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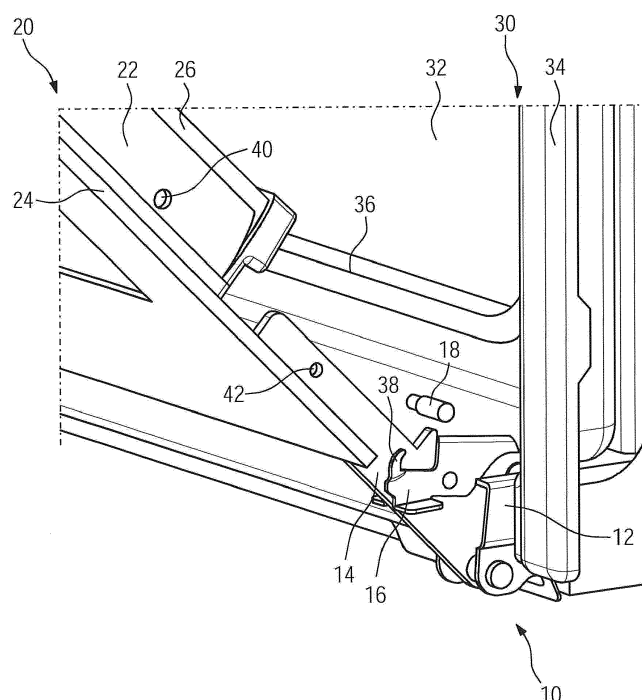
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(54) **DOOR HINGE SYSTEM FOR AN OVEN DOOR OF A COOKING OVEN**

(57) The present invention relates to a door hinge system (10) for an oven door (20) of a cooking oven. The door hinge system (10) comprises a stationary hinge part (12) insertable into or attachable at an oven chassis (30) of the cooking oven. The door hinge system (10) comprises an elongated moveable hinge part (14) insertable into or attachable at an oven door (20) of the cooking

oven. The moveable hinge part (14) includes at least one saddle bracket (16) engageable with a door column (22) of the oven door (20). The saddle bracket (16) is pivoting at the moveable hinge part (14) between a locked state and an unlocked state. The saddle bracket (16) is engageable with the door column (22) of the oven door (20) in the locked state.

FIG 1



Description

[0001] The present invention relates to a door hinge system for an oven door of a cooking oven. Further, the present invention relates to an oven door with a door hinge system. In particular, the present invention relates to a drop-down oven door with a door hinge system. Moreover, the present invention relates to a cooking oven.

[0002] An oven door, in particular a drop-down oven door, of a cooking oven is attached at an oven chassis by at least two door hinge systems. Each door hinge system comprises a stationary hinge part and a moveable hinge part, wherein the moveable hinge part is pivoting at the stationary hinge part. The stationary hinge part is inserted in or attached at the oven chassis of the cooking oven, while the moveable hinge part is inserted in a door column of the oven door. Usually, the oven door is releasable from the moveable hinge part by a user in order to clean the oven door.

[0003] However, there is a danger that the oven door is inadvertently released from the moveable hinge part of the door hinge systems.

[0004] It is an object of the present invention to provide a door hinge system for an oven door of a cooking oven, which avoids an inadvertently releasing of the oven door from the cooking oven.

[0005] The object is achieved by a door hinge system for an oven door of a cooking oven according to claim 1.

[0006] According to the present invention a door hinge system for an oven door of a cooking oven is provided, wherein:

- the door hinge system comprises a stationary hinge part insertable into or attachable at an oven chassis of the cooking oven,
- the door hinge system comprises an elongated moveable hinge part insertable into or attachable at an oven door of the cooking oven,
- the moveable hinge part includes at least one saddle bracket engageable with a door column of the oven door,
- the saddle bracket is pivoting at the moveable hinge part between a locked state and an unlocked state, and
- the saddle bracket is engageable with the door column of the oven door in the locked state.

[0007] The saddle bracket provides a reliable connection between the moveable hinge part and the oven door. The saddle bracket is pivoting at the moveable hinge part between a locked state and an unlocked state by a user. The saddle bracket avoids an inadvertently releasing of the oven door from the cooking oven.

[0008] For example, the saddle bracket includes a hook engageable with the door column of the oven door in the locked state of said saddle bracket.

[0009] Further, the saddle bracket may secure the door

hinge system in a half open state, when said saddle bracket is in the unlocked state. Thus, the oven door may be secured in said half open state.

[0010] In particular, the door hinge system comprises at least one safety pin for penetrating a pin hole formed in the moveable hinge part and a pin hole formed in the door column of the oven door. Preferably, a further pin hole formed in the door column is penetrated or penetrable by the safety pin.

[0011] For example, the safety pin is a stepped pin including a section with a bigger diameter and a further section with a smaller diameter.

[0012] Alternatively, the safety pin is a stepped set screw including a section with a bigger diameter and a further section with a smaller diameter, wherein preferably the pin hole formed in the moveable hinge part includes a core thread.

[0013] Advantageously, the bigger diameter of the stepped pin corresponds with the diameter of the pin hole in the door column of the oven door, while the smaller diameter of the stepped pin corresponds with the diameter of the pin hole in the moveable hinge part.

[0014] Furthermore, the present invention relates to an oven door with a door hinge system, wherein said oven door comprises or corresponds with at least two door hinge systems mentioned above.

[0015] In particular, the oven door comprises at least two door columns for receiving the moveable hinge parts of at least two door hinge systems.

[0016] Further, the oven door may comprise an outer door panel attached at outer sides of the at least two door columns, wherein preferably said outer door panel is permanently attached at the outer sides of the at least two door columns.

[0017] Moreover, the oven door may comprise an inner door panel attached at inner sides of the at least two door columns, wherein preferably said inner door panel is releasable at the outer sides of the at least two door columns.

[0018] Additionally, the oven door may comprise at least one intermediate door panel arranged between the inner door panel and the outer door panel, wherein said intermediate door panel is removable by sliding between the two door columns, and wherein preferably said intermediate door panel is covered by a releasable top cover element.

[0019] In particular, the door column includes at least one pin hole for receiving the safety pin, wherein preferably the diameter of said pin hole corresponds with the bigger diameter of the stepped pin.

[0020] Additionally, the door column includes at least one further pin hole for receiving the safety pin, wherein preferably the diameter of said further pin hole corresponds with the smaller diameter of the stepped pin.

[0021] Further, the present invention relates to a cooking oven, wherein the cooking oven comprises the door hinge system and/or the oven door mentioned above.

[0022] For example, the cooking oven is a microwave

oven or a cooking oven with microwave heating function.

[0023] At last, the cooking oven may comprise a power supply cable running from the oven door to a chassis of said cooking oven.

[0024] Novel and inventive features of the present invention are set forth in the appended claims.

[0025] The present invention will be described in further detail with reference to the drawings, in which

FIG 1 illustrates a schematic exploded perspective view of a door hinge system for an oven door of a cooking oven according to a preferred embodiment of the present invention,

FIG 2 illustrates a schematic perspective view of the door hinge system for the oven door of the cooking oven according to the preferred embodiment of the present invention,

FIG 3 illustrates a schematic sectional top view of the door hinge system for the oven door of the cooking oven according to the preferred embodiment of the present invention, and

FIG 4 illustrates a schematic perspective view of the oven door at the cooking oven according to the preferred embodiment of the present invention.

[0026] FIG 1 illustrates a schematic exploded perspective view of a door hinge system 10 for an oven door 20 of a cooking oven according to a preferred embodiment of the present invention. In particular, the cooking oven is a microwave oven or an oven with microwave heating function. In this example, the oven door 20 is a drop-down oven door.

[0027] The door hinge system 10 comprises a stationary hinge part 12 and a moveable hinge part 14 connected to each other. The moveable hinge part 14 is pivoting at the stationary hinge part 12. The stationary hinge part 12 is inserted in or attached at an oven chassis 30 of the cooking oven, while the moveable hinge part 14 is insertable into a door column 22 of the oven door 20. In this example, the moveable hinge part 14 is elongated and ex-open state of the oven door 20 the moveable hinge part 14 extends substantially along a horizontal direction.

[0028] The cooking oven comprises the oven chassis 30, an oven cavity 32, a front frame 34 and a gasket 36. The front frame 34 and the gasket 36 enclose an opening of the oven cavity 32.

[0029] The oven door 20 comprises an outer door panel 24 and an inner door panel 26. The terms "outer" and "inner" relates to the cooking oven, when the oven door 20 is in the closed state. The outer door panel 24 is attached at an outer side of the door column 22, while the inner door panel 26 is attached at an inner side of said door column 22. Preferably, the oven door 20 comprises two parallel door columns 22, wherein one moveable hinge part 14 is insertable into each door column 22 of

the oven door 20. In this example, the oven door 20 comprises two intermediate door panels arranged between the outer door panel 24 and inner door panel 26 on the one hand and between the door columns 22 on the other hand. The outer door panel 24, the inner door panel 26 and the intermediate door panels 28 are arranged plane-parallel to each other.

[0030] Further, the door hinge system 10 comprises a saddle bracket 16. Said saddle bracket 16 is attached at the moveable hinge part 14 of the door hinge system 10. The saddle bracket 16 is pivoting at the moveable hinge part 14. The saddle bracket 16 includes a hook 38 engageable with a counterpart formed inside the door column 22. The saddle bracket 16 is pivoting between a locked and an unlocked position. When the moveable hinge part 14 has been inserted into the door column 22, then the saddle bracket 16 may be turned into the locked position. When the saddle bracket 16 is in the locked position, then the door column 22 cannot be removed from the moveable hinge part 14. The saddle bracket 16 allows that the oven door 20 is reliably fastened at the moveable hinge part 14. If a user wants to detach the oven door 20 from the door hinge system 10, then the saddle bracket 16 has to be turned into the unlocked position. In the unlocked position the hook 38 is disengaged from the door column 22, so that the oven door 20 can be moved away from the door hinge system 10. Then, the oven door 20 may be cleaned and assembled again to the door hinge system 10. Another function of the saddle bracket 16 in the unlocked position is that the oven door 20 is secured in a half open state. In that half open state of the oven door 20 components of said oven door 20 may be removed by the user.

[0031] Moreover, the door hinge system 10 comprises a safety pin 18. Said safety pin 18 is insertable into a first pin hole 40 and a second pin hole 42. The door column 22 may comprise a third pin hole 43. The first pin hole 40 and the third pin hole 43 are formed in the door column 22 of the oven door 20, while the second pin hole 42 is formed in the moveable hinge part 14 of the door hinge system 10.

[0032] Preferably, the safety pin 18 is formed as a stepped pin 18. Said stepped pin 18 includes a section having a smaller diameter and a section having a bigger diameter. The bigger diameter of the stepped pin 18 corresponds with the diameter of the first pin hole 40 in the door column 22. The smaller diameter of the stepped pin 18 corresponds with the diameter of the second pin hole 42 in the moveable hinge part 14 as well as the third pin hole 43 which can be formed in the door column 22.

[0033] The main function of the third pin hole 43 is to allow a disassembling of the oven door 20 and the door column 22 from the moveable hinge part 14, e.g. for service purposes. The safety pin 18 can be pushed outwards from the inner side of the oven door 20 or the door column 22, e.g. by the service staff, so that the pin 18 is pushed out of the pin holes 40, 42 and 43. Then, the saddle bracket 16 with its hook 38 can be pivoted into the unlocked

position, and the oven door 20 and the door column 22 can be pulled out of the moveable hinge part 14.

[0034] Alternatively, the door hinge system 10 may comprise a stepped set screw instead of the stepped pin 18. In this case, the second pin hole 42 in the moveable hinge part 14 may include a core thread. In particular, the door hinge system 10 with the stepped set screw is advantageous for an oven door 20 of a microwave oven. The stepped set screw allows an exact connection between the oven door 20 and the door hinge system 10.

[0035] FIG 2 illustrates a schematic perspective view of the door hinge system 10 for the oven door 20 of the cooking oven according to the preferred embodiment of the present invention.

[0036] In FIG 2 the oven door 20 is fastened at the cooking oven by the door hinge system 10. The moveable hinge part 14 of the door hinge system 10 is inserted in the door column 22 of the oven door 20. The hook 38 of the saddle bracket 16 is engaged with the counterpart formed inside the door column 22. The saddle bracket 16 is in the locked position. The safety pin 18 penetrates the first pin hole 40 and the third pin hole 43 in the door column 22 and the second pin hole 42 in the moveable hinge part 14.

[0037] FIG 3 illustrates a schematic sectional top view of the door hinge system 10 for the oven door 20 of the cooking oven according to the preferred embodiment of the present invention.

[0038] The door hinge system 10 comprises the stationary hinge part 12 and the moveable hinge part 14 connected to each other, wherein the moveable hinge part 14 is pivoting at the stationary hinge part 12. The stationary hinge part 12 is inserted in and attached at the oven chassis 30 of the cooking oven, while the moveable hinge part 14 is inserted in the door column 22 of the oven door 20.

[0039] The oven door 20 comprises the outer door panel 24, the inner door panel 26 and the both intermediate door panels 28. The outer door panel 24 is attached at the outer side of the door column 22, while the inner door panel 26 is attached at the inner side of said door column 22. The intermediate door panels are arranged between the outer door panel 24 and inner door panel 26. The outer door panel 24, the inner door panel 26 and the intermediate door panels 28 are arranged plane-parallel to each other.

[0040] The safety pin 18 is inserted in the first pin hole 40 formed in the door column 22 of the oven door 20 and in the second pin hole 42 formed in the moveable hinge part 14 of the door hinge system 10 and the third pin hole 43 formed in the door column 22. In this example, the safety pin 18 is formed as the stepped pin 18. Said stepped pin 18 includes the section having the smaller diameter and the section having the bigger diameter. The bigger diameter of the stepped pin 18 corresponds with the diameter of the first pin hole 40 in the door column 22, while the smaller diameter of the stepped pin 18 corresponds with the diameter of the second pin hole 42 in

the moveable hinge part 14 and with the third pin hole 43 in the door column 22.

[0041] FIG 4 illustrates a schematic perspective view of the oven door 20 at the cooking oven according to the preferred embodiment of the present invention. In FIG 4 the oven door 20 is in a half open state. In this half open state the oven door 20 can be cleaned and removed from the oven chassis 30. Further, the inner door panel 26 and the intermediate door panel 28 can be removed from the door columns 22, after a top cover element 48 has been removed from the oven door 20.

[0042] The oven door 20 comprises two door columns 22 and is fastened at the cooking oven by two door hinge systems 10. The moveable hinge parts 14 of the door hinge systems 10 are inserted in the corresponding door columns 22 of the oven door 20. The outer door panel 24 is attached at the outer side of the door column 22, while the inner door panel 26 is attached at the inner side of said door column 22. The intermediate door panels are arranged between the outer door panel 24 and inner door panel 26. A door handle 44 is attached at an outer side of the outer door panel 24. A power supply cable 46 runs from the oven door to the oven chassis 30.

[0043] The door hinge system 10 according to the present invention is a relative simple mounting device, which prevents that the oven door 20 is inadvertently detached from the oven chassis 30. The safety pin 18 guarantees an exact position of the oven door 20 in relation to the door hinge system 10 and oven chassis 30. The exact position of the oven door 20 provided a reliable tightness between the oven door 20 and the gasket 36 of the oven cavity 32. The door hinge system 10 of the present invention is suitable for a standard cooking oven as well as for a microwave cooking oven.

[0044] Although an illustrative embodiment of the present invention has been described herein with reference to the accompanying drawings, it is to be understood that the present invention is not limited to that precise embodiment, and that various other changes and modifications may be affected therein by one skilled in the art without departing from the scope or spirit of the invention. All such changes and modifications are intended to be included within the scope of the invention as defined by the appended claims.

List of reference numerals

[0045]

10	door hinge system
12	stationary hinge part
14	moveable hinge part
16	saddle bracket
18	safety pin, stepped pin
20	oven door
22	door column
24	outer door panel
26	inner door panel

28 intermediate door panel
 30 oven chassis
 32 oven cavity
 34 front frame
 36 gasket
 38 hook
 40 first pin hole
 42 second pin hole
 43 third pin hole
 44 door handle
 46 power supply cable
 48 top cover element

Claims

1. A door hinge system (10) for an oven door (20) of a cooking oven, wherein:

- the door hinge system (10) comprises a stationary hinge part (12) insertable into or attachable at an oven chassis (30) of the cooking oven,
- the door hinge system (10) comprises an elongated moveable hinge part (14) insertable into or attachable at an oven door (20) of the cooking oven,
- the moveable hinge part (14) includes at least one saddle bracket (16) engageable with a door column (22) of the oven door (20),
- the saddle bracket (16) is pivoting at the moveable hinge part (14) between a locked state and an unlocked state, and
- the saddle bracket (16) is engageable with the door column (22) of the oven door (20) in the locked state.

2. The door hinge system according to claim 1, **characterised in that** the saddle bracket (16) includes a hook (38) engageable with the door column (22) of the oven door (20) in the locked state of said saddle bracket (16).

3. The door hinge system according to claim 1 or 2, **characterised in that** the saddle bracket (16) secures the door hinge system (10) in a half open state, when said saddle bracket (16) is in the unlocked state.

4. The door hinge system according to any one of the preceding claims, **characterised in that** the door hinge system (10) comprises at least one safety pin (18) for penetrating a pin hole (42) formed in the moveable hinge part (14) and a pin hole (40) formed in the door column (22) of the oven door (20), wherein preferably a further pin hole (43) formed in the door column (22) is penetrated or penetrable by the safety pin (18).

5. The door hinge system according to claim 4, **characterised in that** the safety pin (18) is a stepped pin including a section with a bigger diameter and a further section with a smaller diameter.

6. The door hinge system according to claim 4, **characterised in that** the safety pin (18) is a stepped set screw including a section with a bigger diameter and a further section with a smaller diameter, wherein preferably the pin hole (42) formed in the moveable hinge part (14) includes a core thread.

7. The door hinge system according to claim 5 or 6, **characterised in that** the bigger diameter of the stepped pin (18) corresponds with the diameter of the pin hole (40) in the door column (22) of the oven door (20), while the smaller diameter of the stepped pin (18) corresponds with the diameter of the pin hole (42) in the moveable hinge part (14).

8. An oven door (20) for a cooking oven, **characterised in that** the oven door (20) comprises or corresponds with at least two door hinge systems (10) according to any one of the preceding claims, wherein preferably the oven door (20) comprises at least two door columns (22) for receiving the moveable hinge parts (14) of at least two door hinge systems (10).

9. The oven door according to claim 7 or 8, **characterised in that** the oven door (20) comprises an outer door panel (24) attached at outer sides of the at least two door columns (22), wherein preferably said outer door panel (24) is permanently attached at the outer sides of the at least two door columns (22).

10. The oven door according to any one of the claims 7 to 9, **characterised in that** the oven door (20) comprises an inner door panel (26) attached at inner sides of the at least two door columns (22), wherein preferably said inner door panel (26) is releasable at the outer sides of the at least two door columns (22).

11. The oven door according to any one of the claims 8 to 10, **characterised in that** the oven door (20) comprises at least one intermediate door panel (28) arranged between the inner door panel (26) and the outer door panel (26), wherein said intermediate door panel (28) is removable by sliding between the two door columns (22), and wherein preferably said intermediate door panel (28)

is covered by a releasable top cover element (48).

12. The oven door according to any one of the claims 8 to 11,
characterised in that 5
the door column (22) includes at least one pin hole (40) for receiving the safety pin (18), wherein preferably the diameter of said pin hole (40) corresponds with the bigger diameter of the stepped pin (18). 10
13. The oven door according to claim 12,
characterised in that
the door column (22) includes at least one further pin hole (43) for receiving the safety pin (18), wherein preferably the diameter of said further pin hole (43) corresponds with the smaller diameter of the stepped pin (18). 15
14. A cooking oven,
characterised in that 20
the cooking oven comprises a door hinge system (10) according to any one of the claims 1 to 7 and/or an oven door (20) according to any one of the claims 8 to 13, wherein preferably the cooking oven is a microwave oven or a cooking oven with microwave heating function. 25
15. The cooking oven according to claim 14,
characterised in that
the cooking oven comprises a power supply cable (46) running from the oven door (20) to a chassis (30) of said cooking oven. 30

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FIG 1

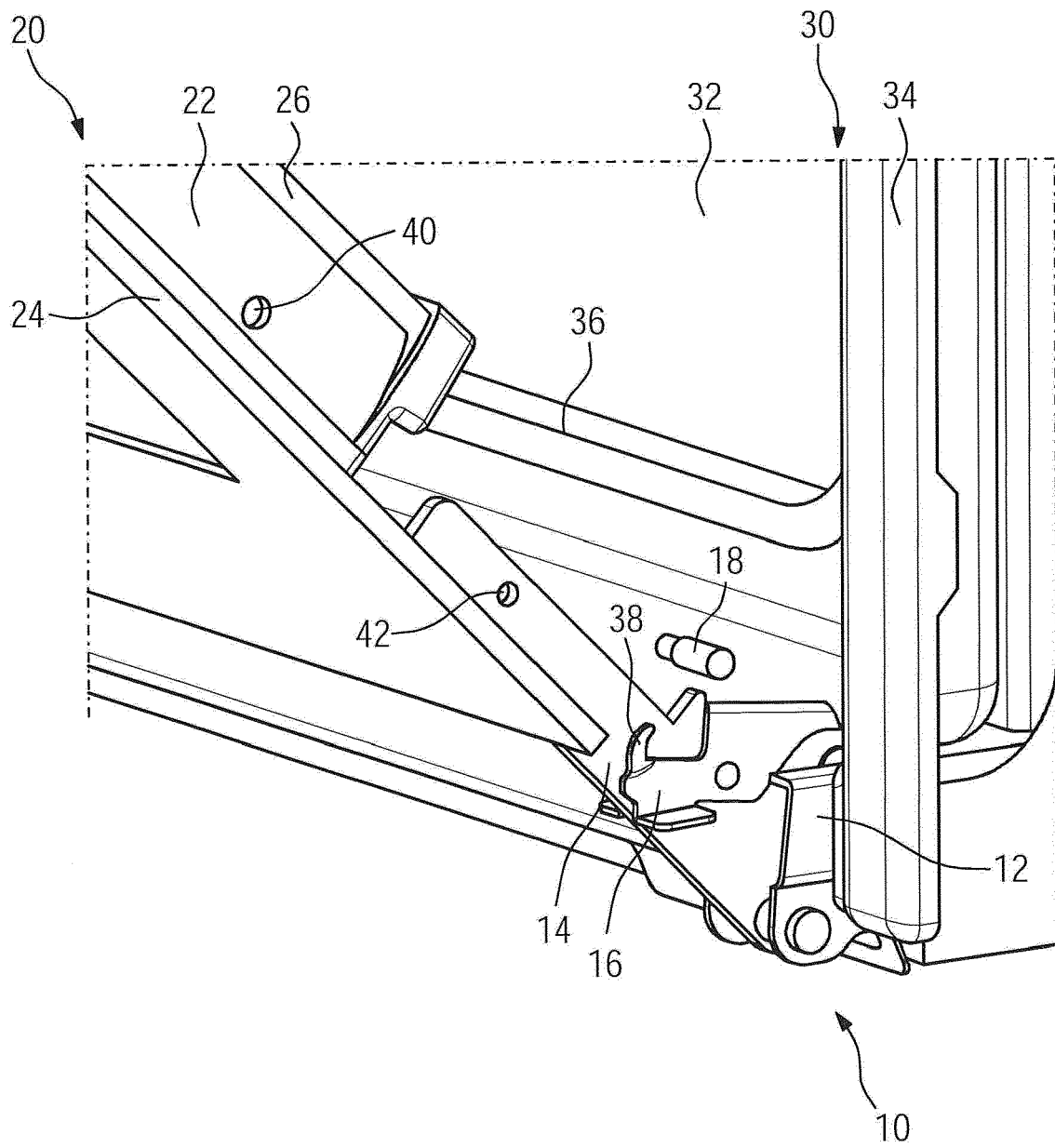


FIG 2

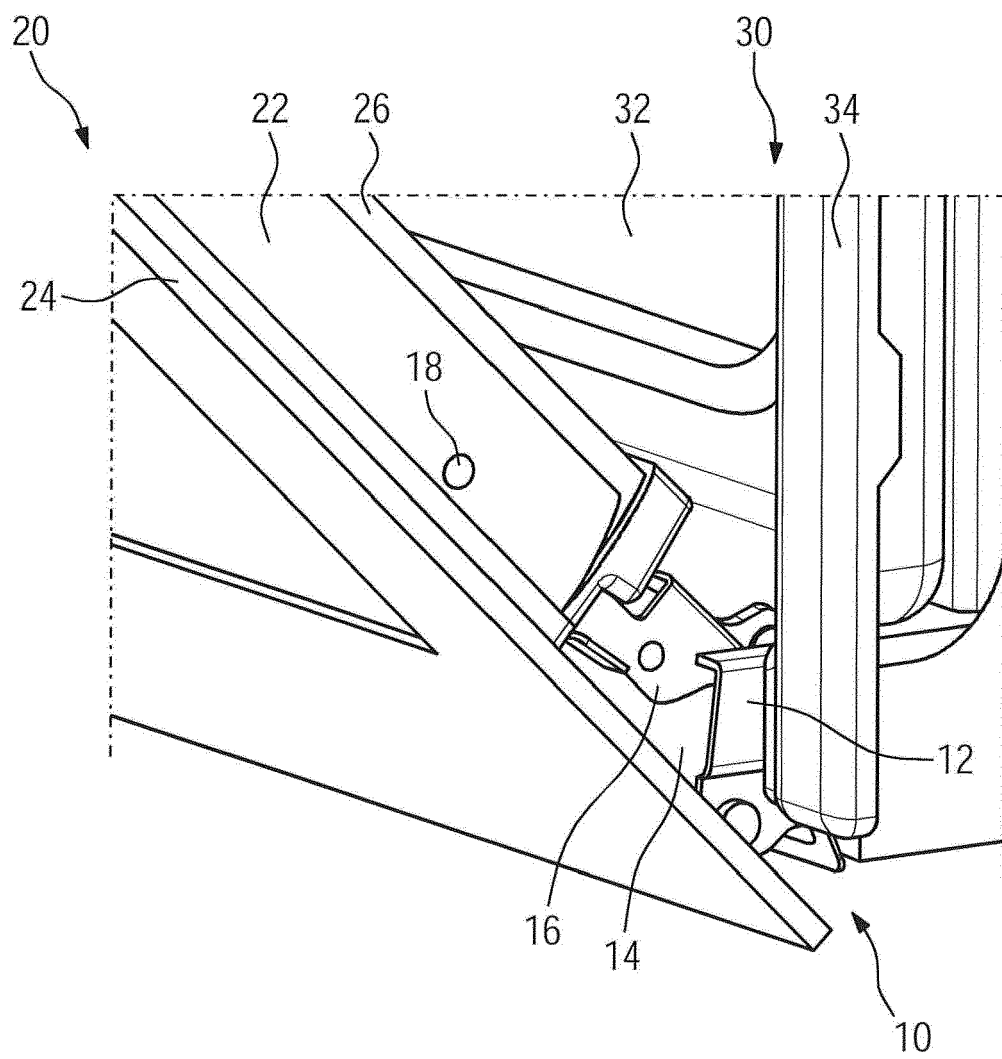


FIG 3

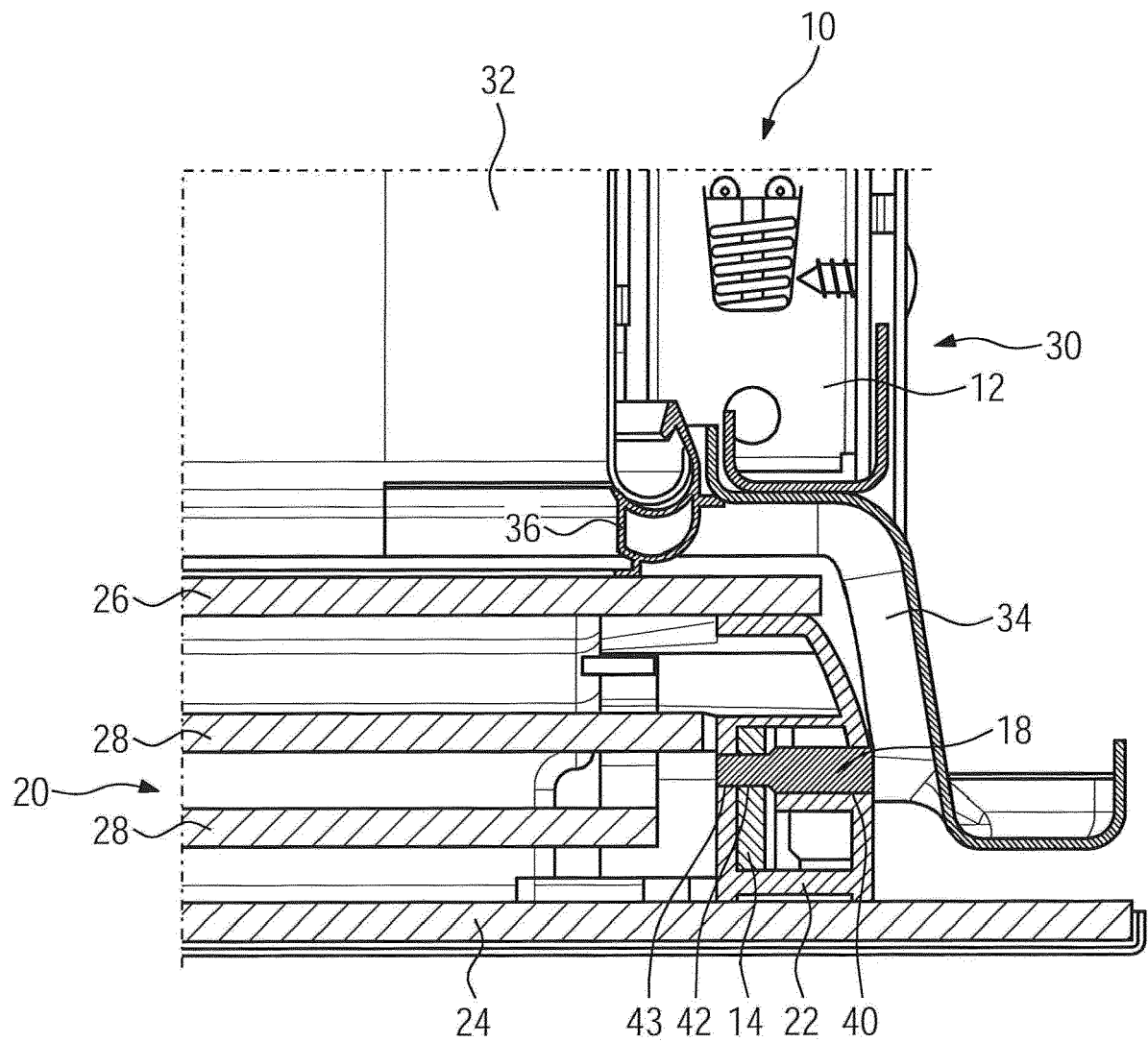
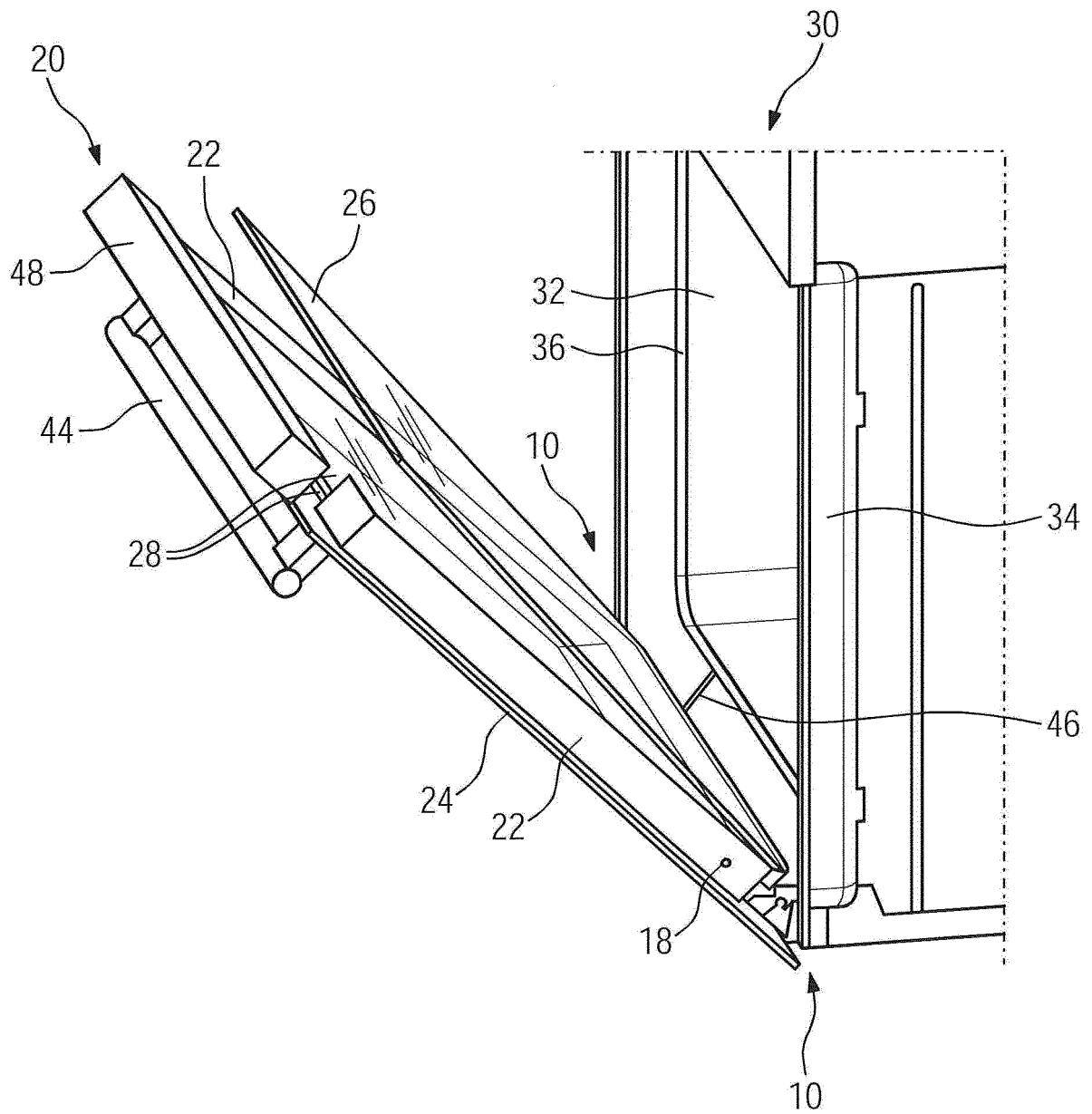


FIG 4





EUROPEAN SEARCH REPORT

Application Number
EP 17 17 1984

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DOCUMENTS CONSIDERED TO BE RELEVANT			
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X	US 4 315 495 A (JELLIES DAVID A) 16 February 1982 (1982-02-16)	1-3, 8-10,14	INV. E05D7/12
Y	* column 1, line 64 - column 2, line 56; figures 1-3 *	4,5,7, 11-13,15	F24C15/02 F24C15/04
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Y	WO 2016/161131 A1 (ELECTROLUX HOME PROD INC [US]) 6 October 2016 (2016-10-06)	11	
	* paragraph [0042] - paragraph [0043]; figures 1-3 *		
Y	US 2 786 094 A (MORTON EVANS T) 19 March 1957 (1957-03-19)	15	TECHNICAL FIELDS SEARCHED (IPC)
	* claim 1; figures 1-3 *		E05D F24C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 1 August 2017	Examiner Guillaume, Geert
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 17 1984

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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