MOVABLE KITCHEN WITH ADAPTABLE ACCESSIBILITY

Movable kitchen with adaptable accessibility consisting of a set of cupboards and worktops which have means enabling movement thereof, in a controlled way and with reinforced safety systems, in ascending and descending directions, and with simultaneous horizontal movement in the case of cupboards, to make them more accessible for persons of slight stature or reduced mobility, such as elderly or handicapped persons.
As expressed in the title of the present specification, the invention relates to a movable kitchen with adaptable accessibility, which provides to the function for which it is intended several advantages and innovative features which will be described in detail below.

More specifically, the object of the invention consists of a kitchen, specifically the group of cupboards, furniture and elements which, located in a room, are especially intended for the storage of utensils and foods as well as for incorporating the different household appliances enabling the preparation of meals, which have the particularity of having means which allow the movement thereof in a controlled manner and at will, in the upward and downward directions, in order to make them more accessible for people with reduced height or mobility, such as the elderly, the disabled, etc., for whom the standard measurements and positioning that said elements typically have are a barrier which seriously complicates the daily tasks for which they are intended.

The problems which the disabled often have, especially those confined to a wheelchair, due to the fact that most elements and apparatuses in any area of the industry are studied without taking these people into account, are well known.

Therefore, in the case at hand regarding the furniture and elements forming conventional kitchens, it is difficult, if not impossible, for the disabled to use such furniture and elements due to the heights and positioning thereof.

This is because on one hand, worktops in which the burners and the sink are typically located and in which the foods are prepared, have a height that cannot be easily accessed if one does not reach the suitable height or remains standing; on the other hand, the higher furniture is usually at a height that is likewise inaccessible, so said people usually do not use them or have to have them placed at a much lower height, therefore losing space between them and the worktop.

It is clear there is a need to create a system which allows adapting said elements to the needs of each user, this being the main objective of the present invention, with respect to which, on the other hand, currently and as a reference to the state of the art, it must be mentioned that the applicant is not aware of the existence of any other movable kitchen with adaptable accessibility having technical, structural and configuration features that are similar to those of the kitchen herein proposed. Some movable kitchens with adaptable accessibility are described in the following patents: MU7102189, DE10023203 and DE19505391, which describe a movement of the kitchen furniture only in the vertical direction, whereas patent FR2906983 also describes a horizontal movement. Patents US2007/0236114, US4134629 and US3857623 propose complex mechanisms to facilitate accessibility with a considerable increase of the technical complexity and without the safety systems described in the present invention, resulting in a complex assembly and making the maintenance and repair of the proposed kitchen more difficult.

Japanese patent JP2005/261885 describes a raised cupboard with a system of upward movement, downward movement and forward shifting of its inner body and for the opening of the door covering only the lower part of the outer part of the furniture. Said system used motors which are each associated with a belt which, when wound and unwound, moves in the vertical direction first vertical boards inserted between the outer part and the inner body of the furniture, in turn moving downwards with the aid of guides and the belts themselves of said inner body with respect to said vertical boards. This structure requires multiple assemblies and layers of structural components: outer part, inner body and vertical boards for connection between both of them, in turn using motors and belts. On the other hand, the use of belts makes the system more complex because the placement of a single belt and motor in one of the sides provides a rather unstable mechanism that is susceptible of experiencing continuous breakdowns and in contrast, the use of two motors and a belt on each side again increases the complexity of said system, as well as causing higher maintenance, assembly and manufacturing costs, and a risk of the belt slipping out of the pulley/pulleys.

Therefore, the kitchen proposed by the invention is configured as an evident novelty because due to its application, the problem of accessibility in the kitchen which a wide range of people suffer is specifically lessened, allowing such people to move and place the different elements, furniture and apparatuses of the kitchen at will in order to be able to work comfortably, subsequently being able to put them again in their place once the work is done.

To that end and specifically, the movable kitchen proposed by the invention consists of a set of raised furniture, each of which furniture independently by means of the operation of a remote control designed for that effect and as a result of the incorporation of a system of motors and guides, moves upwards and gradually moves forwards until the level of the worktop, while at the same time the door thereof opens automatically, and when it moves up such door closes in the same manner.

The door of the furniture can also open or close manually, as in traditional furniture.

Since the furniture remains at the level of the worktop, and furthermore moved forward to almost the edge thereof (worktops are usually wider than the cup-
boards), the inside thereof is within reach of any disabled person and/or person with limited mobility or height.

[0013] The cupboard returns to its original position, the door closing again, upon receiving the corresponding order, operating the mentioned remote control.

[0014] In parallel, the invention also provides a movable worktop or tabletop, which can cover all of it, a significant part or be divided into two or more parts with independent mobility, being able to move upwards and move downwards at different heights, at will of the person giving the order, also by means of the operation of a remote control, and manual push buttons, and as a result of a system of motors and guides, or alternatively, as a result of a system of motors, legs, central electronic control and safety mechanisms, which prevent the worktop from being able to accidentally trap and press against the body of a person or thing.

[0015] It should be pointed out that both the raised cupboards and the tabletop have a safety system. In the case of the raised furniture, it is a contact system which detects any interference in the pre-established path, not only immediately paralyzing the downward movement of the cupboard, but also automatically initiating its upward movement after a few seconds to return to the original position. In the event that the safety detection system for lowering the cupboard should fail, the motor moving each inner body of the cupboard pulls on same when it moves upwards, but in contrast it does not push the inner body of the cupboard when it is lowered; this is achieved by means of a connection of the motor with the inner body by means of high-strength flexible cloth. Therefore, if the furniture runs into an obstacle when it is being lowered, such as the body of a child, for example, even if the contact safety mechanism fails, the pressure that would be exerted on the body of the child would be that of the weight of the furniture and the content thereof, but it does not add the pulling force of the motor.

[0016] The use of said flexible cloth is a simple technical solution that is easy to maintain and assemble during its assembly in the factory or repair, especially if it is compared with an assembly by means of belts. On the other hand, the use of belts continuously transmitting force to the inner module is dangerous because in the event of the failure of the safety mechanisms, a person trapped by the inner body during its downward movement would have to support the weight of said inner body plus the pulling force of said motor. Likewise, the use of a flexible cloth prevents problems of belts coming out of the guide pulleys. Finally, in addition to providing a simple safety system, the use of a flexible cloth typically allows, using the same materials, higher breaking and tear strength indexes.

[0017] Furthermore, roller-flexible band connections are known in the state of the art, which even in the event that an object is trapped, if the motor continues to rotate the flexible cloth would start to wind in the reverse direction, transmitting a downward movement of the furniture, thus releasing the obstacle.

[0018] In the case of the tabletop, it incorporates a system of side sensors which stop the movement thereof due to any obstacle, and additionally, if desired, an innovative system of sheets by means of which if the tabletop runs into an obstacle in the downward movement, they also stop the mechanism.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The following figures are included for the purpose of facilitating understanding of the invention:

- Figure 1 shows a perspective view of the set of the movable kitchen object of the invention.
- Figure 2 shows an exploded perspective view of an embodiment of raised furniture, in which the main parts and elements forming it as well as the configuration and arrangement thereof can be seen.
- Figure 3 shows an exploded perspective view of a variant of the raised furniture.
- Figure 4 shows an exploded perspective view of the worktop or tabletop and of the structure and safety elements with which it is provided.
- Figure 5 shows an exploded perspective view of a variant of the worktop or tabletop and of the structure and safety elements with which it is provided.

PREFERRED EMBODIMENT OF THE INVENTION

[0020] In view of the mentioned figures, and according to the reference numbers used, a preferred embodiment of the kitchen object of the invention, comprising the parts and elements indicated and described in detail below, can be seen.

[0021] Therefore, as can be seen in said figures, the movable kitchen in question comprises a set of cupboards (1) of the raised type, i.e., they are located in the upper part of the kitchen, each of which has its corresponding door (2), being formed, as is observed in Figure 2, by three outer boards (3) forming a fixed outer box, inside which an inner movable body (4) fits, laterally having a system of slide guides (5) complemented with the guides (5') provided laterally inside the outer box (3), which will direct the downward and forward movement of the inner body (4), in the shifting of which the wheels (6) provided in the upper part thereof will cause the opening of the door (2), hingedly fixed at the upper part thereof to the fixed outer box (3).

[0022] Figure 3 shows a variant in which four outer boards form a fixed outer box (103), inside which an inner movable body (104) fits, laterally having a system of slide guides (105) complemented with the guides (105') provided laterally inside the fixed outer box (103), which will direct the downward and forward movement of the inner
body (104), in the shifting of which the wheels (106) provided in the upper side part thereof will cause the opening of the door (102), hingedly fixed at the upper part thereof, by means of a raisable spring element (111), to the fixed outer box (103).

[0023] For performing said shifting of the inner body (4), the cupboard (1) has a roller (7) fixed internally to the aforementioned outer box (3) which is associated with a motor (8) having a of a high-strength pull band or cloth (9), the mechanism being operated through a remote control (not depicted) specially programmed for such purpose.

[0024] In certain cases in which the inner drawer (4) houses elements having a greater weight or volume, such as a microwave (10) or the like, the cupboard (1) incorporates a second thrust motor (25) which initially separates the door (2) from the outer box (3), facilitating the downward movement of the inner body (4). Alternatively, as depicted in Figure 3, the door (102) incorporates cams (113) which initially separate said door (102) from the fixed outer box (103), facilitating the downward movement of the inner movable body (104).

[0025] As can be seen in Figure 2, said inner body (4) can optionally incorporate an accessory (11) suitable for coupling different small household appliances thereto.

[0026] In Figure 2 it is seen that each cupboard (1) furthermore has a safety system formed by two metallic sheets (12) and (13) located in the lower part thereof, the upper sheet (12) of which is directly screwed to the inner body (4) and the lower sheet (13) has a series of side holes (14) which are used for the securing to the body (4), by means of screws serving to operate the safety mechanism, since said holes (14) are slightly larger than the screw, which provides an allowance between the sheets (12) and (13). If the mechanism collides with an obstacle when the body (4) moves downwards, the lower sheet (13) will make contact with the upper sheet (12), closing an electric circuit connected to motor (8), and therefore operating the safety mechanism, which will reverse the direction of rotation of the pull band or cloth (9), making the body (4) move upwards again.

[0027] Figure 3 shows a variant of the safety system for the cupboards, in which each cupboard has a safety system formed by a sensitive membrane (112). If the mechanism collides with an obstacle when the inner movable body (104) moves downwards, the sensitive membrane (112) will make internal contact, closing an electric circuit connected to the motor (108) and therefore operating the safety mechanism, which will first stop the lowering movement to reverse it in a few seconds and take the inner movable body (104) to its original position.

[0028] Additionally, both in the embodiment in Figure 2 and in the alternative of Figure 3, and in the event that the contact safety system of the sheets (12,13) or, where appropriate, the sensitive membrane (112), fails, the motor (8,108) which moves each inner body (4,104) pulls on said inner body (4,104) when it moves upwards, but in contrast, it does not push the inner body when it is lowered; this is achieved by means of a connection of the motor with the inner body by means of the aforementioned high-strength pull band or cloth (9,109) which will be highly flexible, even in the case of opposing forces (the thrust force of the motor and the resistance force of the intercepted body or object) located in the plane thereof.

[0029] In turn, as can be seen in Figure 1 and with greater detail in Figure 4, the invention also comprises a movable worktop or work table (15), formed by a board or tabletop (16) which moves upwards and downwards by means of a motor (not depicted) operated in the same manner by a remote control programmed for such purpose.

[0030] Said tabletop (16) is arranged on a metallic structure (17) which is provided with a safety system formed by a metallic sheet (18) located in the front part thereof and fixed thereto by means of screwing; and on which there is another sheet (19) fixed to the former by means of screws inserted in the holes (20) provided in the sheet (18), which holes (20) are larger than the screws such that there is a certain allowance between both. Therefore, if the front sheet (19) collides with an obstacle in the downward movement of the tabletop (16), it will move upwards and operate the safety mechanism by means of an end switch or switch which will stop the movement of the motor.

[0031] The tabletop (16) furthermore has at least one photoelectric cell (21) and a reflector (22) arranged on the sides thereof as additional safety elements.

[0032] It should be pointed out that the structure (17) on which the tabletop (16) is supported and fixed by means of screws (23), in which the plate and the sink could furthermore be installed, in which case they will have the corresponding flexible connections allowing movement, other leveling screws (24) for the correct installation thereof.

[0033] The flexible connections are the sink drain connections and the domestic (hot and cold) water intake connections so that they allow movement of the worktop.

[0034] Alternatively, as can be seen in Figure 5, the movable worktop or work table is formed by a decorative board or tabletop (216), which moves upwards and downwards by means of motor-driven legs (226), operating same by push buttons (227) and, optionally, a remote control programmed for such purpose.

[0035] Said decorative tabletop (216) is arranged on a metallic structure (228). This tabletop has a system of sensors (230) which stop the movement thereof when it runs into an obstacle in its lowering path. This is achieved because the sensors have an emitter which sends a light beam to a receiver and when this beam is interrupted, the latter acts and the movement is stopped.

[0036] The motor-driven legs (226) which operate the worktop are covered with telescopic covers (229,229') made of the same decorative material, arranged in two parts per motor-driven leg (226) so that they can run the same distance as the leg.
Each motor-driven leg (226) is secured with the following fixings: leveling fixing plate (233) anchored to the metallic structure (228) by means of leveling screws (231) and fixing screws (232); floor fixing plate (234); and side fixing square (235).

In the event that any anomaly is detected, the safety system of the tabletop in any of the alternatives of Figures 4 or 5 renders the worktop inoperative, always giving priority to safety over operation.

**Claims**

1. A movable kitchen with adaptable accessibility, of the type formed by a set of cupboards, furniture and elements located in a room, characterized in that it comprises a set of raised cupboards (1) provided with means which allow opening the front door (2,102) of each of said cupboards and the downward movement of its inner part or inner body (4,104) by means of a motor (8,108) operated by a remote control, a roller (7,107) fixed internally to the outer box (3,103) of said cupboards and associated with said motor (8,108), and a high-strength flexible cloth connecting said motor (8,108) with said inner body (4,104).

2. The movable kitchen with adaptable accessibility according to the previous claim, characterized in that it has a contact safety mechanism (12,13,14,112) the activation of which reverses the downward movement and makes the inner body (4,104) of the cupboard (1) move upwards.

3. The movable kitchen with adaptable accessibility according to any of the previous claims, characterized in that it also comprises a movable worktop or work table (15), formed by a board or tabletop (16) moving upwards and downwards by means of a motor operated in the same manner by a remote control, which has a contact safety system (18,19,20) which stops the downward movement.

4. The movable kitchen with adaptable accessibility according to any of the previous claims, characterized in that each of the cupboards (101) is formed by four outer boards (103) forming a fixed outer box, inside which the inner movable body (104) fits, laterally having a system of slide guides (105) complemented with the guides (105') provided laterally inside the outer box (103), which direct the downward and forward movement of the movable body (104), in the shifting of which the wheels (106) provided in the upper side part thereof of said inner movable body (104) cause the opening of the door (102), hingedly fixed at the upper part thereof, by means of a raisable spring element (111), to the fixed outer box (103).

5. The movable kitchen with adaptable accessibility according to any of claims 1 to 3, characterized in that each of the cupboards (101) is formed by four outer boards (103) forming a fixed outer box, inside which the inner movable body (104) fits, laterally having a system of slide guides (105) complemented with the guides (105') provided laterally inside the outer box (103), which direct the downward and forward movement of the movable body (104), in the shifting of which the wheels (106) provided in the upper side part thereof of said inner movable body (104) cause the opening of the door (102), hingedly fixed at the upper part thereof, by means of a raisable spring element (111), to the fixed outer box (103).

6. The movable kitchen with adaptable accessibility according to any of the previous claims, characterized in that the cupboard (1) incorporates a second thrust motor (25) which initially separates the door (2) from the outer box (3), facilitating the downward movement of the inner body (4) when it incorporates elements having a greater weight or volume, such as a microwave (10).

7. The movable kitchen with adaptable accessibility according to any of claims 1 to 6, characterized in that the door (102) incorporates in the inner upper part thereof cams (113) which initially separate it from the outer box (103), facilitating the downward movement of the inner body (104).

8. The movable kitchen with adaptable accessibility according to any of the previous claims, characterized in that the safety system incorporated in the raised furniture (1) is formed by two metallic sheets (12,13) located in the lower part thereof, the upper sheet (12) of which is directly screwed to the inner body (4) and the lower sheet (13) has a series of side holes (14) which are used for the securing to the body (4) by means of screws; wherein said holes (14) are slightly larger than the screw, which provides an allowance between the sheets (12) and (13), making contact upon running into an obstacle.

9. The movable kitchen with adaptable accessibility according to any of claims 1 to 7, characterized in that the safety system it incorporates is formed by a sensitive membrane (112) located in the lower part of the inner body (104).

10. The movable kitchen with adaptable accessibility according to claim 3, characterized in that the tabletop (16) is arranged on a metallic structure (17) which is provided with a safety system formed by a metallic sheet (18) located in the front part thereof and fixed thereto by means of screwing, on which there is another sheet (19) fixed to the former by means of screws inserted in the holes (20) provided in the sheet (18), which holes (20) are larger than the screws such that there is a certain allowance be-
between both, colliding upon running into an obstacle.

11. The movable kitchen with adaptable accessibility according to any of claims 3 and 10, characterized in that the tabletop (16) has furthermore at least one photoelectric cell (21) and a reflector (22) arranged on the sides thereof as additional safety elements.

12. The movable kitchen with adaptable accessibility according to any of claims 3, 10 and 11, characterized in that the structure (17) on which the tabletop (16) is supported and fixed by means of screws (23) has other leveling screws (24) for the correct installation thereof.

13. The movable kitchen with adaptable accessibility according to claim 3, characterized in that the tabletop (216) is arranged on a metallic structure (228) which incorporates a safety system formed by sensors (230).

14. The movable kitchen with adaptable accessibility according to the previous claim, characterized in that the tabletop and the metallic structure are operated by motor-driven legs (226) covered with telescopic covers (229, 229') arranged in two parts for each leg, said telescopic legs are anchored at the upper part thereof to the metallic structure (228) by means of a leveling fixing plate (233) and with leveling screws (231) and fixing screws (232), at the lower part thereof they are anchored by means of a floor fixing plate (234), and they can laterally be anchored with a side fixing square (235).

15. The movable kitchen with adaptable accessibility according to any of claims 3 to 14, characterized in that the hot plate and the sink having flexible connections are installed in the tabletop.
Fig. 4
REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE 10023203 [0007]
- DE 19505391 [0007]
- FR 2906983 [0007]
- US 20070236114 A [0007]
- US 4134629 A [0007]
- JP 2005261885 A [0008]