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(54) **Connection apparatus for dishwasher doors**

Verbindungsvorrichtung für Spülmaschinentüren

Appareil de connexion pour portes de lave-vaisselle

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Description

Technical Field

[0001] The present invention relates to door connection apparatuses used for mounting hinged doors in dishwashers.

Prior Art

[0002] Dishwashers widely used nowadays are front-loaded white goods equipped with hinged door systems. In such type of machines, in which kitchen utensils to be cleaned are placed in lower and upper dish racks disposed in the machine, the door situated at the front side of machine is sized so as to completely expose the front of the washing compartment with respect to placing and removing the kitchen utensils. These doors rotate around a single axis by means of a hinge mechanism, and this axis is parallel to the ground. When the door is completely opened, it comes parallel to the ground, and the lower dish rack is pulled and brought over the door for placing/removing kitchen utensils. Therefore, the doors of dishwashers sustain the weight of filled lower dish racks.

[0003] Additionally, dishwasher doors are frequently opened and closed within a day since they are used frequently. Therefore, the hinge mechanisms of doors become subjected to loads and resultantly to wearing-out. The complex structures of hinge mechanisms in turn bring about difficulties with respect to assembly and service.

[0004] Other problems encountered in said hinge mechanisms are the loosening, which occurs in time, and the running clearances, which occur on moving components. These clearances cause the dishwasher door to close incompletely so that water leaks out of the dishwasher as the latter is in operation.

[0005] There have been various improvement efforts made for door hinge mechanisms of dishwashers according to the prior art. The published patent DE10259065 may be referred to as a relevant example. In the embodiment according to this application is disclosed a connection apparatus for mounting the dishwasher door and the connection of this apparatus to the door pin. For this purpose, a slot is formed on one side of the connection apparatus, wherein this slot is placed a bearing bush. The door is mounted to said apparatus, and this apparatus is attached to the door pin by means of the bearing bush.

[0006] An open slot is provided at one side of the bearing bush described in DE10259065 so that the assembly is made by introducing the door pin into the slot. While the bearing bush is placed on the pin, the spring arms in said slot are flexed, such that the pin is fully settled into the slot. While in this position, the spring arms are released from the pin and restored, and prevent the removal of the pin from the slot. In this connection manner, however, the pin may exert pressure on spring arms in a counter direction, and the spring arms may become flexed back, resulting in a running clearance between the pin and the bearing bush that is larger than the normal running clearance. This is an unwanted case for mounting the door. Additionally, due to the structure of the bearing bush, it may not provide full surface contact with the pin.

[0007] The utility model document DE 29621599 U1 discloses a door connection apparatus which comprises a plate shaped mounting arm with a channel into which a pin is introduced so that the door movement is limited by the channel and the pin. Said apparatus determines a simple and robust connection mechanism.

Brief Description of the Invention

[0008] The subject door connection apparatus is likewise developed for mounting hinged doors in dishwashers. Said apparatus comprises a mounting arm on which the door is connected, a bearing part and a fixation element which connects these two parts together. The mounting arm contains a channel, extending from the side of the arm to the interior, with one end open and the opposite bottom part having the form of a semicircle. A projection on the bearing part is introduced into the channel at the mounting arm, and the side of projection facing the bottom part of the channel is provided with a leaning surface with a semicircle form. The cylindrical door pin of the dishwasher is supported between said bottom part and the leaning surface.

[0009] When the bearing part is attached to the mounting arm, the bottom part with the semicircle form and the leaning surface come together, resulting in a full-circle gap. This gap is the gap where the door pin is disposed. Bearing the door pin in said full-circle gap provides full surface contact between the door pin and the door connection apparatus. In other words, the door pin becomes borne within a uniform surface.

Objective of Invention

[0010] The objective of the present invention is to provide a connection apparatus to be used for mounting the doors of dishwashers to the latter.

[0011] Another objective of the present invention is to ensure the placement of the door connection apparatus to the door pin in a rapid and practical manner.

[0012] A further objective of the present invention is to form a structure to provide full surface contact between the door pin and the connection apparatus.

[0013] Still a further objective of the present invention is to form an inexpensive, reliable and robust structure for connecting the door connection apparatus to the door pin.

Description of Figures

[0014] An exemplary dishwasher and the respective exemplary door connection apparatus according to the

present invention are illustrated in annexed figures briefly described hereunder.

Figure 1 is a side view of the interior of an exemplary dishwasher.

Figure 2 is a perspective view of the dishwasher door connection apparatus in a mounted form.

Figure 3 is a perspective view of the dishwasher door connection apparatus prior to being mounted to the dishwasher.

[0015] The parts in said figures are individually enumerated as following:

Door connection apparatus (A)
Dishwasher (1)
Door placement region (1a)
Mounting arm (2)
Door pin (3)
Bearing part (4)
Fixation element (5)
End of the mounting arm (21, 22)
Channel (23)
Bottom part (24)
Side surface (25)
Orifice (26)
Surface (40)
Projection (41)
Leaning surface (42)
Orifice (46)

Description of the Invention

[0016] Figure 1 illustrates the side view of the interior of an exemplary dishwasher (1). As is known, the dishwasher's door (not illustrated in figures) is placed onto a placement region (1 a) at the front of the dishwasher (1). At the lower part of the door is disposed a door connection apparatus (A) according to the present invention. Said door connection apparatus (A) is developed for mounting hinged doors to dishwashers. (The apparatus (A) is used at both ends of the dishwasher door for providing the door with a balanced movement.)

[0017] In figures 2 and 3 are given perspective illustrations of the connection apparatus (A), in mounted form and prior to mounting, respectively. The door connection apparatus (A) comprises a mounting arm (2), a bearing part (4) and a fixation element (5). Said mounting arm (2) has a plate-shaped structure, with one end (21) used for directly connecting the dishwasher door and the other end (22) used for coupling a mechanism which prevents the door from falling down (this mechanism, which is usually equipped with a spring, is not illustrated in the figures).

[0018] At the edge of the mounting arm (2) is provided a channel (23), extending from outside to the interior, with one end open and the opposite bottom part (24) having the form of a semicircle. The channel (23) is formed so that the cylindrically-structured door pin (3) is passed through it (23). When the door pin (3) rests against the bottom part (24) of the channel (23), the pin (3) and the mounting arm (2) become relatively rotating in each other. This rotation motion is required for opening and closing the door coupled to the arm (2). The door pin (3) is fixed in the machine body, whereas the central axis of the cylindrical pin (3) constitutes the rotational axis of both the mounting arm (2) and the door.

[0019] As for the bearing part (4), it is used for preventing the removal or dislocation of the mounting arm (2) over the door pin (3), and for bearing the door pin (3) together with the mounting arm (2). The bearing part (4) in turn has a plate-shaped structure, with one surface (40) leaning against the side surface of the mounting arm (2) (against the surface which is opposite to the side surface (25) illustrated in Figure 3). The bearing part (4) is provided with a projection (41), extending out of said surface (40) thereof, this projection (41) becoming introduced into the channel (23) in the mounting arm (2).

[0020] The projection (41) is introduced to perform only linear movement within the channel (23) and closes the channel (23). For this reason, the bearing element (4) and the mounting arm (2) are prevented from making rotative motion relative to each other. At the side of the projection (41) that faces the bottom part (24) of the channel (23) is in turn formed a leaning surface (42) with a semicircle form. When the bearing part (4) is attached to the mounting arm (2), the bottom part (24) with the semicircle form and the leaning surface (42) come together, resulting in a full-circle gap. This gap is the gap where the door pin (3) is disposed. Bearing the door pin (3) in said full-circle gap provides full surface contact between the door pin (3) and the door connection apparatus (A). In other words, the door pin (3) becomes borne within a uniform surface.

[0021] As referred to *supra,* once the mounting arm (2) is attached to the door pin (3), the bearing part (4) is attached to the mounting arm (2) such that the removal of the arm (2) from the pin (3) is prevented. This structure is also used for bearing the door pin (3). For fixing the bearing part (4) to the mounting arm (2), one orifice (26, 46) is provided on each of both parts (2, 4), these orifices (26, 46) becoming coaxial when the parts (2, 4) are attached to each other. Both parts (2, 4) are fixed to each other by introducing into these orifices (26, 46) a fixation element (5), such as a screw, a rivet, or another standard fixation element. Screws or rivets are preferably used with respect to convenience of assembly.

Claims

1. A door connection apparatus (A) of a dishwasher (1), comprising;

- a plate-shaped mounting arm (2), onto which the dishwasher door is couplable, said mounting arm (2) containing a channel (23), extending from one edge of the mounting arm (2) into its interior, with one end open, and the opposite bottom part (24) having the form of a semicircle;
- a plate-shaped bearing part (4);
- and a fixation element (5) connecting the mounting arm (2) and the bearing part (4) together;
- a cylindrical door pin (3) of the dishwasher (1) being borne or supported between the bottom part (24) and a semicircular leaning surface (42) of the plate-shaped bearing part (4);

characterized in that said plate-shaped bearing part (4) comprises a surface (40) leaning against a side surface of the mounting arm (2), a projection (41) extending outward from this surface (40) being introduced into the channel (23) at the mounting arm (2), said projection (41) being provided with the semicircular leaning surface (42) at the side thereof facing the bottom part (24) of the channel (23).

2. A door connection apparatus (A) according to Claim 1, **characterized in that** the door pin (3) is borne or supported in a full circular gap left between the bottom part (24) and the leaning surface (42).

3. A door connection apparatus (A) according to Claim 1, **characterized in that** one orifice (26, 46) is provided on each of the mounting arm (2) and bearing element (4), said orifices (26, 46) becoming coaxial when these parts (2, 4) are attached to each other.

4. A door connection apparatus (A) according to Claim 3, **characterized in that** the fixation element (5) is attached to said orifices (26, 46).

5. A door connection apparatus (A) according to Claim 1, **characterized in that** the dishwasher door is connected directly to one end (21) of the mounting arm (2).

6. A door connection apparatus (A) according to Claim 1, **characterized in that** said apparatus (A) further comprises a door downfall prevention mechanism, attached to the other end (22) of the mounting arm (2).

Patentansprüche

1. Türverbindungsvorrichtung (A) für einen Geschirrspüler (1), umfassend

- einen plattenförmigen Befestigungsarm (2), mit dem die Geschirrspülertür verbindbar ist, wobei der Befestigungsarm (2) eine Auskehlung (23) beinhaltet, die sich von einer Kante des Befestigungsarms (2) in Richtung dessen Inneren erstreckt, mit einem offenen Ende, wobei der gegenüberliegende Bodenbereich (24) die Form eines Halbkreises besitzt,
- ein plattenförmiges Lagerelement (4),
- und ein Befestigungselement (5) zum Verbinden des Befestigungsarms (2) und des Lagerelements (4) miteinander,
wobei ein zylinderförmiger Türstift (3) des Geschirrspülers (1) zwischen dem Bodenbereich (24) und einer halbkreisförmigen Stützfläche (42) des plattenförmigen Lagerelements (4) getragen oder gestützt ist,

dadurch gekennzeichnet, dass das plattenförmige Lagerelement (4) eine Fläche (40) umfasst, die an einer Seitenfläche des Befestigungsarms (2) angelehnt ist, wobei ein Vorsprung (41), der sich von dieser Fläche (40) nach außen erstreckt, in die Auskehlung (23) des Befestigungsarms (2) eingeführt ist, wobei der Vorsprung (41) an seiner dem Bodenbereich (24) der Auskehlung (23) gegenüberliegenden Seite mit der halbkreisförmigen Stützfläche (42) versehen ist.

2. Türverbindungsvorrichtung (A) nach Anspruch 1, **dadurch gekennzeichnet, dass** der Türstift (3) in einem vollkreisförmigen Spalt aufgenommen oder gestützt ist, der zwischen dem Bodenbereich (24) und der Stützfläche (42) verbleibt.

3. Türverbindungsvorrichtung (A) nach Anspruch 1, **dadurch gekennzeichnet, dass** eine Öffnung (26, 46) jeweils am Befestigungsarm (2) und am Lagerelement (4) vorgesehen ist, wobei die Öffnungen (26, 24) koaxial sind, wenn diese Elemente (2, 4) aneinander befestigt sind.

4. Türverbindungsvorrichtung (A) nach Anspruch 3, **dadurch gekennzeichnet, dass** das Befestigungselement (5) mit diesen Öffnungen (26, 46) verbunden ist.

5. Türverbindungsvorrichtung (A) nach Anspruch 1. **dadurch gekennzeichnet, dass** die Geschirrspülertür direkt mit einem Ende (21) des Befestigungsarms (2) befestigt ist.

6. Türverbindungsvorrichtung (A) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Vorrichtung (A) des Weiteren einen Mechanismus zum Verhindern eines Herunterfallens der Türe umfasst, der an dem anderen Ende (22) des Befestigungsarms (2) anschließt.

Revendications

1. Appareil de connexion de porte (A) d'un lave-vaisselle (1) comprenant :

   - un bras de montage en forme de plaque (2), sur lequel la porte du lave-vaisselle peut être couplée, ledit bras de montage (2) contenant un canal (23), s'étendant depuis un bord du bras de montage (2) dans son intérieur, avec une extrémité ouverte, et la partie inférieure opposée (24) ayant la forme d'un demi-cercle ;
   - une partie de support en forme de plaque (4) ;
   - et un élément de fixation (5) assemblant le bras de montage (2) et la partie de support (4) ;
   - une cheville de porte cylindrique (3) du lave-vaisselle (1) étant soutenue ou supportée entre la partie inférieure (24) et une surface d'appui semi-circulaire (42) de la partie de support en forme de plaque (4) ;

   caractérisé en ce que ladite partie de support en forme de plaque (4) comprend une surface (40) appuyant contre une surface latérale du bras de montage (2), une protubérance (41) s'étendant vers l'extérieur à partir de cette surface (40), étant introduite dans le canal (23) au niveau du bras de montage (2), ladite protubérance (41) étant pourvue de la surface d'appui semi-circulaire (42) sur son côté faisant face à la partie inférieure (24) du canal (23).

2. Appareil de connexion de porte (A) selon la revendication 1, **caractérisé en ce que** la cheville de porte (3) est soutenue ou supportée dans un écartement circulaire complet laissé entre la partie inférieure (24) et la surface d'appui (42),

3. Appareil de connexion de porte (A) selon la revendication 1, **caractérisé en ce qu'**un orifice (26, 46) est disposé sur chacun du bras de montage (2) et de l'élément de support (4), lesdits orifices (26, 46) devenant coaxiaux lorsque ces parties (2, 4) sont attachées l'une à l'autre.

4. Appareil de connexion de porte (A) selon la revendication 3, **caractérisé en ce que** l'élément de fixation (5) est attaché auxdits orifices (26, 46).

5. Appareil de connexion de porte (A) selon la revendication 1, **caractérisé en ce que** la porte du lave-vaisselle est connectée directement à une extrémité (21) du bras de montage (2).

6. Appareil de connexion de porte (A) selon la revendication 1, **caractérisé en ce que** ledit appareil (A) comprend en outre un mécanisme de prévention de chute de porte, attaché à l'autre extrémité (22) du bras de montage (2).

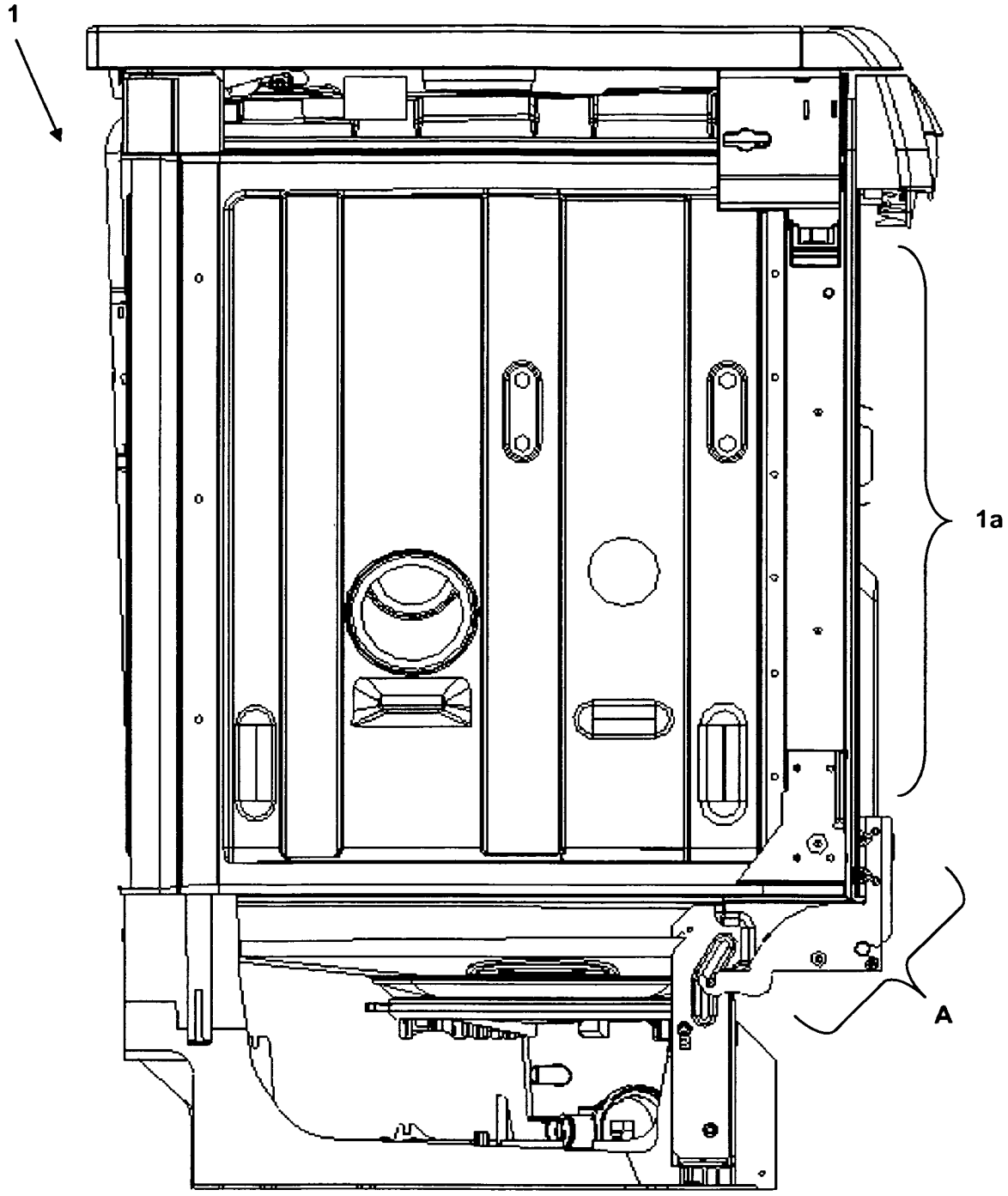


FIGURE – 1

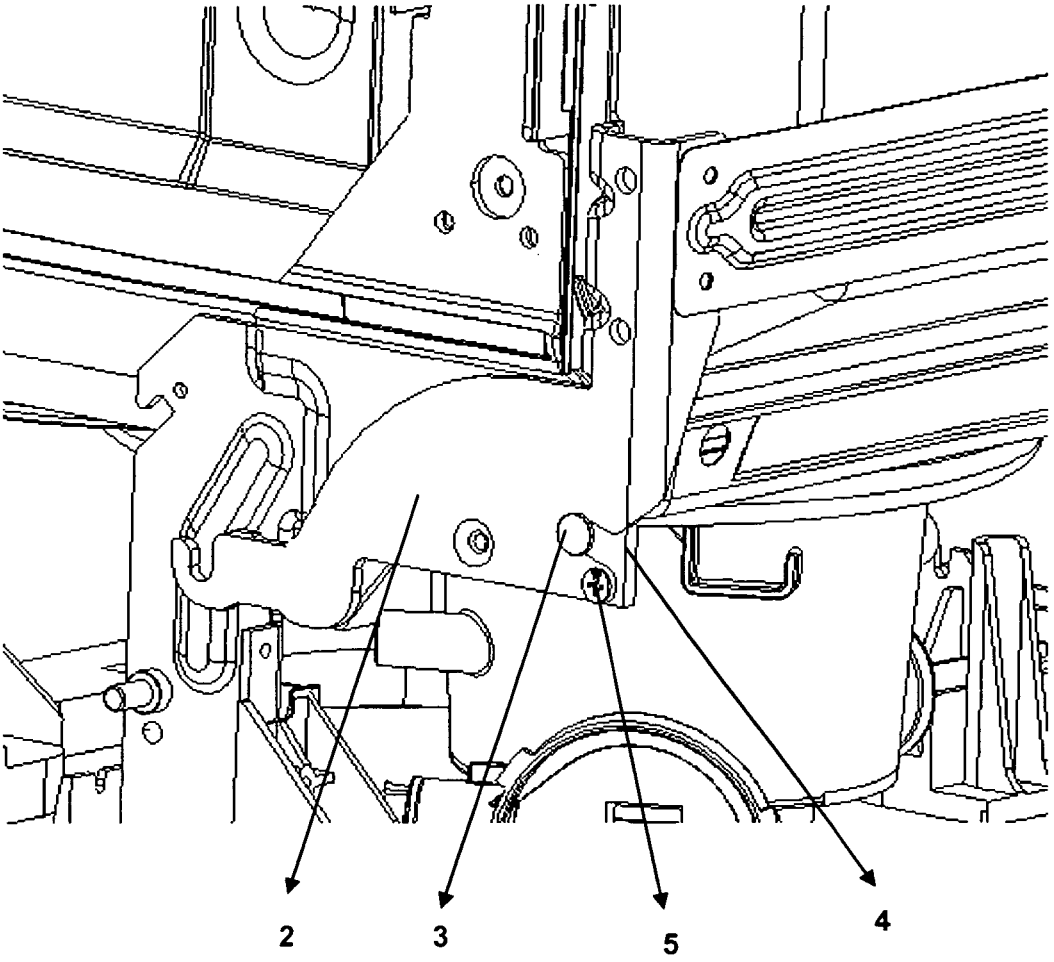


FIGURE – 2

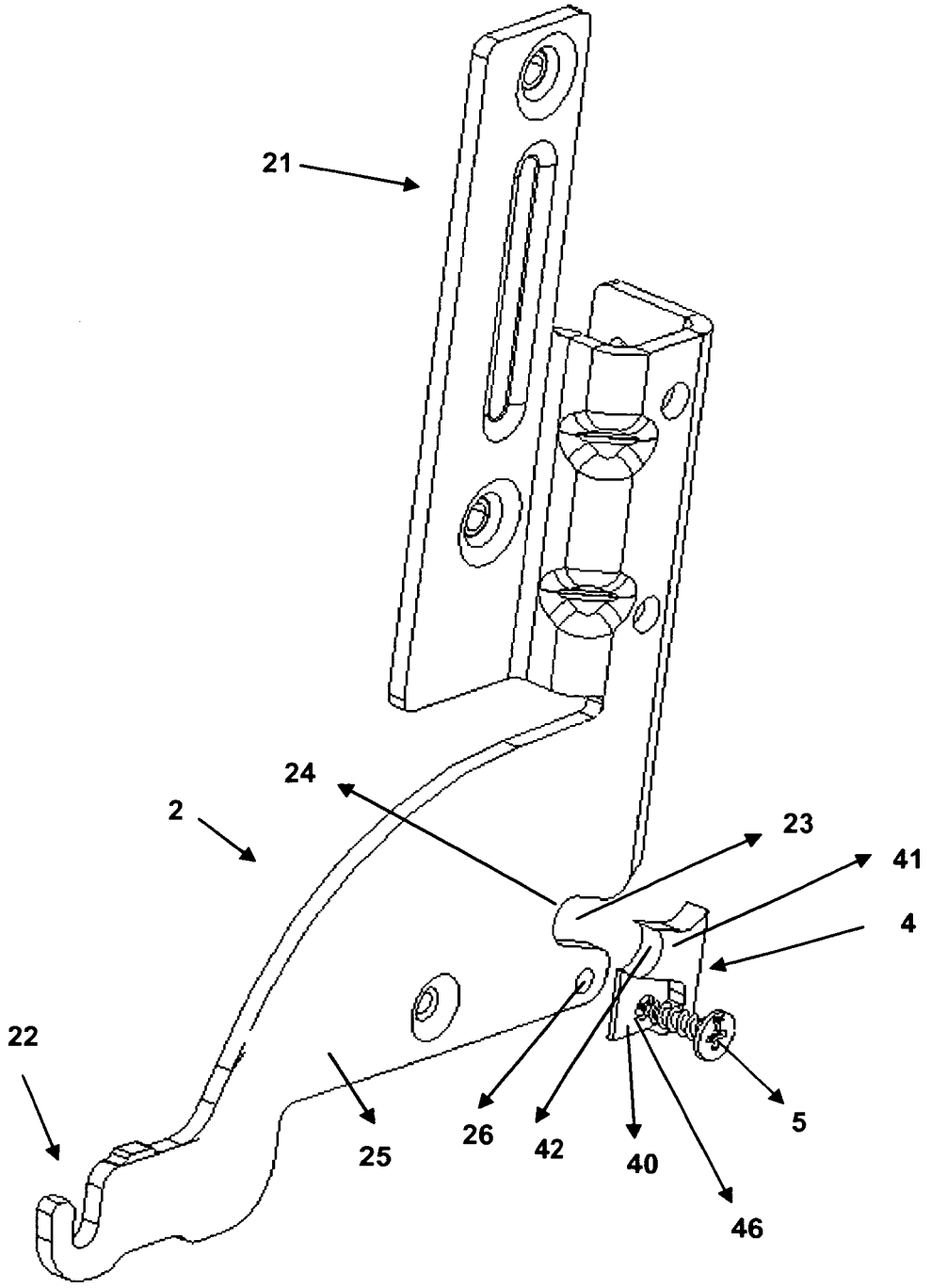


FIGURE – 3

REFERENCES CITED IN THE DESCRIPTION

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