

(19)



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(11)

EP 0 610 717 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
17.09.1997 Bulletin 1997/38

(51) Int Cl.⁶: **D06F 37/20**

(21) Application number: **94101094.4**

(22) Date of filing: **26.01.1994**

(54) **Washing machine with quick assembly motor**

Waschmaschine mit schnell montierbarem Motor

Machine à laver avec montage rapide du moteur

(84) Designated Contracting States:
BE DE ES FR GB IT NL SE

(30) Priority: **08.02.1993 IT TO930069**

(43) Date of publication of application:
17.08.1994 Bulletin 1994/33

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(56) References cited:
DE-A- 4 026 549 **DE-B- 1 585 611**
FR-A- 2 201 366

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Description

This invention refer to a washing machine, specifically a laundry washing machine.

It is conventional practice to fasten a motor to the body of a laundry machine having both motor caps provided with supports on which rubber pads are assembled to absorb the vibrations caused by motor during operation; thereafter, spacers will be inserted into the rubber pads to avoid excessive compression when tightening the bolts to fasten the motor to the machine (generally to the tub).

Subsequently the transmission belt is assembled and as a final step belt tension adjusted by positioning the motor correctly, generally using proper slot in the supports.

From DE-A-4 026 549 a washing machine is known, where the motor is sustained by a transmission belt and comprises a rigid guide, which is inserted is a proper seat integral with an appendix of the rear cross member of the washing tub. In this solution, however, vibration and mechanical stresses between the two elements occur, with consequent noise during the machine operation; furthermore, the cited appendix involves a complication in the manufacturing step and reduces the available space within the machine cabinet.

From FR-A-2 201 366 a washing machine is also known where the motor is pivoted at both sides to two supports, being integral with the tub; a spring must be provided, opposing its elastic force to the belt, with the purpose of guaranteeing the belt tension. This solution presents the disadvantage of employing a highly precompressed spring, that complicates to a high extent the motor assembly and disassembly operations, and it is dangerous by itself.

Furthermore, this solution involves a high amount of vibrations being transmitted to the washing tub.

Purpose of the invention is to provide a washing machine, specifically a laundry washer, allowing an easier and faster motor assembly, thus reducing the number of parts required and of operations to be carried out.

Starting from FR-A-2 201 366 these aims are attained by a washing machine and a method for the motor assembly having the characterizing features of the annexed claims 1 and 9.

The features and advantages of the machine according to the invention are detailed in the following description with reference to the annexed drawings, which are supplied only by way of non limiting example, where:

- Fig. 1 shows a schematic front view (A) and a side view (B) of the motor for a laundry washer according to the invention;
- Fig. 2 shows a schematic front view (A) and a side view (B) of the tub lower section in a laundry washer according to the invention;
- Fig. 3 is a schematic view of the motor assembly method of the laundry washer according to the in-

vention;

- Fig. 4 is a perspective view of the assembled motor of the laundry washer according to the invention.

In Fig. 1 reference no. 1 refers to the laundry washer motor as a whole according to the invention; no. 2 refers to the rear cap of motor 1, whereas no. 3 shows a support integral to cap 2; said support 3 is used to hook and hold the motor 1 from the rear side through a pin (14 - Fig. 2) fastened to the machine tub.

The support 3 has a shaped section to accommodate a cylindrical rubber pad 4 for motor 1 vibrations absorption.

No. 5 refers to the front cap of motor 1; said cap is provided with two side supports 6.

No. 7 refers to rubber pads inside the side supports 6 for motor stabilisation against static, reverse and operating torques.

The rubber pads 7 are dimensioned and their relevant material selected not only to absorb vibrations but also keep the sheave-motor axle-distance within a range to ensure motion transmission by the belt (15 - figs. 3 and 4); said belt is flexible to balance small deviations from the nominal value.

In fig. 2, no. 10 shows the machine tub lower section according to the present invention, e.g. in stainless steel, on which supports 11 and a support 12 for motor 1 are provided; as best seen in the partial section of A in Fig. 2 the supports 11 are shaped and have cylindrical indentations to accommodate the upper part of the rubber pads 7 to hinder motion.

Support 12 has two side brackets 13, between which is located the cylindrical rubber pad 4 through a supporting pin 14 fastened between the two brackets 13.

Fig. 3 illustrates schematically through a step sequence the assembly system on the tub 10 of motor 1; showing in particular the following four steps :

- Cycle F1 : motor alignment - during this step the shaped part of support 3 on cap 2 is aligned with the supporting pin 14 bearing the rubber pad 4;
- Cycle F2 : motor insertion - during this step the support 3 is hooked through its shaped section onto the rubber pad 4 supported by pin 14;
- Cycle F3 : front rubber pads assembly - during this step the rubber pads 7 are assembled in the supports 6 of cap 5; this assembly step is simplified as motor 1 - already supported - can rotate constrained around the pin 14;
- Cycle F4 : transmission belt assembly - during this step where final motor positioning is reached, a flexible belt 15 is assembled between the motor and the drum sheave (not shown) of the laundry washer.

Following the above described assembly, the machine motor according to the present invention will appear as shown in Fig. 4.

It should still be mentioned that rotation around pin 14 is constrained to have motor 1 in an easy position during assembly; in other words, the shape of the support 3 upper surface is suitably selected for the motor to be supported with an inclination allowing e.g. an easy assembly of the rubber pads 7 (Fig. 3 - part F3).

According to a further feature the special shape of the support 3 allowing said constrained rotation, practically forms a sort of stop element hindering the motor 1 from falling down and/or striking the floor should the transmission belt 15 break.

According to the above description the features and advantages of the washing machine with simplified motor assembly disclosed by the present invention appear quite evident.

As it results from said description, the washing machine according to the present invention offers the essential advantage of a particularly fast motor assembly and disassembly, without the use of tools.

Obviously, the inventive principle unaffected, many modifications may be made to the constructive features of the machine described by way of example without departing from the innovative criteria of the invention; the same as it is also obvious that in the practical execution of the invention both the shape and dimensions of the components may vary and be replaced by technically equivalent elements.

As an example, in case of wash tubs in plastic material the supports 11 and support 12 may be shaped or moulded.

Claims

1. Washing machine, specifically a laundry washing machine, comprising a tub and an electric motor (1), said motor (1) being coupled to support means (12) integral with a tub wall (10) and sustained in its front part by a transmission belt (15) extending from the motor (1) to a sheave, whereby rest means (6) are provided between the tub wall (10) and the motor (1) opposing the tension of the belt (15), characterized in that, in order to allow the assembly/disassembly of the motor (1) to the tub without the use of screw, rivets or other equivalent fastening means, or the use of tools:

- said transmission belt (15) is of the flexible type, being able to balance small deviations from its nominal value,
- said motor (1) is hooked only in its rear portion to said support means (12),
- in the contact points between said rest means (6) and the tub wall (10) first rubber pads (7) are provided, for absorbing operating vibrations and keeping the sheave motor axle distance within a range which ensure the motion transmission by the belt.

2. Washing machine, according to claim 1, characterized in that said support means integral with the tub (10) accommodates a second rubber pad (4), onto which said motor (1) is hooked.

3. Washing machine, according to claim 1, characterized in that the rear cap (2) of the motor (1) comprises a hook shaped element (3).

4. Washing machine, according to Claim 1, characterized in that said rest means (6) are integral with the front cap (5) of the motor (1) and define a seat for containing the lower section of said first rubber pads (7).

5. Washing machine, according to Claim 1, characterized in that resting seats (11) are defined by said tub (10), for containing the upper section of said first rubber pads (7).

6. Washing machine, according to at least one of the previous claims, characterized in that said resting seats (11) and/or said support means (12) are obtained by the moulding of a tub (10) realized in plastic material.

7. Washing machine, according to claim 1, characterized in that the hooking system (3,12) between the motor (1) and the support means (12) is shaped for allowing a constrained rotation of said motor (1) around said support means (12).

8. Washing machine, according to at least one of the previous claims, characterized in that said hook element (3) and/or said support means (12) are shaped for supporting the motor even in case of break of the transmission belt (15).

9. Method for the assembly of an electric motor (1) to the tub (10) of a laundry washing machine without the use of screw, rivets or other equivalent fastening means, or the use of tools, whereby the motor (1) has to be coupled with support means (12) being integral with said tub (10) and sustained in its front part by a transmission belt (15), rest means (6) being arranged between the tub (10) and the motor (1) opposing the tension of the belt (15), characterized in that the following steps are provided:

- an hooking element (3) integral with the rear part of the motor (1) is aligned with a support means (12) integral with the tub;
- the hooking element (3) is coupled with the support means (12), in a way that the constrained rotation of the motor (1) is allowed around the support means (12);
- the motor (1), while sustained by the support means (12), is rotated around the support

- means (12) till an inclined position;
- when the motor (1) is in said inclined position, rubber pads (7) are mounted at the ends of the rest means (6);
- the motor (1) is then rotated around said support means (12), till the rubber pads (7) come into contact with the tub wall (10);
- a flexible transmission belt (15) is assembled between the motor (1) and the sheave.

Patentansprüche

1. Waschmaschine, insbesondere eine Wäschewaschmaschine, die eine Wanne und einen elektrischen Motor (1) enthält, wobei der Motor (1) an Tragemittel (1 2) gekoppelt ist, die Bestandteil einer Wannenwand (10) sind und im Frontbereich durch einen Übertragungsriemen (15) gehalten wird, der sich vom Motor (1) zu einer Rolle erstreckt, wobei zwischen der Wannenwand (10) und dem Motor (1) entgegen der Spannung des Riemens (15) Haltemittel (6) vorgesehen sind, dadurch gekennzeichnet, daß, um das Anbringen/Abmontieren des Motors (1) an der Wanne ohne die Benutzung von Schrauben, Nieten oder anderen äquivalenten Befestigungsmitteln oder der Benutzung von Werkzeugen zu ermöglichen:
 - der Übertragungsriemen (15) flexibel und fähig ist, kleine Abweichungen vom Nennwert auszugleichen,
 - der Motor (1) nur im hinteren Bereich mit den Haltemitteln (12) eingehakt ist,
 - in den Kontaktpunkten zwischen den Haltemitteln (6) und der Wannenwand (10) erste Gummipolster (7) vorgesehen sind, um Betriebsvibrationen aufzunehmen und den Rollen-Motorachsenabstand innerhalb eines Bereiches zu halten, welcher die Bewegungsübertragung durch den Riemen sicherstellt.
2. Waschmaschine nach Anspruch 1, dadurch gekennzeichnet, daß die Haltemittel, die Bestandteil der Wanne (10) sind, ein zweites Gummipolster (4) aufnehmen, auf dem der Motor (1) sitzt.
3. Waschmaschine nach Anspruch 1, dadurch gekennzeichnet, daß die hintere Haube (2) des Motors (1) ein hakenförmiges Element (3) enthält.
4. Waschmaschine nach Anspruch 1, dadurch gekennzeichnet, daß die Haltemittel (6) Bestandteil der vorderen Haube (5) des Motors (1) sind und eine Auflagefläche bilden, die den unteren Bereich der ersten Gummipolster (7) aufnimmt.
5. Waschmaschine nach Anspruch 1, dadurch gekennzeichnet, daß durch die Wanne (10) Auflageflächen (11) gebildet werden, die den oberen Bereich der ersten Gummipolster (7) aufnehmen.
6. Waschmaschine nach mindestens einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß die Auflageflächen (11) und/oder die Haltemittel (1 2) durch die Formgebung der aus Plastikmaterial hergestellten Wanne (10) gebildet werden.
7. Waschmaschine nach Anspruch 1, dadurch gekennzeichnet, daß das Haltesystem (3, 1 2) zwischen dem Motor (1) und den Haltemitteln (12) derart geformt ist, um eine gezwungene Drehung des Motors (1) um die Haltemittel (12) zu erlauben.
8. Waschmaschine nach mindestens einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß das Hakenelement (3) und/oder die Haltemittel (12) derart geformt sind, um den Motor zu halten, selbst für den Fall, daß der Übertragungsriemen (15) bricht.
9. Methode zur Anbringung eines elektrischen Motors (1) an die Wanne (10) einer Wäschewaschmaschine ohne die Benutzung von Schrauben, Nieten oder äquivalenten Befestigungsmitteln oder der Benutzung von Werkzeugen, wobei der Motor (1) mit Haltemitteln (12), die Bestandteil der Wanne (10) sind, gekoppelt werden muß und in dem vorderen Bereich durch einen Übertragungsriemen (15) gehalten wird, wobei Haltemittel (6) zwischen der Wanne (10) und dem Motor (1) entgegen der Spannung des Riemens (15) angeordnet sind, dadurch gekennzeichnet, daß die folgenden Schritte vorgesehen sind:
 - ein Hakenelement (3), welches Bestandteil des hinteren Teils des Motors (1) ist, wird zu den Haltemitteln (12), die Bestandteil der Wanne sind, ausgerichtet;
 - das Hakenelement (3) wird mit den Haltemitteln (12) in der Weise gekoppelt, daß eine gezwungene Drehung des Motors (1) um die Haltemittel (12) möglich ist;
 - der Motor (1) wird, während er durch die Haltemittel (12) gehalten wird, um die Haltemittel (12) bis zu einer geeigneten Position geschwenkt;
 - wenn sich der Motor (1) in der geeigneten Position befindet, werden Gummipolster (7) an die Enden der Haltemittel (6) montiert;
 - der Motor (1) wird dann um die Haltemittel (12) geschwenkt, bis die Gummipolster (7) mit der

- Wannenwand (10) in Kontakt kommen;
- ein flexibler Übertragungsriemen (15) wird zwischen dem Motor und der Rolle angebracht.

Revendications

1. Machine à laver, spécifiquement machine à laver le linge, comprenant une cuve et un moteur électrique (1), ledit moteur (1) étant accouplé à des moyens de support (12) intégrés à une paroi de cuve (10) et soutenu dans sa partie frontale par une courroie de transmission (15) qui s'étend depuis le moteur (1) jusqu'à une poulie, dans laquelle des moyens de repos (76) sont prévus entre la paroi de cuve (10) et le moteur (1) et s'opposent à la tension de la courroie (15), caractérisée en ce que, pour permettre l'assemblage/le démontage du moteur (1) sur la cuve sans utiliser de vis, de rivets, ou d'autres moyens de fixation équivalents, ou sans utiliser d'outils :

- ladite courroie de transmission (15) est du type flexible, étant capable de compenser de petites déviations depuis sa valeur nominale,
- ledit moteur (1) est accroché uniquement dans sa partie arrière sur lesdits moyens de support (12), et
- dans les points de contact entre lesdits moyens de repos (6) et la paroi de cuve (10) sont prévus des premiers coussinets en caoutchouc (7), pour absorber les vibrations de fonctionnement et maintenir la distance entre la poulie et l'axe moteur dans une plage qui assure la transmission de mouvement par la courroie.

2. Machine à laver, selon la revendication 1, caractérisée en ce que lesdits moyens de support intégrés à la cuve (10) logent un second coussinet en caoutchouc (4) sur lequel est accroché ledit moteur (1).

3. Machine à laver selon la revendication 1, caractérisée en ce que la coiffe postérieure (2) du moteur (1) comprend un élément en forme de crochet (3).

4. Machine à laver selon la revendication 1, caractérisée en ce que lesdits moyens de repos (6) sont intégrés avec la coiffe avant (5) du moteur (1) et définissent un siège pour contenir le tronçon inférieur desdits premiers coussinets en caoutchouc (7).

5. Machine à laver selon la revendication 1, caractérisée en ce que des sièges de repos (11) sont définis par ladite cuve (10), pour contenir le tronçon supérieur desdits premiers coussinets en caoutchouc (7).

6. Machine à laver selon l'une au moins revendications précédentes, caractérisée en ce que lesdits sièges de repos (11) et/ou lesdits moyens de support (12) sont obtenus par moulage d'une cuve (10) réalisée en matière plastique.

7. Machine à laver selon la revendication 1, caractérisée en ce que le système d'accrochage (3, 12) entre le moteur (1) et les moyens de support (12) est formé pour permettre une rotation limitée dudit moteur (1) autour desdits moyens de support (12).

8. Machine à laver selon l'une au moins des revendications précédentes, caractérisée en ce que ledit élément d'accrochage (3) et/ou lesdits moyens de support (12) sont conformés pour supporter le moteur même en cas de rupture de la courroie de transmission (15).

9. Procédé pour l'assemblage de moteur électrique (1) sur la cuve (10) d'une machine à laver le linge sans utiliser de vis, de rivets, ou d'autres moyens de fixation équivalents, ou sans utiliser d'outils, grâce à quoi le moteur (1) doit être accouplé avec des moyens de support (12) qui sont intégrés à ladite cuve (10), et il est soutenu dans sa partie avant par une courroie de transmission (15), des moyens de repos (6) étant agencés entre la cuve (10) et le moteur (1) en s'opposant à la tension de la courroie (15), caractérisé en ce que les étapes suivantes sont prévues :

- un élément d'accrochage (3) intégré à la partie arrière du moteur (1) est aligné avec des moyens de support (12) intégrés à la cuve ;
- l'élément d'accrochage (3) est accouplé aux moyens de support (12) de telle manière que la rotation limitée du moteur (1) est permise autour des moyens de support (12) ;
- le moteur (1), tout en étant soutenu par les moyens de support (12), est mis en rotation autour des moyens de support (12) jusqu'à une position inclinée ;
- lorsque ledit moteur (1) est dans ladite position inclinée, des coussinets en caoutchouc (7) sont montés aux extrémités des moyens de repos (6) ;
- le moteur (1) est alors tourné autour desdits moyens de support (12), jusqu'à ce que les coussinets en caoutchouc (7) viennent en contact avec la paroi de cuve (10) ; et
- une courroie de transmission flexible (15) est assemblée entre le moteur (1) et la poulie.

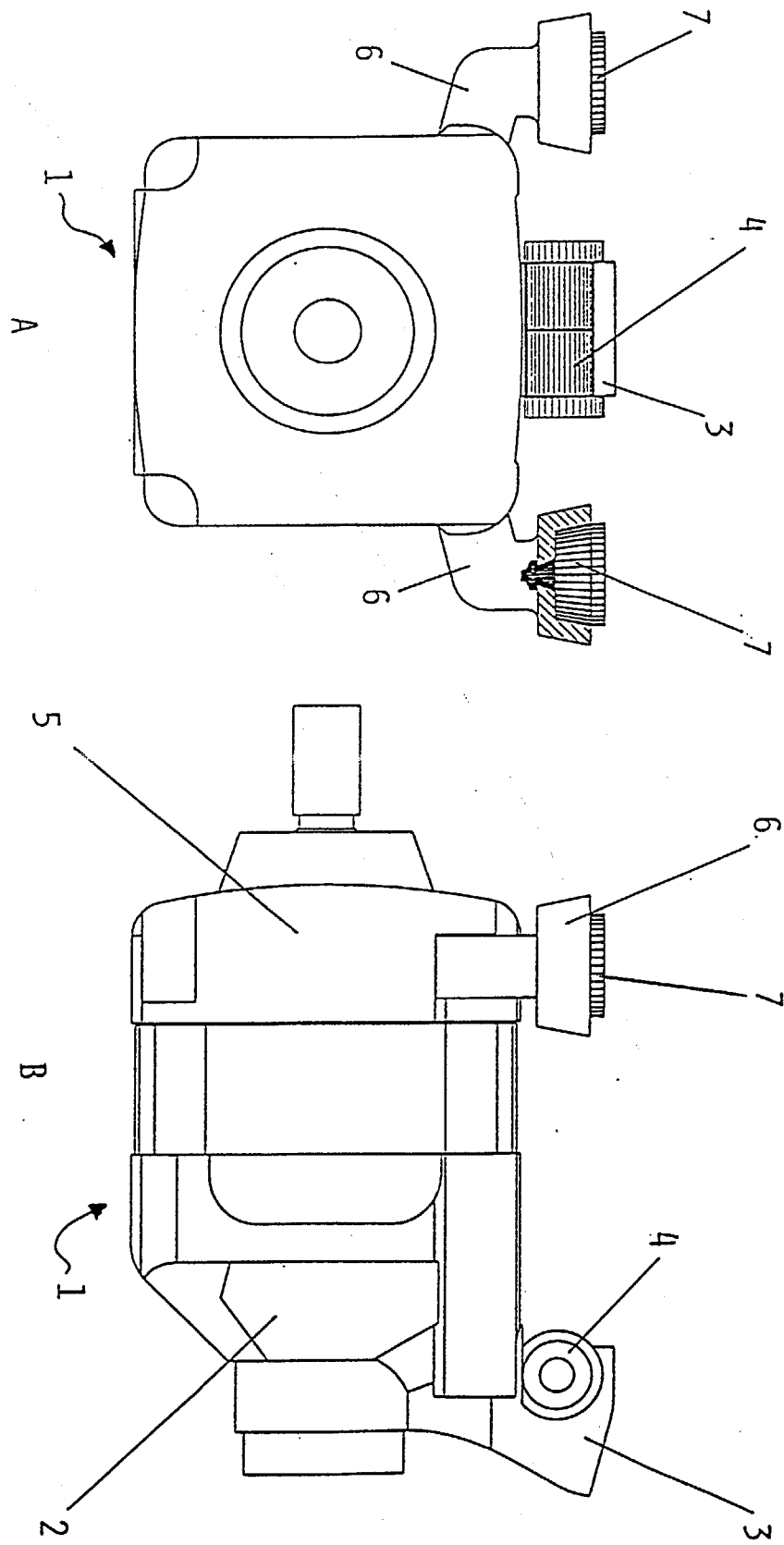


FIG. 1

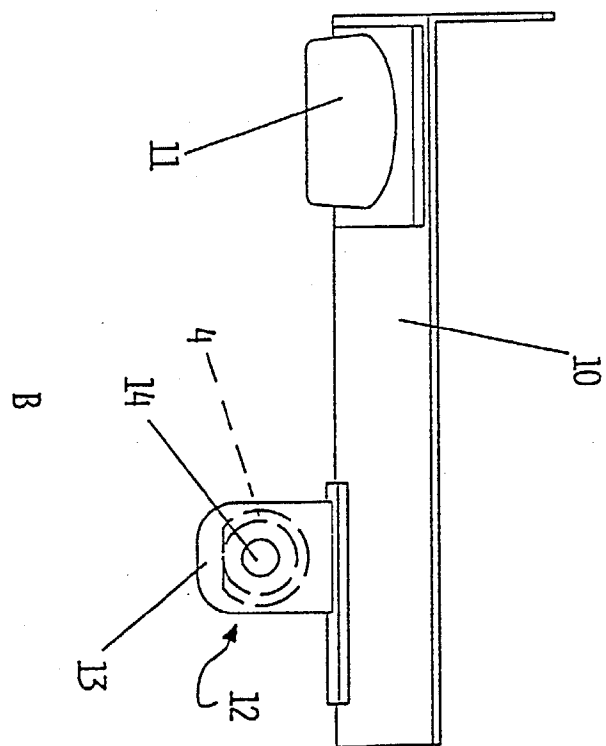
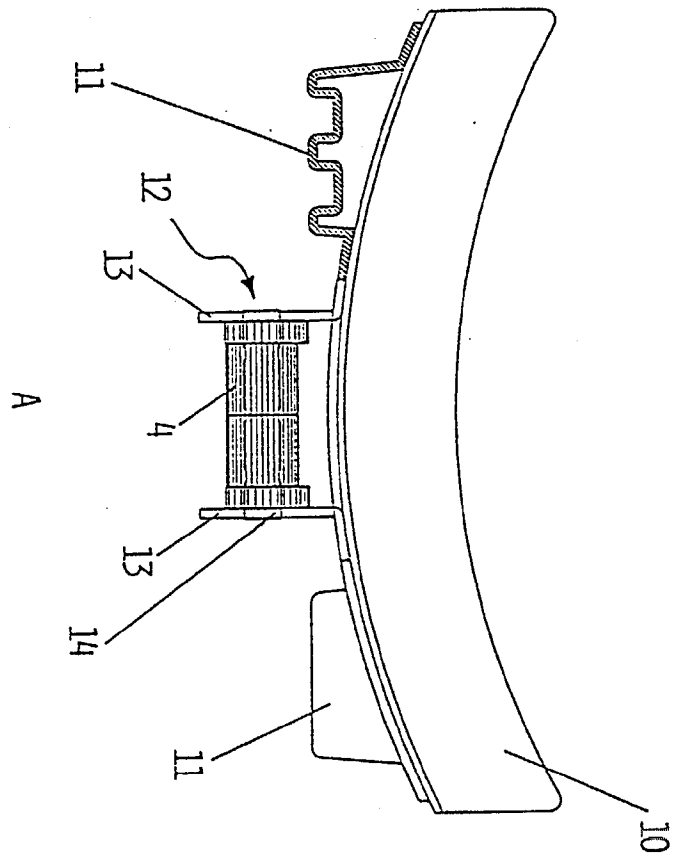


FIG. 2

FIG. 3

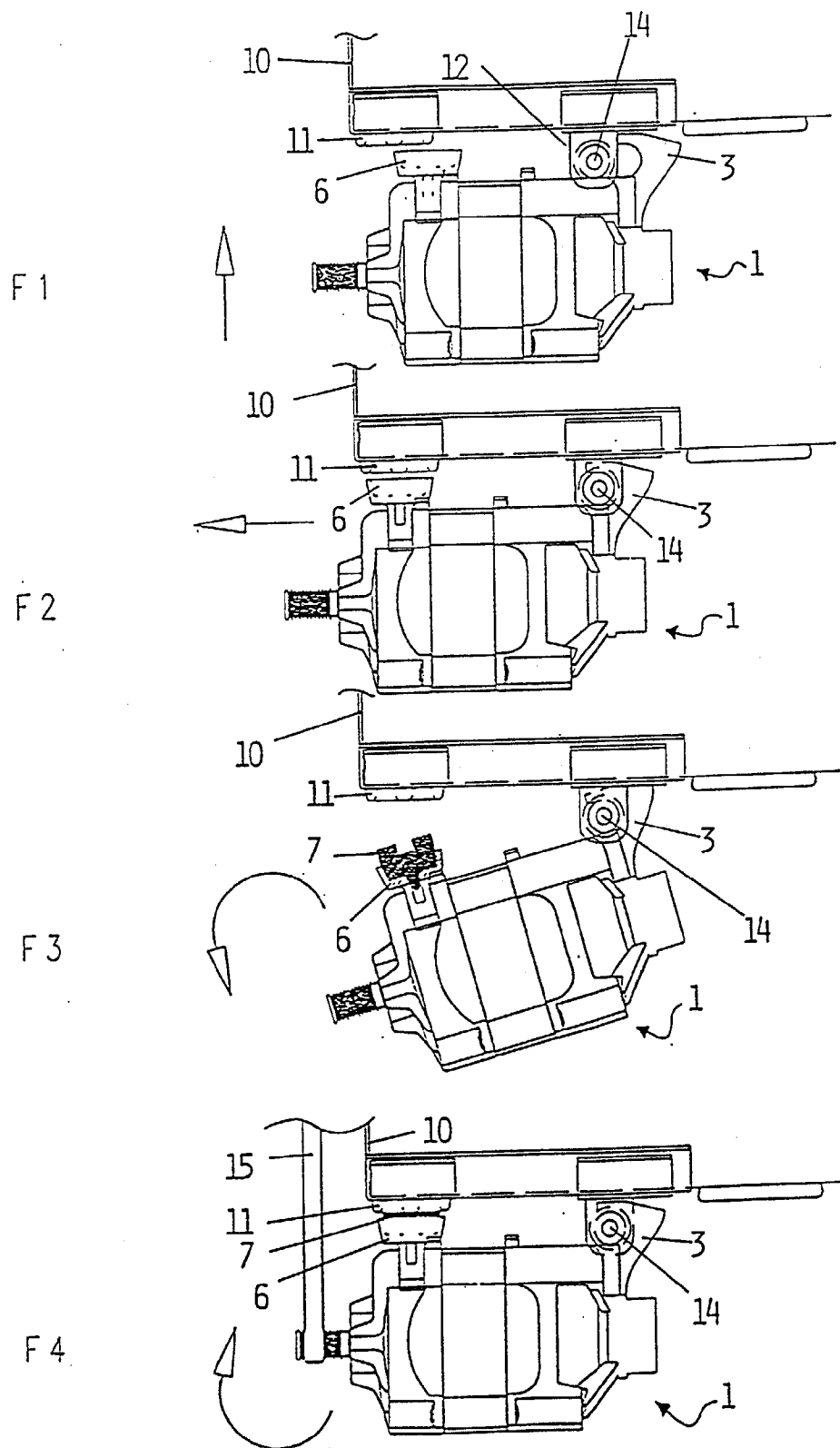


FIG. 4

