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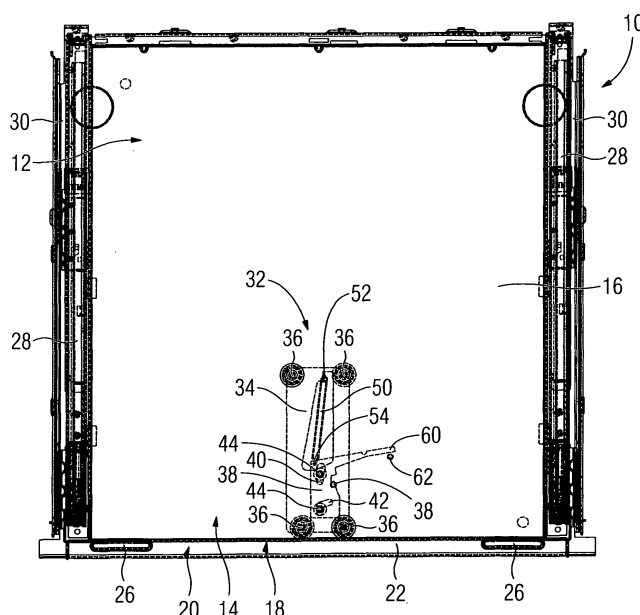
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(54) **Appliance wit drawer, for instance a domestic oven**

(57) Appliance (10) comprising a cabinet (1) having an internal space (14) defined by a bottom wall (16), a top wall, a back wall and side walls, whereas an opening (18) is provided on the front side; a drawer-like door (20) for optionally opening and closing said opening (18), said drawer-like door (20) comprising a base plate (22), which is received in the internal space (14) of the cabinet (12)

in the closed state of the door (20); and a closing device (32) for closing the door (20) with a predetermined closing force, whereas the closing device (32) comprises at least one spring (50), which provides said predetermined closing force; whereas the closing device (32) is arranged between the bottom wall (16) of the internal space (14) of the cabinet (12) and the base plate (22) of the door (20).

FIG 1



Description

TECHNICAL FIELD

[0001] The present invention relates to an appliance, such as a domestic oven, comprising a cabinet having an internal space defined by a bottom wall, a top wall, a back wall and side walls, whereas an opening is provided on the front side; a drawer-like door for optionally opening and closing said opening, said drawer-like door comprising a base plate, which is received in the internal space of the cabinet in the closed state of the door; and a closing device for closing the door with a predetermined closing force.

BACKGROUND TECHNOLOGY

[0002] An oven of the above-mentioned kind is disclosed in DE-A-102 53 158. The oven comprises a cabinet defining an oven cavity with a charging opening for charging the open cavity with food stuff to be cooked; a drawer-like door for optionally opening and closing said charging opening in a substantially horizontal direction; and a sealing gasket arranged between the door and the oven cavity. The drawer-like door comprises a base plate, which is slidingly received in the oven cavity. More precisely, the door is fixed to sliding bars, which slide in guiding rails provided within the oven cavity in order to realize the horizontal opening and closing movement of the door. The guiding rails are inclined towards their rear-most free end in a downward direction relative to the horizontal, i.e. downwards towards the backwall of the cabinet, such that the self-weight of the door contributes to the door closing force closing the door. However, this arrangement cannot always guarantee a proper functioning of the sealing.

[0003] A further oven is described in DE-U-20 2007 007 450, which comprises a cabinet defining an oven cavity with a charging opening for charging the oven cavity with food stuff to be cooked; a drawer-like door for optionally opening and closing the charging opening in a substantially horizontal direction; and a sealing gasket arranged between the door and the oven cavity. The door is fixed to sliding bars, which slide in guiding rails in order to realize the horizontal opening and closing movement of the door. A closing device generating a closing force for closing the door is arranged at the guiding rails, which cooperates with the sliding bars. This closing device comprises spring elements fixed to the rearmost portions of the guiding rails. These spring elements draw the sliding bars at the end of their closing movement towards the backwall of the cabinet in order to press the inner wall of the door with a predetermined closing force against the sealing gasket, which is arranged around the charging opening of the cabinet. To ensure a smooth closing of the door, the cooking oven further comprises an attenuating means or damper, which counteracts the closing force of the closing device.

[0004] There is a general problem with respect to cooking ovens in that the depth of the cabinet is limited due to installation space standardisation and the tendency of downsizing the installation space of cooking ovens. Accordingly, also the extraction length of drawer-like doors is limited. Nevertheless, the extraction length of the doors should be as long as possible in order to ensure a comfortable handling with respect to the charging and discharging of the oven cavity.

[0005] However, according to DE-U-20 2007 007 450 the extraction length of the door is shortened due to the fact that the closing device is arranged between the back-wall of the cabinet and the sliding bars. Moreover, the installation space for the closing device is limited. Accordingly, it may happen, that the closing device cannot guarantee a closing force, which is strong enough to ensure a proper functioning of the sealing gasket, in particular when an attenuation means is provided, which counteracts the closing force of the closing device.

[0006] Moreover, ovens are known, which comprise a closing device using pairs of magnets for providing the closing force, which come into contact with each other in the closed state of the door. However, the contact points of the magnets of each pair define stoppers, which do not allow an adaptation of the closing force to variations with respect to the elastic compression of the gasket, which are generated due to a varying degree of pollution of the gasket, an ageing of the gasket, etc. Accordingly, a changing elastic compression of the gasket cannot be compensated by the closing device. Thus, the closing force provided by the closing device is not stable in this case so that a proper closing function of the door cannot be guaranteed.

[0007] Starting from this prior art technology it is an object of the present invention to provide an appliance of the above mentioned type, which has an alternative configuration in order to eliminate one or more of the foregoing drawbacks.

DISCLOSURE OF THE INVENTION

[0008] This object is solved by providing an appliance according to claim 1. The dependent claims refer to individual embodiments of the present invention.

[0009] The present invention provides an appliance, such as an oven, a dishwasher, etc., comprising a cabinet having an internal space defined by a bottom wall, a top-wall, a backwall and sidewalls, whereas an opening is provide on the front side through which the internal space is accessible. A drawer-like door is provided for optionally opening and closing said opening while performing a substantially linear and horizontal movement. The door comprises a base plate, which is received in the internal space of the cabinet in the closed state of the door, whereas the base plate may form a drip tray or the like. Moreover, the appliance comprises a closing device for closing the door with a predetermined closing force, whereas the closing force is provided by means of at least one spring.

According to the present invention, the closing device is arranged between the bottom wall of the internal space of the cabinet and the base plate of the door. Thus, a negative influence on the extraction length of the door can be avoided.

[0010] Preferably, the closing device of the appliance according to the present invention is designed in such a manner, that the spring is coupled with the opening movement of the door between a first position, in which the door is in its entirely closed state, and a second position, in which the door is in a partially opened state. Accordingly, the spring is further tensioned when opening the door between the first position and the second position. Moreover, the closing device is designed in such a manner, that the spring is decoupled from the opening movement of the door, when the opening movement is continued between the second position and a third position, in which the door is in its entirely opened state, whereas the tension state of the spring is maintained while moving the door between the second and the third position. Furthermore, the closing device is designed in such a manner, that the spring is uncoupled from the closing movement of the door between the third and the second position, and that the spring is coupled to the closing movement of the door, when the closing movement of the door continuous from the second position to the first position, such that the spring supports the closing movement of the door between the second position and the first position and provides the predetermined closing force in the first position. The second position is preferably chosen in such a manner, that only the last part of the closing movement of the door and the first part of the opening movement of the door are performed under the influence of the load of the spring.

[0011] Preferably, the closing device of the appliance according to the present invention comprises a movable unit, which is fixed to the cabinet of the appliance and comprises guiding means for guiding a movement of the movable unit relative to the cabinet between a first location, in which the door is in its first position, and a second location, in which the door is in its second position. Moreover, a carrier is provided, which is fixed to the door and carries the movable unit from the first location to the second location, when the door is moved from the first position to the second position. The spring, which is provided for generating the predetermined closing force, is fixed to the movable unit and to the cabinet in such a manner, that it is further tensioned when the movable unit is moved from its first location towards its second location. Moreover, the closing device comprises locking means for locking the movable unit in its second location in order to maintain the tensioned state of the spring. Furthermore, releasing means are provided, which release the lock of the locking means when reaching the second position of the door during its closing movement, such that the movable unit is returned to its first location under the restoring force of the spring.

[0012] The movable unit preferably comprises a snap-

fit, which is engaged by the carrier during the opening movement of the door between the first position and the second position. Accordingly, the movable unit follows the movement of the carrier until the door reaches its second position.

[0013] Moreover, the movable unit is advantageously fixed to the cabinet by means of sliding bushings, which extend through guiding slots formed in the moveable unit as guiding means. Accordingly, the relative movement between the movable unit and the cabinet is defined by the length and the form of the guiding slot.

[0014] The locking means is preferably provided by means of a curved or angled design of at least one guiding slot and by means of the sliding bushing extending there-through, whereas the sliding bushing is locked in a curved or angled section of the slot.

[0015] Preferably, the releasing means is provided by means of a projection, which is fixed to or made integral with the door, in particular with the underside of the base plate of the door and a lever, which is fixed to or made integral with the movable unit, whereas the projection moves the lever, when the door reaches its second position during its closing movement, so that the movable unit is moved in such a manner that the lock of the locking means is released.

[0016] The closing device advantageously comprises a base, which is fixed to the cabinet, and the moveable unit is fixed to the base and relatively movable to the base between the first and the second location, whereas the spring is fixed to the base and to the movable unit. By providing the closing device with a separate base it is not necessary to directly fix the movable unit and the spring to the cabinet of the appliance. Accordingly, the bottom wall of the cabinet does not have to be prepared for such fixation. Therefore, the production and installation may be simplified.

[0017] Preferably, the closing device is produced from metallic and/or plastic material, in particular from heat resistant and/or rigid material.

[0018] According to a preferred aspect of the present invention, the appliance is an oven.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

[0019] The detailed configuration, features and advantages of the present invention will become apparent in the course of the following description with reference to the accompanying drawings.

Figure 1 is a top sectional view of an appliance according to a first embodiment of the present invention, which shows the appliance in a state, in which the door of the appliance is arranged in its entirely closed state;

Figure 2 is a top sectional view of the appliance shown in figure 1, whereas the door is arranged in

a partially opened state;

Figure 3 is a sectional side view showing the lower portion of the appliance;

Figure 4 is an enlarged top view of the closing device of the appliance shown in figures 1 to 3; and

Figure 5 is a side view of the closing device shown in figure 4.

BEST MODE FOR CARRYING OUT THE INVENTION

[0020] Below, one embodiment of an appliance of the present invention will be described with reference to the figures. In the figures, like parts are denoted by like reference numerals and redundant description will be omitted.

[0021] The figures 1 to 5 show an embodiment of an appliance 10 according to the present invention which is provided in form of an oven. The oven 10 comprises a cabinet 12 having an internal space 14 for receiving food stuff therein. The internal space 14 is defined by a bottom wall 16 as well as by a topwall, a backwall and two side-walls, which are not shown in the figures. The internal space 14 has an opening 18 for charging the oven 10, which is provided on the front side of the oven 10. Moreover, the oven 10 comprises a drawer-like door 20 for optionally opening and closing the opening 18. The door 20 is formed by a horizontally extending base plate 22 and a vertically extending front plate 24, which are fixed to each other. On top of the vertically extending front plate 22 recessed grips 26 are provided, which can be gripped by a user in order to open and close the door 20. The door 20 is fixed to sliding bars 28, which are received and guiding by guiding rails 30, which in turn are fixed to the right and left sides of the bottom wall 16 of the internal space 14. Accordingly, the door 20 can be opened and closed by performing a substantially linear and horizontal movement. As it is shown in figures 1 to 3, a closing device 32 is arranged within the internal space 14 of cabinet 12. The closing device 32 comprises a plate-like base 34, which is fixed to the bottom wall 16 by means of sheet metal screws 36. Moreover, the closing device 32 comprises a movable unit 38 made from sheet metal, which is fixed to the base 34 in such a manner, that it can perform a combined linear and pivotal movement relative to the base 34. For this purpose, a straight extending slot 40 and an angled slot 42 are provided in the movable unit 38. Sliding bushings 44 and 46 are inserted through these slots 40 and 42 and fixed to the base 34 by means of screws 46 and nuts 48. Accordingly, the sliding bushings 44 serve as a guiding means for guiding the combined linear and pivotal movement of the movable unit 38 relative to the base 34. Moreover, the closing device 32 comprises a helical spring 50 having two free ends which are fixed to hook elements 52 and 54, which are made integral with the base 34 and the movable unit

38, respectively. The length of the spring 50 is chosen in such a manner, that the spring 50 is tensioned between the base 34 and the movable unit 38 in the entirely closed state of the door 20, which will be described in more detail below. On the side of the movable unit 38 a snap-fit 56 is provided, which can receive a carrier 58 projecting downwards from the underside of the horizontally extending base plate 22 of the door 20. Furthermore, the movable unit 38 comprises a lever 60, which extends sideways from the movable unit 38. For operating the lever 60, a projection 62 is provided on the underside of the horizontally extending base plate 22.

[0022] Below, the operation of the closing device 32 will be described with reference to figures 1 and 2, which are sectional topviews of the oven 10 along a section plane extending between the bottom wall 16 of the internal space 14 and the horizontal base plate 22 of the door 20, whereas figure 1 shows the oven 10 in a entirely closed state of the door 20 and figure 2 shows the oven 10 in a state, in which the door 20 is partially opened.

[0023] With reference to figure 1, the horizontal extending base plate 22 of the door 20 is engaged with the movable unit 38 by means of the carrier 58, which is hooked in the snap-fit 56 of the movable unit 38. Moreover, the spring 50 is in a biased state, such that it generates a predetermined closing force, which presses the vertical extending front plate 24 of the door 20 against the cabinet 12, more precisely against a gasket (not shown) arranged around the opening 18 of the cabinet 12. Accordingly, the tight seal is provided between the cabinet 12 and the door 20 as long as the movable unit 38 is arranged in the first location shown in figure 1.

[0024] When the door 20 is opened starting from the state shown in figure 1, the movable unit 38 follows the opening movement of the door, because the carrier 58 and the snap-fit 56 are still engaged with other such that the movable unit 38 is drawn by the carrier 58. During this movement, the movable unit 38 is guided by the guidance resulting from the sliding bushings 44 and the slots 40 and 42. Accordingly, the movable unit 38 performs a combined linear and pivotal movement while further tensioning the spring 50. This movement is stopped in the second location of the movable unit 38, in which the sliding bushes 44 reach the ends of the slots 40 and 42. In this second location, the leading sliding bushing 44 is locked within the angled end of the slot 42. Accordingly, a locking means is provided for locking the second location of the movable unit 38 in order to maintain the tensioned state of the spring 50. Moreover, the carrier 58 is decoupled from the snap-fit 56 in the second location of the movable unit 38, as soon as the movable unit 38 is locked in position. Accordingly, the movable unit 38 does no longer follow the opening further movement of the door 20.

[0025] When closing the door 20 again, the projection 62 comes into engagement with the lever 60 of the movable unit 38 shortly prior to the end of the closing movement of the door 20. The projection 62 presses against

the lever 60, such that the movable unit 38 is slightly turned in order to release the lock provided by the leading sliding bushing 44 and the angled slot 42. As soon as the lock is released, the movable unit 38 is drawn towards the completely closed position of the door 20 by means of the restoring force of the spring 50, until a entirely closed position of the door 20 is reached as shown in figure 1. In this condition, the door 20 is held closed with a predetermined closing force generated by the spring 50, as it was described above.

Claims

1. Appliance (10) comprising

- a cabinet (1) having an internal space (14) defined by a bottom wall (16), a top wall, a back wall and side walls, whereas an opening (18) is provided on the front side,
- a drawer-like door (20) for optionally opening and closing said opening (18), said drawer-like door (20) comprising a base plate (22), which is received in the internal space (14) of the cabinet (12) in the closed state of the door (20); and
- a closing device (32) for closing the door (20) with a predetermined closing force, whereas the closing device (32) comprises at least one spring (50), which provides said predetermined closing force,

characterized in that the closing device (32) is arranged between the bottom wall (16) of the internal space (14) of the cabinet (12) and the base plate (22) of the door (20).

2. Appliance (10) according to claim 1, **characterized in that** a gasket is provided between the door (20) and the cabinet (12).

3. Appliance (10) according to claim 1 or 2, **characterized in that** the closing device (32) is designed in such a manner, that

- the spring (50) is coupled with the opening movement of the door (20) between a first position, in which the door (20) is in a entirely closed state, and a second position, in which the door (20) is in a partially opened state, such that the spring (50) is further tensioned when opening the door (20) between the first position and the second position,
- that the spring (50) is decoupled from the opening movement of the door (20), when the opening movement is continued between the second position and a third position, in which the door (20) is in its entirely opened state, whereas the tensioned state of the spring (50) is maintained

while moving the door (20) between the second and the third position,

- that the spring (50) is decoupled from the closing movement of the door (20) between the third and the second position, and
- that the spring (50) is coupled to the closing movement of the door (20), when the closing movement of the door (20) continuous from the second position to the first position, such that the spring (50) supports the closing movement of the door (20) between the second position and the first position and provides the predetermined closing force in the first position.

4. Appliance (10) according to one of the foregoing claims, **characterized in that** the closing device (32) comprises

- a movable unit (32), which is fixed to the cabinet (12) of the appliance (10) and comprises guiding means (42, 44) for guiding a movement of the movable unit (38) relative to the cabinet (12) between a first location, in which the door (20) is in its first position, and a second location, in which the door (20) is in its second position,
- a carrier (58), which is fixed to the door (20) and carries the movable unit (38) from the first location to the second location, when the door (20) is moved from the first position to the second position;
- the spring (50) for providing the predetermined closing force, which is fixed to the movable unit (38) and to the cabinet (12) in such a manner, that it is further tensioned when the movable unit (38) is moved from its first location towards its second location,
- locking means (42, 44) for locking the movable unit (38) in its second location in order to maintain the tensioned state of the spring (50); and
- releasing means (60) for releasing the lock of the locking means (42, 44) when reaching the second position of the door (20) during its closing movement, such that the movable unit (38) is returned to its first location under the restoring force of the spring (50).

5. Appliance (10) according to claim 4, **characterized in that** the movable unit (38) comprises a snap-fit (56), which comes into engagement with the carrier (58) during the opening movement of the door (20) between the first position and the second position.

6. Appliance (10) according to claim 4 or 5, **characterized in that** the movable unit (38) is fixed to the cabinet (12) by means of sliding bushings(44), which extend through guiding slots (42, 44) provided as guiding means.

7. Appliance (10) according to claim 6, **characterized in that** the locking means (42, 44) is provided by means of a curved or angled design of the guiding slot (42) and by means of the sliding bushing (44) extending therethrough. 5
8. Appliance (10) according to anyone of claims 4 to 7, **characterized in that** the releasing means (60, 62) is provided by means of a projection (62), which is fixed to or made integral with the door (20), and a lever (60), which is fixed to or made integral with the movable unit (38), whereas the projection (62) and the lever (60) come into engagement with each other, when the door (20) reaches its second position during its closing movement, and the movable unit (38) is moved due to this engagement in such a manner that the lock of the locking means (42, 44) is released. 10 15
9. Appliance (10) according to any of claims 4 to 8, **characterized in that** the closing device (32) comprises a base (34), which is fixed to the cabinet (12), whereas the movable unit (38) is fixed to the base (34) while allowing a movement of the movable unit (38) relative to the cabinet (12) between the first and the second location, and the spring (50) is fixed to the base (34) and the movable unit (38). 20 25
10. Appliance (10) according to any of the forgoing claims, **characterized in that** the closing device (32) is produced from metallic and/or plastic material. 30
11. Appliance (10) according to one of the foregoing claims, **characterized in that** the appliance (10) is an oven. 35

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FIG 1

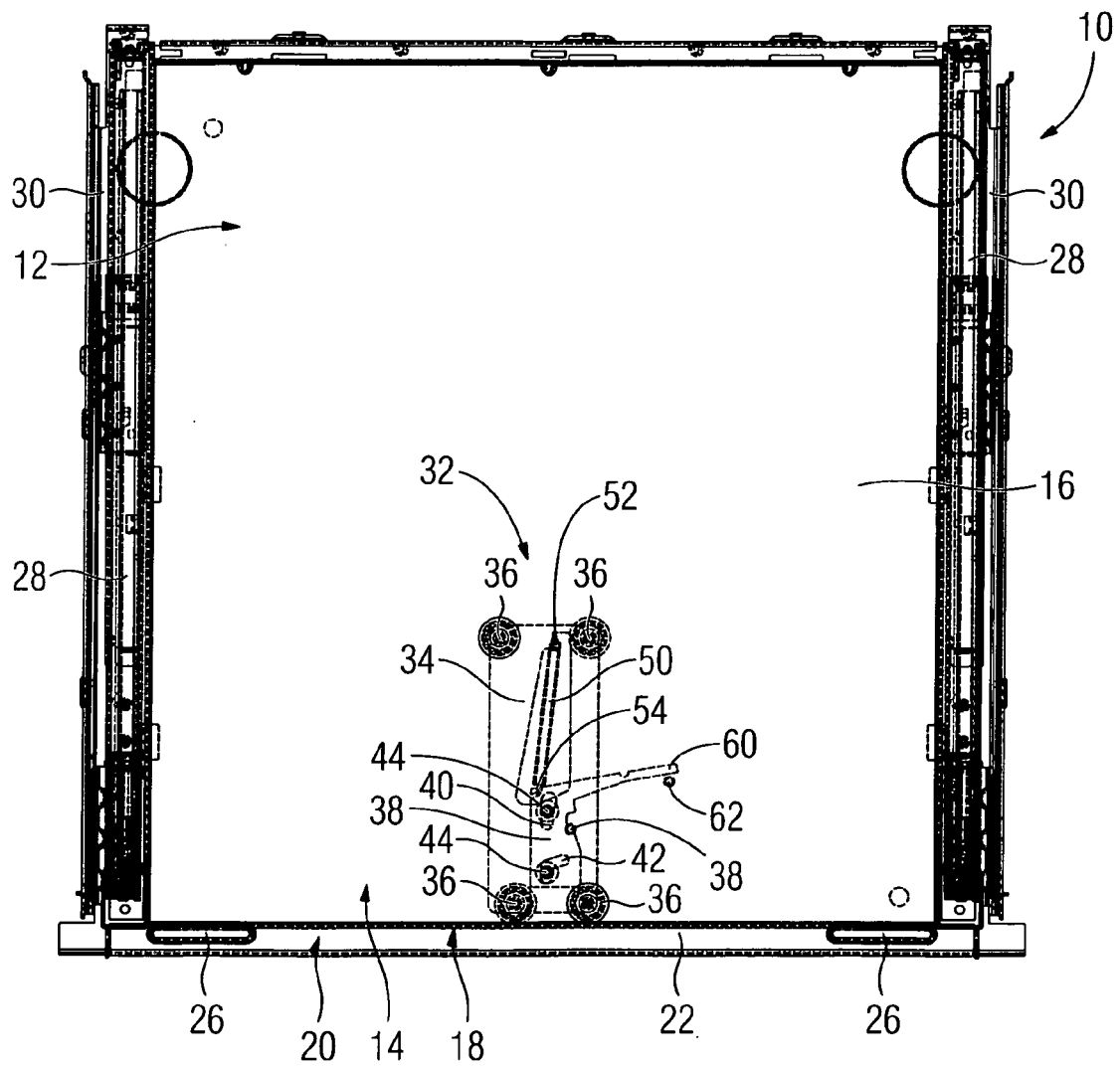


FIG 2

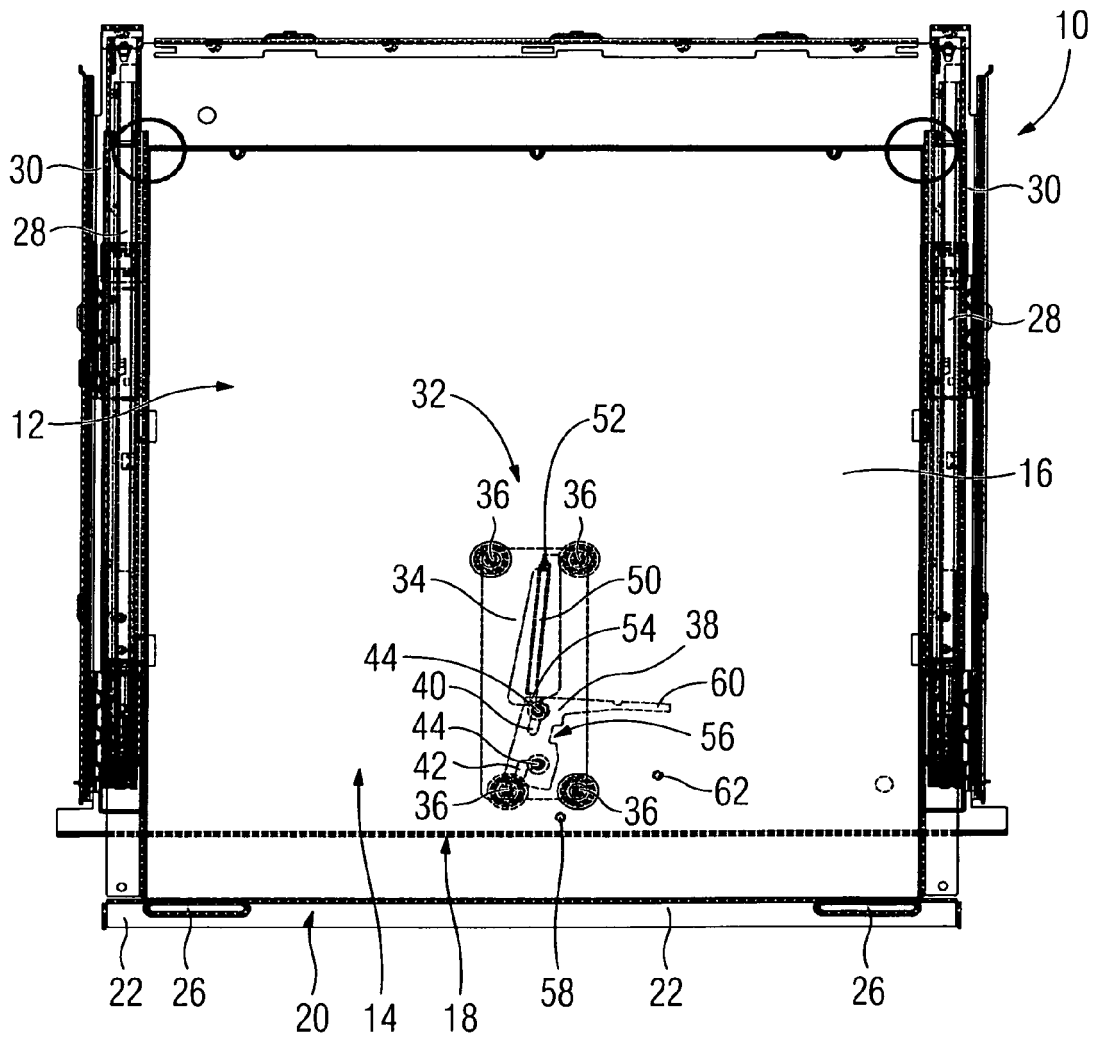


FIG 3

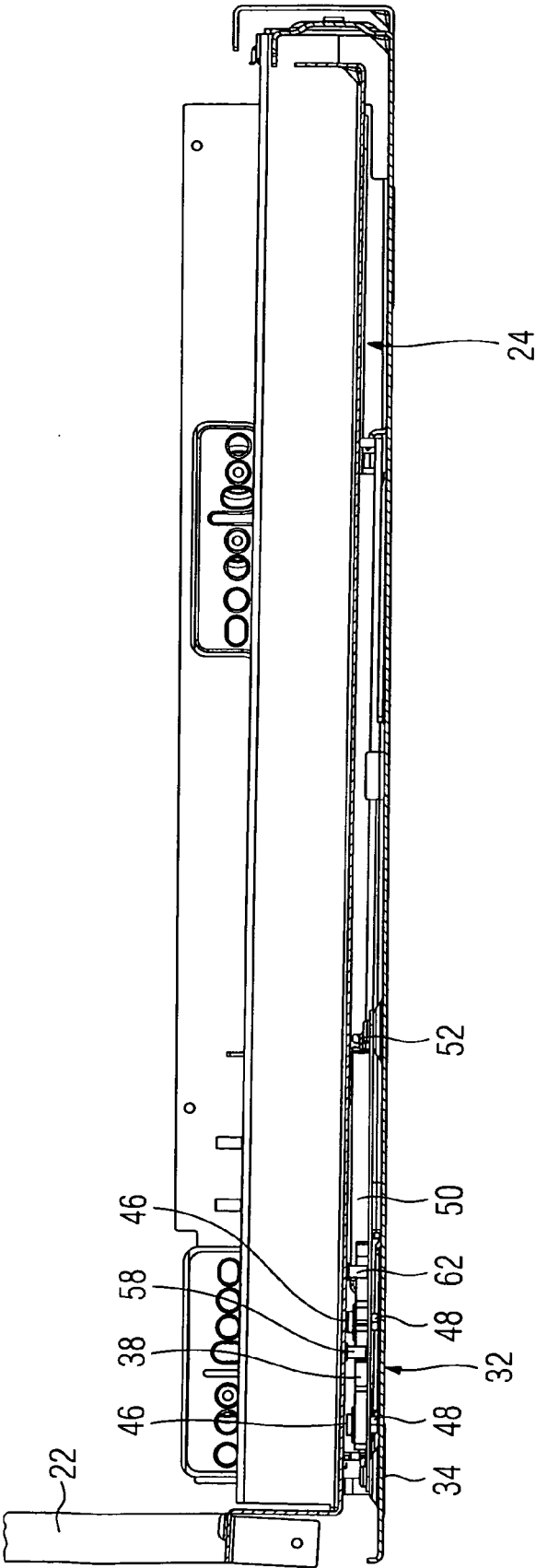


FIG 4

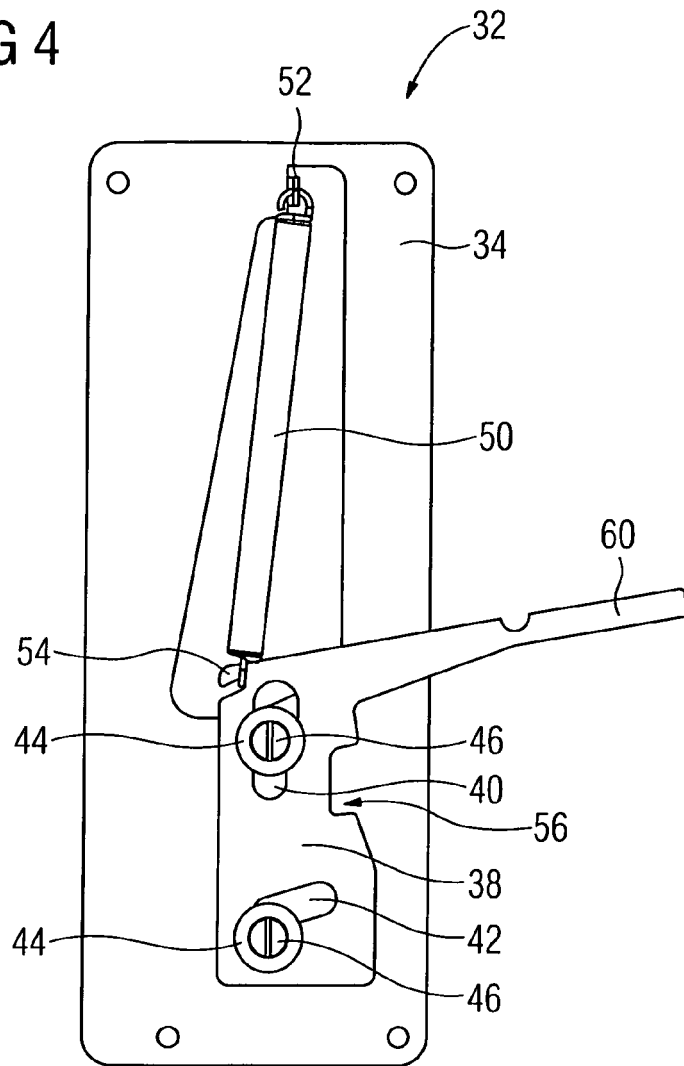
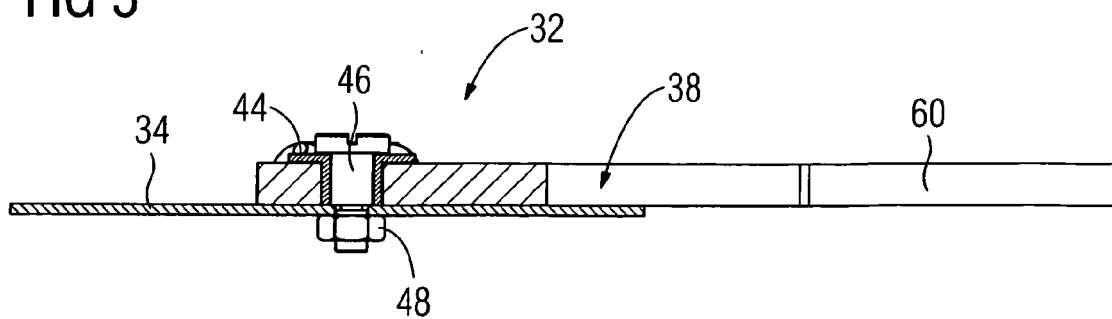


FIG 5





EUROPEAN SEARCH REPORT

Application Number
EP 08 01 6602

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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