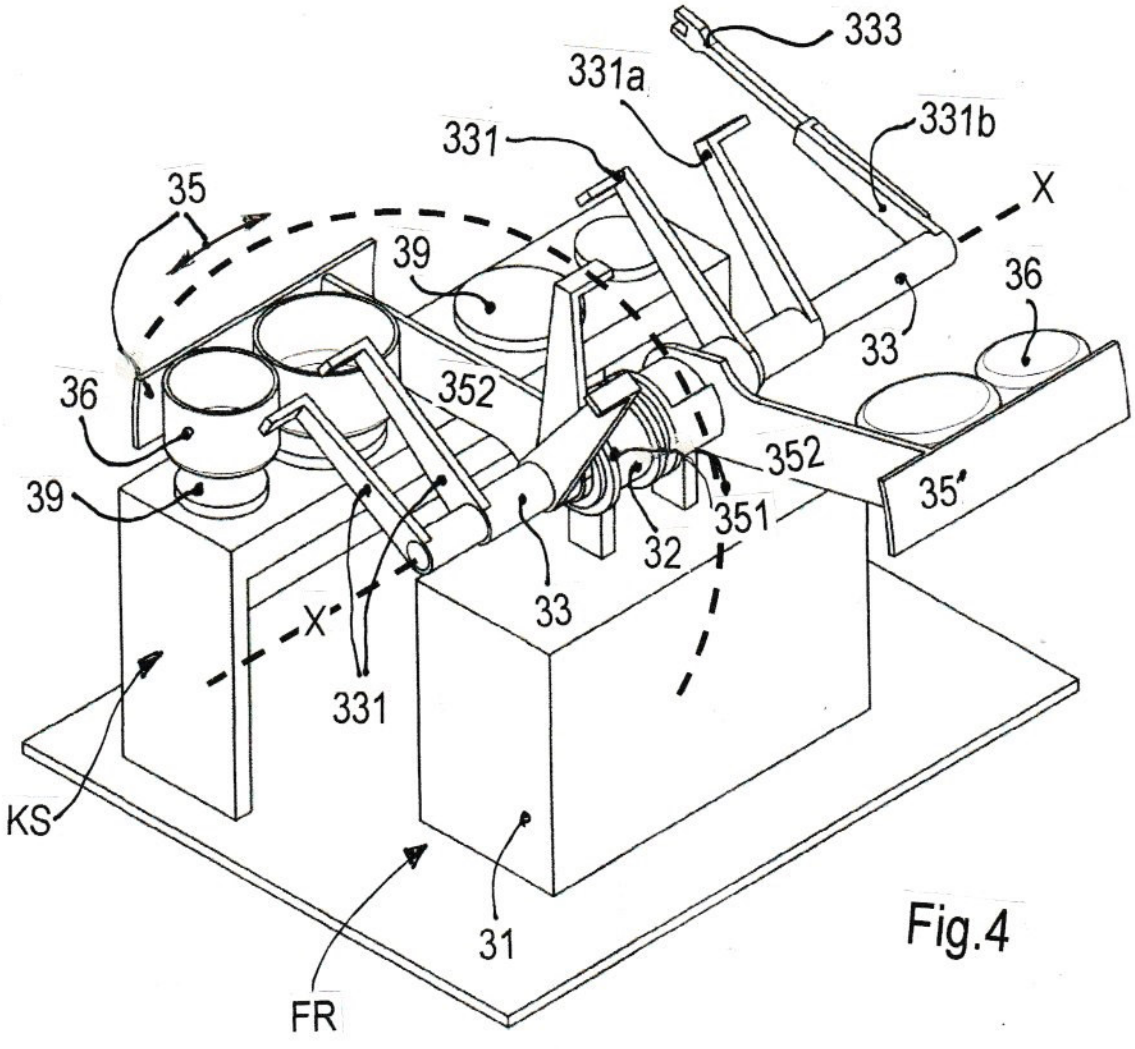

273
271
27
273
271
272

Fig.3


333
331a
331b
331
35
X
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36
33
36
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352
39
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32
33
X
331
KS
31
FR

Fig.4

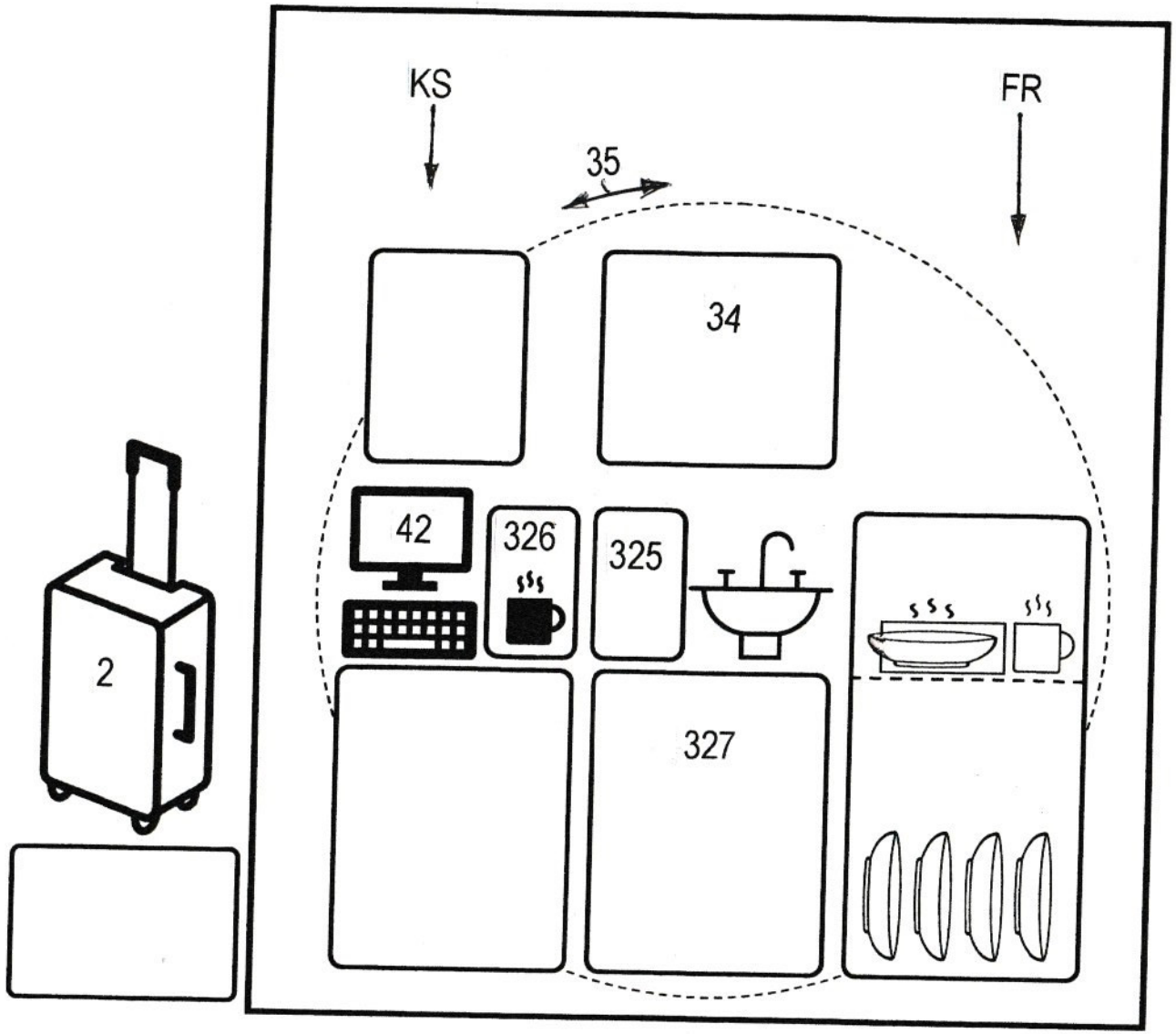

Fig.5