Abstract

A household appliance has an appliance body and at least one first roller bearing (24) connected to a bottom plate (4) of said appliance body. The first roller bearing (24) defines a first roller axis (38) extending above said bottom plate (4). A roller (8) is held in at least one second roller bearing (25) which is fixed to said bottom plate (4). A second axis (37) of said roller (8) extends below said bottom plate (4). Fig. 4

We claim

1. A household appliance having an appliance body (1) and at least one first roller bearing (24) connected to a bottom plate (4) of said appliance body, the first roller bearing (24) defining a first roller axis (38) extending above said bottom plate (4), characterized in that a roller (8) is held in at least one second roller bearing (25) which is fixed to said bottom plate (4) and that a second axis (37) of said roller (8) extends below said bottom plate (4).

2. The household appliance of claim 1, wherein the bottom plate (4) is formed of sheet material, and bearing brackets (17) of said first bearing (24) are formed in one piece with said bottom plate (4) and located at opposite sides of a hole (23) of said bottom plate (4).

3. The household appliance of claim 2, wherein the second roller bearing (25) has a boss (30) which fits in said hole (23).

4. The household appliance of claim 1, 2 or 3, wherein the second roller bearing (25) comprises bearing brackets (27) and a bridging member (26) which interconnects the bearing brackets (27) and is fixed to said bottom plate (4).

5. The household appliance of claim 4, wherein the bearing brackets (27) of said second roller bearing (25) are located at opposite sides of a hole (23) of said bottom plate (4).

6. The household appliance of any of the preceding claims, wherein the second roller bearing (25) is fixed to said bottom plate (4) by means of screws or rivets (35).

7. The household appliance of claim 6 and claim 3, wherein the bottom plate (4) and the second roller bearing (25) have openings (31, 32) for receiving said screws or rivets (35) and that these openings (31, 32) overlap when the boss (30) engages the hole (23) of the bottom plate (4).

8. The household appliance of any of the preceding claims, wherein a shaft (33) is press-fitted into shaft receiving holes (28) of said second bearing (25), and the roller (8) is rotatably mounted on said shaft (33).

9. The household appliance of any of the preceding claims, wherein shaft receiving holes (18, 28) of said first and second bearings (24, 25) are sized to accommodate a same shaft (33).

10. The household appliance of any of the preceding claims, wherein the roller (8) has a radius which is larger than the distance between said first axis and said bottom plate (4).

11. The household appliance of any of the preceding claims, wherein said roller (8) is located in a rear portion of a bottom side (6) of the appliance body (1), and the appliance body rests on said roller (8) and on a footing (9) formed in a front portion of said bottom side (6).

12. The household appliance of claim 11, wherein the footing (9) comprises a member (12), the height (h) of which equals the distance between said first and second axes (38, 37).

13. The household appliance of any of the preceding claims, wherein the household appliance is a cooling appliance.

14. The household appliance of claim 13, wherein the bottom plate (4) supports a compressor (9).

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The present invention relates to a household appliance, in particular to a household appliance having a substantially cuboid body which, due to its size and shape, is difficult to displace by hand. In order to facilitate displacement, such appliances may have a number rollers installed at a bottom plate of the appliance body.

In appliances developed for e.g. the European market, the height of a space between a bottom side of the appliance body and a floor on which the appliance rests tends to be rather small, and usually, the space is closed off by a cover plate which will slow down the accumulation of dust and organic matter under the appliance body and which prevents matter accumulated there from spreading o to the floor in front of the appliances. In other markets, in particular in hotter and more humid climates, where there is a substantial risk that pests might thrive on organic matter accumulated under the appliance, consumers expect that the space below the appliance body should be easily accessible for cleaning. To this effect, the space below the appliance body should be higher than in a European style appliance where this space is closed off.

If an appliance does not have to be displaced, the height of the space between the appliance body and the floor is easily modified by inserting spacers between the appliance body and the floor. However, if the appliance has rollers in order to be easily displaceable, it is evident that spacers cannot be inserted between the rollers and the floor, because, if displaced too far, the appliance would fall off the spacers. If spacers were inserted between the appliance body and the rollers, the rollers would always be in contact with the floor, and the appliance could be rolled as far as desired. However, this would require that bearings of the rollers could be detached from the appliance body. Further, fixing the spacers to both the appliance body and to the roller bearings is laborious and, hence expensive.

The object of the present invention is, therefore, to provide a household appliance, which is easily displaceable, economic to manufacture and which facilitates adaptation of a space between the appliance body and the floor to the expectations of consumers in different markets.

The object is achieved by a household appliance having an appliance body and at least one first roller bearing connected to a bottom plate of said appliance body, the first roller bearing defining a first roller axis extending above said bottom plate, and in which a roller is held in at least one first roller bearing which is fixed to said bottom plate, a second axis of that roller extending below said bottom plate. In an appliance where the distance between the floor and the appliance body is small, a roller can be installed in said first roller bearing, and the second roller bearing is not required. On the other hand, if the distance between the floor and the appliance body is to be large, the second roller bearing will be provided and will receive a roller.

According to a preferred embodiment, the bottom plate of the appliance is formed of sheet material, in particular of sheet metal, and bearing brackets of said first bearing are formed in one piece with said bottom plate and are located at opposite sides of a hole of said bottom plate. Such a bearing may be formed at little expense by punching an H-shaped cutout in the sheet material of the bottom plate. By bending upwards the two tabs formed by punching said cutout, the tabs can constitute the bearing brackets and the hole between the bearing brackets is opened up.

Placing the second roller bearing at said bottom plate is very easy if the second roller bearing has a boss which fits in said hole.

The second roller bearing preferably comprises bearing brackets, which may be similar to those of the first roller bearing, and a bridging member which interconnects the bearing brackets and is fixed to said bottom plate. The second roller bearing may also be formed from sheet metal.

Like the bearing brackets of the first roller bearing, those of the second roller bearing may be located at opposite sides of a hole of the bottom plate.

The second roller bearing can be fixed to said bottom plate by means of screws or rivets.

If the bottom plate and the second roller bearing have openings for receiving said screws or rivets, engagement of the boss in the hole of the bottom plate can ensure that these openings overlap and that the screws or rivets can be mounted conveniently.

A shaft associated to the second roller can be received in holes of the second bearing. Installation of the roller is particularly easy if the shaft is press-fitted into shaft-receiving holes of the second bearing, and the roller is rotatably mounted on said shaft.

Shaft-receiving holes of said first and second bearings may be sized to accommodate a same shaft. In this way, a same type of roller can be used in both the first and the second bearing, whereby the number of different parts needed to manufacture household appliances having different floor clearances is minimized.

In a preferred embodiment, the roller is located in a rear portion of a bottom side of the appliance body, and the appliance body rests on said roller and on a footing formed in a front portion of said bottom side. Such a roller facilitates pushing the appliance against a wall in a room where it is deployed, while at the same time ensuring a firm stand of the appliance against the wall.

The footing may comprise a member, the height of which equals the distance between said first and second axes. In an appliance where the roller is installed in the first roller bearing and the clearance between the appliance body and the floor is small, this member may be dispensed with, whereas in an appliance where the roller is mounted in the second bearing and the clearance between the floor and the appliance body is wide, the height of the footing is easily adapted to this clearance by adding said member.

In a preferred embodiment of the invention, the household appliance is a cooling appliance, such as a freezer or a refrigerator. In such an appliance, the above mentioned bottom plate can support a compressor.

For the figures and advantages for the invention will be kind a parent from the significant description of the embodiment thereof, referring of the appended drawings.

Fig. 1 is a schematic side of view of a refrigerator according to the invention;

Fig. 2 is a perspective view of a piece of sheet metal from which a compressor support of the refrigerator is to be formed;

Fig 3 is an exploded view of the compressor support, a roller bearing and a roller;

Fig. 4 is a partial cross section of the compressor support with the roller bearing and a roller mounted to it;

Fig. 5 is a cross section analogous to that of Fig. 4 of the compressor support and a roller mounted in it in a conventional way.

Fig. 1 is a schematic side view of a household appliance, namely a refrigerator, according to the present invention, which is about to be installed in a room. The refrigerator has a refrigerator body 1, most of which, as usual in the art, is occupied by one or more storage compartments 2. A machinery compartment 3 is formed in a bottom rear portion of refrigerator body 1. A bottom of machinery compartment 3 is formed by a compressor support 4, which extends across the entire width of the machinery compartment 3 between side walls of refrigerator body 1 and carries a compressor 5. The compressor 5 and most of its support 4 are shown in phantom in Fig. 1, being in fact hidden behind a side wall of refrigerator body 1.

A bottom side 6 of refrigerator body 1 is held distant from a floor 7 of the room by a pair of rollers 8 mounted below compressor support 4, and by two pillar-type footings 9 which are fixed to bottom side 6 adjacent to refrigerator door 10. Each footing 9 comprises a top member 11 directly connected to bottom side 6 and a bottom member 12 which is connected to top member 11 by screwing, latching or the like.

In Fig. 1, the refrigerator is shown at distance from wall 13 of the room. In use, the refrigerator will be placed directly at the wall 13. If a user pushes the refrigerator somewhere near the top of refrigerator body 1, as shown by arrow 14 in Fig. 1, the fraction of the weight of the refrigerator supported by footings 9 is reduced, and that supported by rollers 8 is increased. Therefore, it is quiet easy to push the refrigerator against the wall 13, but once it has reached the wall 13, the refrigerator is firmly placed.

Fig. 2 is a perspective view of a rectangular sheet metal blank 15 from which the compressor support 4 shown in Fig. 1 is to be formed. In Fig. 2, H-shaped cutouts 16 are formed adjacent to two corners of blank 15. Each cutout 16 delimits two tabs 17, and a circular hole 18 is formed in each tab 17. The cutout 16 and holes 18 may be punched into blank 15 prior to bending it, or punching and bending may be accomplished in a same processing step, using a same set of dies, whereby the compressor support 4 shown in Fig. 3 is obtained.

The compressor support 4 has the overall shape of a rectangular dish with a flat bottom 19 surrounded by oblique walls 20, and a horizontal flange 21. The tabs 17 are bent upwards and extend at right angles from said bottom 19, whereby the two cutouts 16 are transformed into substantially rectangular holes 23, with the tabs 17 extending from opposite edges of each hole 23. The holes 18 of the tabs 17 are aligned with each other, so that the two tabs 17 at each hole 23 form a first roller bearing 24 in which a roller, not shown, could be mounted.

In the bottom 19 of compressor support 4, ribs 22 can be formed, in order to increase the rigidity of support 4.

Below one of the two holes 23 a second roller bearing 25 is shown in Fig. 3. Roller bearing 25 is formed in one piece from sheet metal and comprises a substantially horizontal bridging member 26 and two bearing brackets 27 extending vertically downwards from two opposite edges of bridging member 26. In Fig. 3, only one of said bearing brackets 27 is visible, the other is concealed under bridging member 26. The bearing brackets 27 have holes 28 which are aligned along a same axis, parallel to

that of first roller bearing 24. The bridging member 26 comprises two flat end portions 29 and an upwardly protruding boss 30 in between. Boss 30 is shaped so as to fit in hole 23 and thereby define an installation position of second roller bearing 25.

Bridging member 26 and compressor support 4 bottom 19 may have holes 31, 32, respectively, which overlap in said installation position and which facilitate fixing second roller bearing 25 to compressor support 4 by means of screws or rivets.

Before or after installation of the second roller bearing 25 at compressor support 4, a roller 8 may be placed between the two bearing brackets of 27 of second roller bearing 25, and a shaft 33 is inserted through hole 28 of the first one of said bearing brackets 27, a hole 34 of roller 8 and, finally, hole 28 of the other bearing brackets 27. The holes 28, 34 and the shaft 33 are dimensioned so as to enable rotation of the roller 8 with respect to the shaft 33, while the shaft 33 is press-fitted in to roller bearing 25. To this effect, the two holes 28 may have a same diameter, whereas shaft 33 is slightly tapered. Alternatively, rivet heads may be formed at the ends of shaft 33 after its insertion in holes 28, 34.

The diameter of holes 28 is same as that of holes 18, so that shaft 33 and roller 8 might also be installed in first roller bearing 24.

Fig. 4 is a cross section of part of compressor support 4 and of second roller bearing 25 fixed to it by rivets 35. Shaft 33 is stuck in the holes 28 of bearing brackets 27, and roller 8 is free to rotate about an axis 37 defined by shaft 32. Part of roller 8 engages boss 30 from below. The distance between axis 37 and the centre of hole 18 is h.

The same shaft 33 and roller 8 are shown in Fig. 5 with shaft 33 mounted in holes 18 of tabs 17. Here, the roller 8 is rotatable about an axis 38 which extends above the bottom 19 of compressor support 4 through the centres of holes 18. Since the radius of roller 8 is larger than the distance between axis 38 and the bottom 19 of support 4, part of roller 32 extends through hole 23 in bottom 19. Here, the clearance d between bottom 19 and floor 7 is smaller than the clearance D between floor 7 and bottom 19 in Fig. 4 by the distance h between the holes 18, 28 of first and second roller bearings

24, 25. So the height of space 36 between the floor 7 and the bottom side 6 of refrigerator body 1 can be adapted quite easily to a user's needs by either installing or not installing second roller bearing 25 and mounting shaft 33 and roller 32 in first roller bearing 24, if second roller bearing 25 is not installed, yielding the configuration of Fig. 5, or, if present, in second roller bearing 25, yielding the configuration of Fig. 4. The height of bottom member 12 equals h, so that if bottom member 12 of footings 9 is installed along with second roller bearing 25, the top of refrigerator body 1 is horizontal in either configuration.

REFERENCE NUMERALS

1.. refrigerator body
2.. storage compartment
3. machinery compartment
4.. compressor support
5.. compressor
6. bottom side
7. floor
8. roller
9. footing
10. door
11. top member
12. bottom member
13. wall
14. arrow
15. blank
16. cutout
17.. tab
18. hole
19. bottom
20. wall
21. flange
22. rib
23. hole
24. first roller bearing
25. second roller bearing
26. bridging member
27. bearing bracket
28. hole
29. end portion

30. boss
31. hole
32. hole
33. shaft
34. hole
35. rivet
36. space
37. axis
38. axis

We claim

1. A household appliance having an appliance body (1) and at least one first roller bearing (24) connected to a bottom plate (4) of said appliance body, the first roller bearing (24) defining a first roller axis (38) extending above said bottom plate (4), characterized in that a roller (8) is held in at least one second roller bearing (25) which is fixed to said bottom plate (4) and that a second axis (37) of said roller (8) extends below said bottom plate (4).

2. The household appliance of claim 1, wherein the bottom plate (4) is formed of sheet material, and bearing brackets (17) of said first bearing (24) are formed in one piece with said bottom plate (4) and located at opposite sides of a hole (23) of said bottom plate (4).

3. The household appliance of claim 2, wherein the second roller bearing (25) has a boss (30) which fits in said hole (23).

4. The household appliance of claim 1, 2 or 3, wherein the second roller bearing (25) comprises bearing brackets (27) and a bridging member (26) which interconnects the bearing brackets (27) and is fixed to said bottom plate (4).

5. The household appliance of claim 4, wherein the bearing brackets (27) of said second roller bearing (25) are located at opposite sides of a hole (23) of said bottom plate (4).

6. The household appliance of any of the preceding claims, wherein the second roller bearing (25) is fixed to said bottom plate (4) by means of screws or rivets (35).

7. The household appliance of claim 6 and claim 3, wherein the bottom plate (4) and the second roller bearing (25) have openings (31, 32) for receiving said screws or rivets (35) and that these openings (31, 32) overlap when the boss (30) engages the hole (23) of the bottom plate (4).

8. The household appliance of any of the preceding claims, wherein a shaft (33) is press-fitted into shaft receiving holes (28) of said second bearing (25), and the roller (8) is rotatably mounted on said shaft (33).

9. The household appliance of any of the preceding claims, wherein shaft receiving holes (18, 28) of said first and second bearings (24, 25) are sized to accommodate a same shaft (33).

10. The household appliance of any of the preceding claims, wherein the roller (8) has a radius which is larger than the distance between said first axis and said bottom plate (4).

11. The household appliance of any of the preceding claims, wherein said roller (8) is located in a rear portion of a bottom side (6) of the appliance body (1), and the appliance body rests on said roller (8) and on a footing (9) formed in a front portion of said bottom side (6).

12. The household appliance of claim 11, wherein the footing (9) comprises a member (12), the height (h) of which equals the distance between said first and second axes (38, 37).

13. The household appliance of any of the preceding claims, wherein the household appliance is a cooling appliance.

14. The household appliance of claim 13, wherein the bottom plate (4) supports a compressor (9).

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