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(54) Front loading laundry washing and/or drying machine, with improved door opening means.

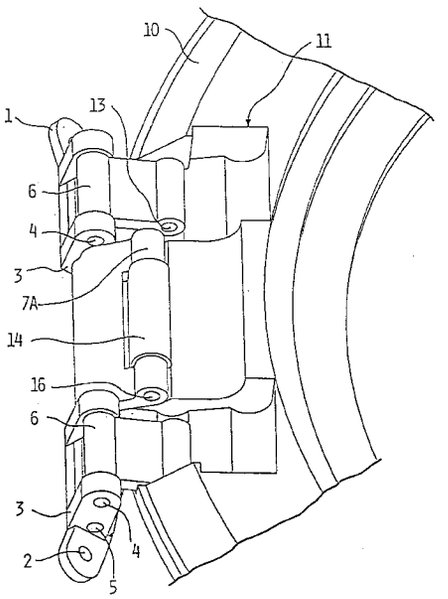
(57) A machine is described for the washing and/or drying of laundry comprising :

— a front loading door (10) that, in particular, in the closed position results in being significantly flush with the frontal wall of the cabinet of the machine,

— a hinge, for the hinging of said door (10) to said cabinet of the machine.

The main characteristic of the machine for the washing and/or drying of laundry as described is that said hinge is an articulated hinge (1-7, 11-16) having a rotary and translational movement.

FIG. 4



EP 0 616 069 A1

The present invention relates to a machine for the washing and/or drying of laundry comprising:

- a front loading door (10) that, in particular, in the closed position results in being significantly flush with the frontal wall of the cabinet of the machine,
- a hinge, for the hinging of said door (10) to said cabinet of the machine.

As is known, front loading washing machines are supplied with a door, generally of a circular shape, through which the user can have access to the inside of the basket of the machine, for the normal laundry loading and unloading operations. Such door, or port, is generally hinged to the cabinet of the machine by means of a hinge comprising a fixed part, internally secured to the body of the machine, and a mobile part, integral to the door; the fixed and mobile parts have mutual hinging means according to a substantially vertical axis.

The mobile part of the hinge has an arched portion, having a curvature axis substantially coinciding with the vertical axis mentioned above: such arched portion extends, and is mobile, through a substantially vertical slot, being part of the fixed part of the hinge, and through a corresponding slot obtained on the cabinet of the machine.

As an example of the cited known art the Italian Patent for a Utility Model Nr. 175.254 is noted.

Such cited solution presents several problems, above all in laundry washing machines with flush doors, or in front loading machines in which the greater part of the door results in being embedded and is thus substantially aligned with the frontal wall of the cabinet of the machine.

A first problem is due to the fact that, according to the cited known art, the hinge is internally fixed to the cabinet, which is not simple or fast, and determines a certain bulk within the cabinet itself.

Another problem is that the cabinet itself has to have a slot within which the mobile part of the hinge moves: such slot, apart from having a terrible aesthetic appearance with the door open, permits the passage of humidity or of eventual foreign bodies to the interior of the cabinet.

Furthermore, as is known, laundry washing machine doors have a shaped glass front, that extends in a manner being considerably pronounced towards the interior of the cabinet: another problem is that the hinges of the described type do not allow for obtaining in machines with flush doors a level of opening that consents the complete release of the loading door: in such machines the bulk determined by the glass of the door can be a hindrance during the operations of loading/unloading laundry.

Still another problem with the machines according to the known art is that, when the door is opened, there is the risk that it may strike the cabinet of the machine, with the risk of damage.

The aim of the present invention is that of solving the aforementioned problems and in particular to indicate a machine for the washing and/or drying of laundry equipped with front loading door, substantially flush with the frontal part of the cabinet, which is hinged to the machine cabinet by means of a hinge being simple, functional, reliable, low-cost and of a good aesthetic appearance.

For attaining such aim, it is the subject of the present invention a machine for the washing and/or drying of laundry comprising:

- a front loading door that, in particular, in the closed position results in being significantly flush with the frontal wall of the cabinet of the machine,
- a hinge, for the hinging of said door to said cabinet of the machine, characterised in that said hinge is an articulated hinge having a rotary and translational movement.

Further characteristics and advantages of the present invention shall result in being clear from the following description and annexed drawings, supplied purely as an explanatory and non limiting example, wherein:

- figure 1 represents a schematic view of a part of a hinge of the machine for laundry washing and/or drying according to the invention;
- figure 2 represents an enlarged schematic view of the hinge partially illustrated in figure 1;
- figure 3 represents in different views two elements making up part of the hinge of figures 1 and 2
- figure 4 represents the hinge of figures 1 and 2 assembled;
- figure 5 illustrates, in a partial sectioned and schematic view, the functioning of the hinge of the machine according to the invention, in the condition of the door being open and closed;
- figures 6 and 7 illustrate, in partial and sectioned views, the functioning of the hinge of the machine according to the invention, respectively in the condition of the door being closed and in the door open condition;
- figures 8 and 9 illustrate, in partial and sectioned views, the functioning of the hinge of the machine according to a possible variant of the invention, respectively in the condition of the door being closed and in the door open condition.

In the figures, with reference number 1 an element of the fixed hinge is indicated, which becomes secured in use to the exterior of the cabinet of a washing machine, for instance by way of a series of through screws inserted in holes 2; the hinge element 1 has a pair of forked supports 3 within which hinging pins 4 and 5 are inserted; such pins 4 and 5 are used for the hinging of three couplers or leverage arms.

In particular, two pins 4 are used for pivoting in the two supports 3 the non oscillating extremities of the two external arms 6, also visible in figure 3, both being identical; pin 5 on the other hand is utilised for pivoting the non oscillating extremity of an internal arm 7, curved, which is arranged between the two supports 3, the oscillating extremity, being fork shaped, of such arm 7, such as that of the arms 6, is hinged to the door or circular port of the washing machine.

In figure 2, in 10 a frame is visible, making up part of the door (for example being circular) of the machine according to the invention; in such frame 10 a shaped seating is obtained, indicated as a whole with 11, for the fixing of the oscillating extremity of the two arms 6 and of the arm 7.

To the sides of such seat 11 two holes are obtained, one of which being visible with 12; both of such holes 12 are apt at housing the extremity of a pin 13 protruding from the oscillating extremity of the arms 6.

The seat 11 centrally has a hooking portion 14, equipped with a through hole 15, the overall size of which being such to be inserted between the two arms (7A) of the fork that constitutes the oscillating extremity of the arm 7; the hooking portion 14 is pivoted to the forked oscillating extremity of the arm 7 by way of a pin 16.

The frame 10, and therefore the door of the washing machine according to the invention are assembled as is seen in figure 4, in which the door is seen in the opened position; from such figure it is also possible to understand how the shaping of the seat 11 has been chosen of more or less a complementary form of the element 1 and of the arms 6 and 7, in such a way that, upon closing the door, the two forms join together, thus determining a greatly reduced encumbrance of the hinge.

As is understood, therefore, the washing machine according to the present invention has a hinge constituted by a articulated quadrilateral comprising a fixed portion (hinge element) and a mobile portion (shaped seat 11 of the frame 10), the first being fixed to the cabinet of the machine and the second being part of the door, the two portions being connected and articulated by means of three couplers or arms 6 and 7.

The distance that takes place between pins 4 and 13 is lower than the distance that takes place between pins 5 and 16, as the arms are of different lengths, for which, in particular, the articulated quadrilateral is irregular; by way of such articulated quadrilateral it is therefore possible to obtain a movement, of the type in itself known, rotary and translational of the door, during the opening and closing phases of which. The positions assumed by the hinge at the beginning and end of such rotary-translational movement are visible in figure 5 and, still cleared by comparing the figures 6 and 7.

In such figures 5-7, 20 indicates the frontal wall of the cabinet of the machine according to the invention, 21 indicates a recess apt at containing the bulk of the hinge 10 and the hinging element 1, 22 indicates the glass of the door and 23 indicates a bellows type seal, normally present between the loading aperture of the washing machine and the central opening of its basket; with the letter A the loading aperture of the machine is indicated.

By way of comparing figures 6 and 7 it is possible to detect the changing of position of the arms 6 and 7, and of the pins 13 in relation to the pin 16, in the passage from the door closed to the door open.

Furthermore, as is seen, the hinging element 1 can be fixed from the outside to the frontal wall of the cabinet, inside the recess 21 and as the door is however substantially flush with the frontal wall 20 of the cabinet of the machine.

From figure 7 it is also possible to see how, with the door open, the glass 22 of the port, even if protruding to the rear in a pronounced manner, is of no encumbrance whatsoever to the loading aperture A of the washing machine, which is not so with washing machines having flush doors of the type known, in which the glass may constitute an impediment of the carrying out of the loading/unloading operations of laundry of the washing machine.

It is finally to be noted that within the seat 11 a recess 24 is obtained on which, with the door open, comes into contact the arm 7; this therefore allows for having a stop upon the angular opening of the hinge, thus avoiding that the door, upon terminating its passage, strikes the frontal wall of the cabinet of the washing machine.

It is clear that the fixed rotational axis of traditional hinges becomes substituted in the machine according to the invention by a virtual axis, to the exterior of the cabinet element of the hinge, which allows the door, even if flush with the frontal part of the machine's body, to open with out causing any interference to the latter.

From the above description, it finally results in being clear that the positioning of the various pins, their mutual distance and the length of the arms, contribute to a variation of, according to ones desires, the form of the translational curve that is determined during the angular opening movement of the hinge.

From the given description the characteristics of the laundry washing and/or drying machine subject of the present invention result in being clear, as do its advantages.

Apart from guaranteeing a flush positioning of the port or door when closed, i.e. substantially in line with the frontal cabinet wall, such advantages are particularly represented by the possibility of:

- obtaining a rotation of the door, and therefore an opening, being greater than that obtained with the present flush hinges used and more-

over obtaining a rotation of such to completely free the entrance for the introduction or removal of laundry;
- obtaining the simple and rapid external assembling of the hinge respect the cabinet, without the necessity of any slot;
- utilising the same hinge for numerous aesthetic variants, in particular for allowing reversibility of the door, in the sense that the hinge may be used be it with machines having a door that opens from right to left and also with doors that open from left to right (considering that slots within the cabinet are not necessary);
- having a stop in the opening of the hinge itself, thus avoiding eventual contacts of the door with the cabinet, with consequent possible scratching of the latter.

A further substantial advantage to be considered is that the contained dimensions of the fixed hinge element 1 and the corresponding shaping of the seat 11, that constitutes the mobile element of the hinge, allow for reducing to a minimum the overall dimensions of the hinge, which thus results in being simply housed within the recess present around the loading aperture of the washing machine.

It is clear that numerous variants to the laundry washing and/or drying machine subject of the present invention can be bought about by the skilled man, without for this departing from the novelty principles inherent in the inventive idea, as is clear that in the practical realisation of the invention the materials and details illustrated may be different, and they may also be substituted with technically equivalent elements.

For instance, remaining with the idea of employing an articulated quadrilateral hinge, the form and number of the arms could be different from that illustrated, and the function of the opening passage termination of the door movement could be obtained through the arms themselves; such a case is schematically indicated in figures 8 and 9, in which, for indicating the elements being substantially equivalent to those already represented in the previous figures, the same reference numbers are used, with the addition of the character "'".

The hinge represented in such figures is in fact supplied with only two arms, visible with 30 and 31; the non oscillating extremities of such arms 30 and 31 have their fulcrum at the fixed element of the hinge 1' by way of pins 33 and 34, whilst the oscillating extremities of the same are pivoted to the mobile element of the hinge (the seat 11' obtained within the frame 10') by way of pins 35 and 36.

By comparing figure 8 (door closed) with figure 9 (door open) it is possible to notice the positions reached by the hinge at the beginning and at the end of its rotary-translational movement; in particular from figure 9 it is possible to notice how, according to the proposed variant, the stop of the angular opening of the hinge is directly obtained by way of two arms 30 and 31.

Claims

1. Laundry washing and/or drying machine comprising:
   - a front loading door (10) that, in particular, in the closed position results in being significantly flush with the frontal wall (20) of the cabinet of the machine,
   - a hinge, for the hinging of said door (10) to said cabinet (20) of the machine, characterised in that said hinge is an articulated hinge (1-7, 11-16) having a rotary and translational movement.

2. Laundry washing and/or drying machine, according to claim 1, characterised in that said hinge (1-7, 11-16) comprises at least a pair of first pins (4,5), integral to a fixed hinge element (1), at least a pair of second pins (13,16), integral to a mobile hinge element (11), and two or more arms (6,7) connecting in an articulated quadrilateral manner the two pairs of first (4,5) and second (13,16) pins.

3. Laundry washing and/or drying machine, according to the previous claim, characterised in that said fixed hinge element (1) has a pair of supports (3) within which the pins (4,5) are inserted for the hinging of the non oscillating extremities of said arms (6,7).

4. Laundry washing and/or drying machine, according to the previous claim, characterised in that said arms are three and in particular comprise:
   - a pair of external identical arms (6), each of which hinged at its non oscillating extremity in said supports (3), and
   - an internal arm (7), hinged at its non oscillating extremity between said supports (3), and therefore between said external arms (6).

5. Laundry washing and/or drying machine, according to claim 2, characterised in that said fixed hinge element (1) is fixed to the exterior of the cabinet of the machine, in particular in a recess (21) present in the frontal part of the cabinet (20).

6. Laundry washing and/or drying machine, according to claim 2, characterised in that said mobile hinge element makes up part of the door and that, in particular, the oscillating extremity of said arms (6,7) are hinged to the door by way of a seat (11) obtained within.

7. Laundry washing and/or drying machine, according to the previous claim, characterised in that said seat (11) has lateral holes (12), apt at housing the extremities of the first pins (13) protruding from the oscillating extremities of said external arms (6).

8. Laundry washing and/or drying machine, according to the previous claim, characterised in that said seat (11) has a central hooking portion (14), equipped with a through hole (15), that, in particular, is apt at being linked with a fork (7A) constituting the oscillating extremity of said internal arm (7), said hooking portion (14) being pivoted at the oscillating extremity of said internal arm (7) by way of a second pin (16).

9. Laundry washing and/or drying machine, according to at least one of the previous claims, characterised in that the external arms (6) are of a different length compared to the internal arm (7) and that, in particular, the distance between the hinging point (13) of the oscillating extremity and the hinging point (4) of the non oscillating point of said external arms (6) is less than the distance between the hinging point (16) of the oscillating extremity and the hinging point of the non oscillating (5) of said internal hinge (7), said quadrilateral articulation as a consequence being irregular.

10. Laundry washing and/or drying machine, according to at least one of the previous claims, characterised in that, with the door being completely open, the glass (22) of said door is of no encumbrance for the loading aperture (A, fig. 7) of the washing machine.

11. Laundry washing and/or drying machine, according to at least one of the previous claims, characterised in that said hinge has stop means (24;30,31) apt at avoiding that, upon the termination of the door opening, said door comes into contact with the frontal part (20;20') of said cabinet, said stop means being in particular realised through said arms (30,31)

12. Laundry washing and/or drying machine, according to at least one of the previous claims, characterised in that said hinge (1-7,11-16) is indifferently used be it with machines having a door opening from right to left or with machines having a door opening from left to right.

13. Laundry washing and/or drying machine, according to at least one of the previous claims, characterised in that said seat (11) is obtained within the frame (10) of said door, that is particularly of a circular form, and that its form is apt at receiving, with the door closed, said fixed hinge element (1) and said arms (6,7), in such a way that the encumbrance of said hinge (1-7, 11-16) is reduced to a minimum.

14. Laundry washing and/or drying machine, according to claim 12, characterised in that said hinge (1-7, 11-16) and/or its fixing means (1,2) to said cabinet are arranged in such a way so as not to require slots on the frontal part (20) of the cabinet.

15. Hinge for the frontal loading door of a laundry washing and/or drying machine, according to one or more of the previous claims.

FIG. 1

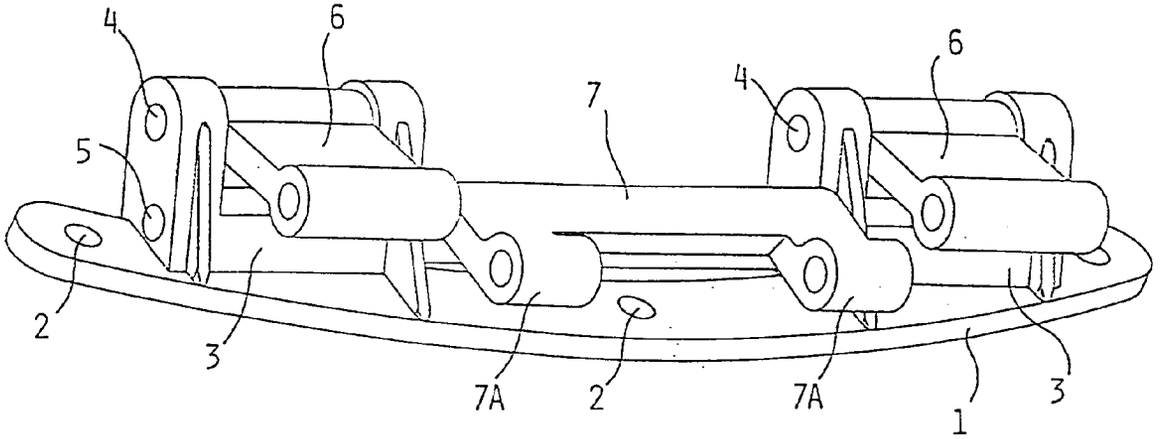


FIG. 2

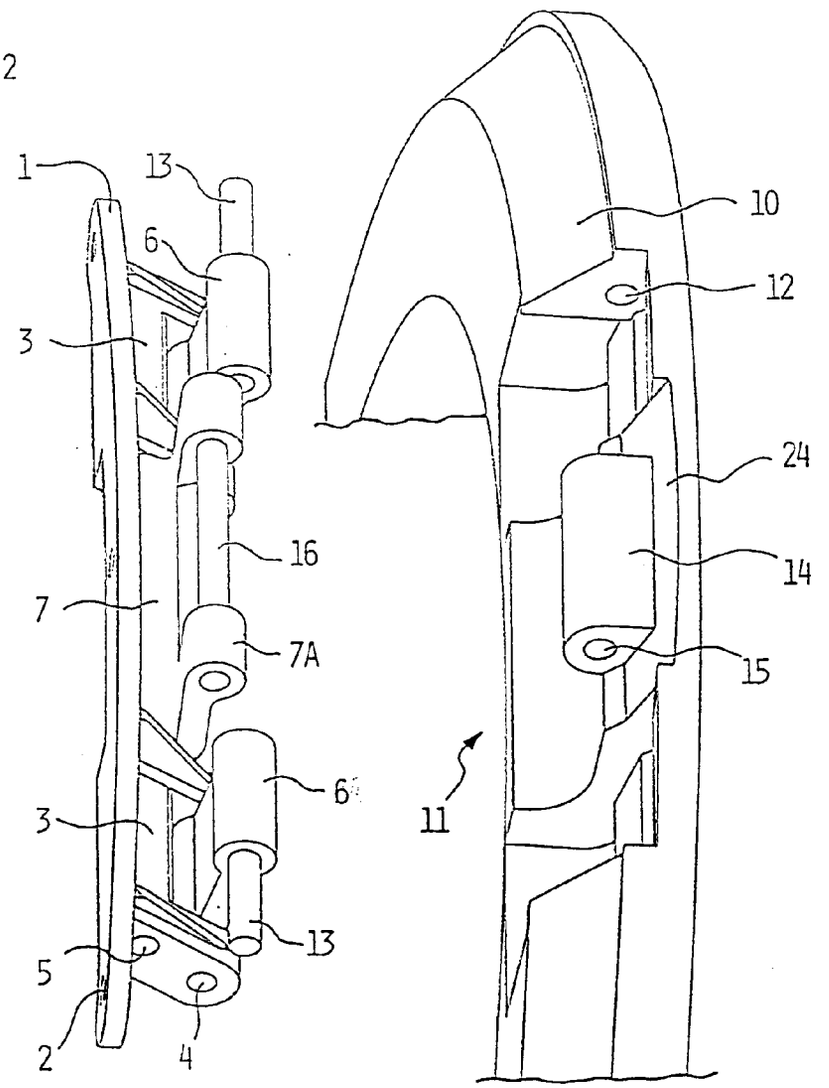


FIG. 3

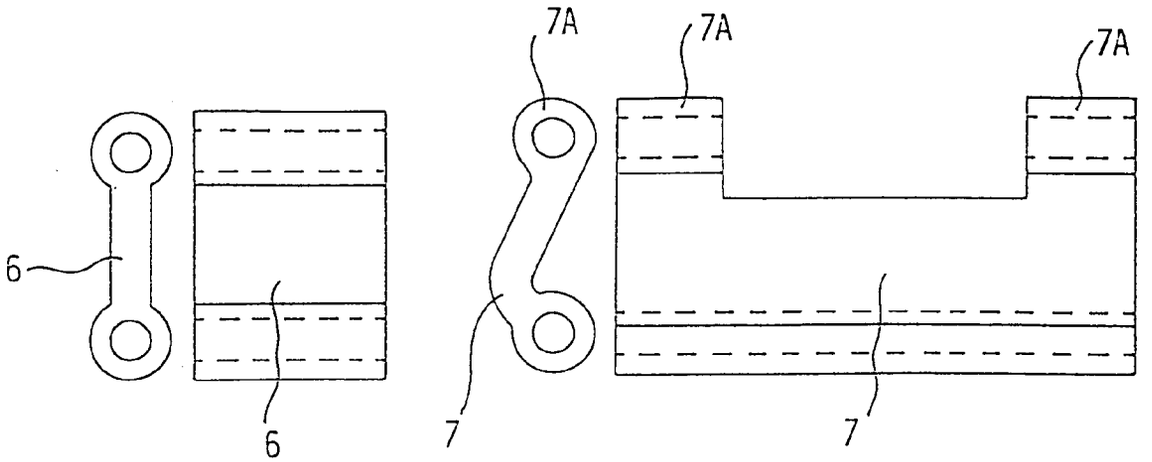


FIG. 4

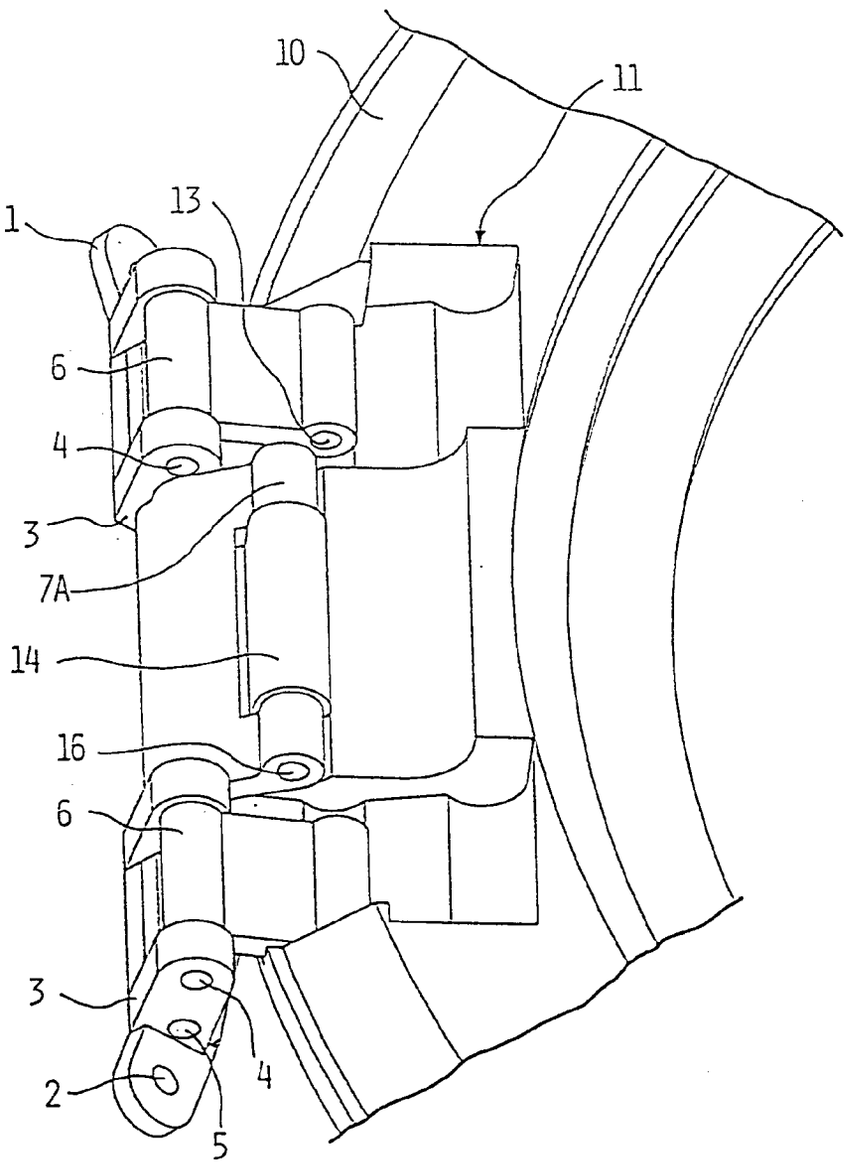
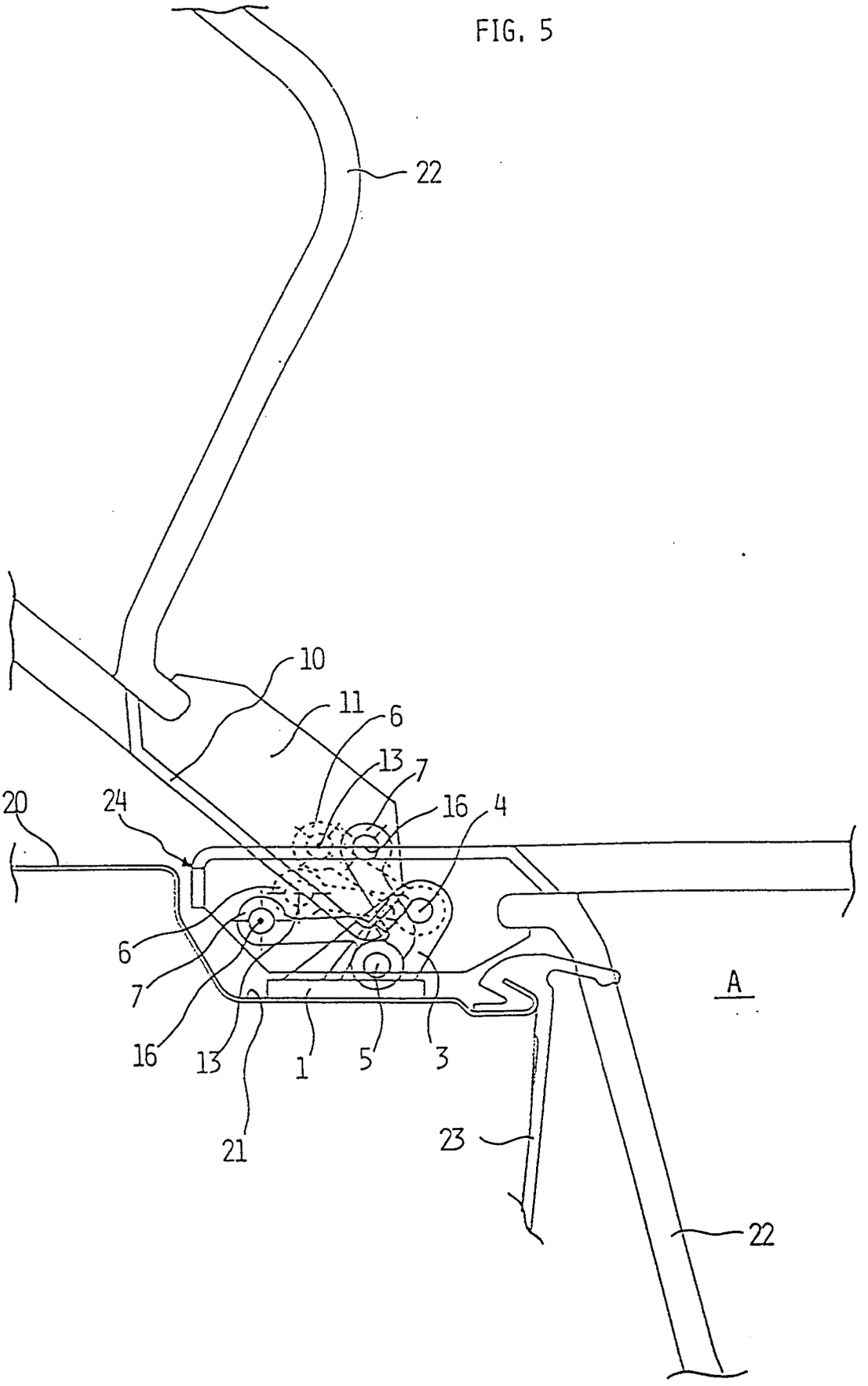


FIG. 5



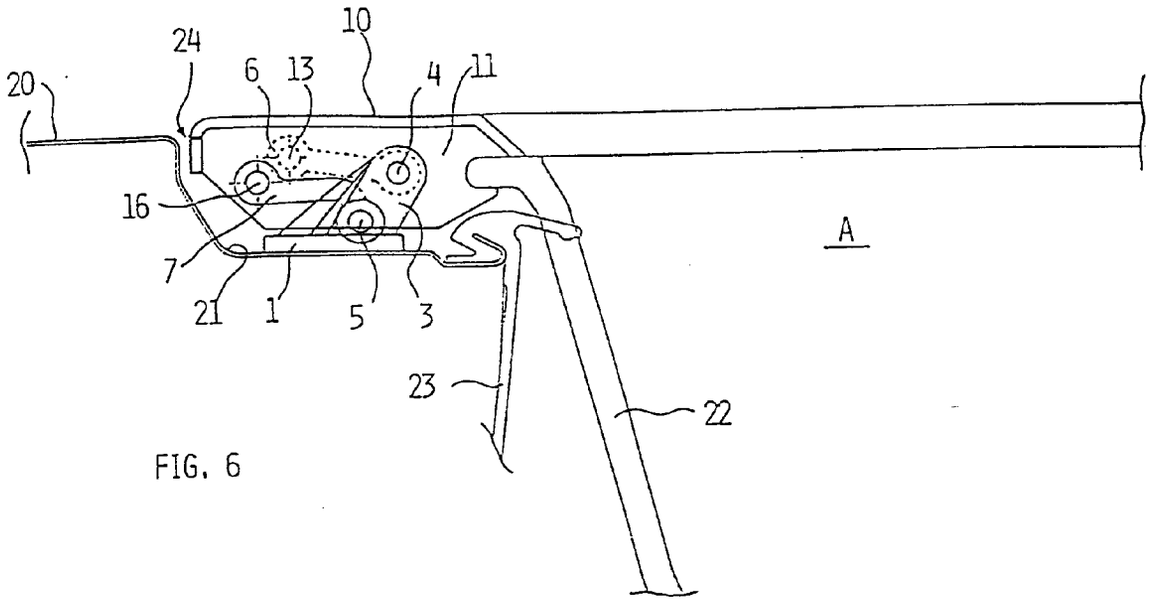


FIG. 6

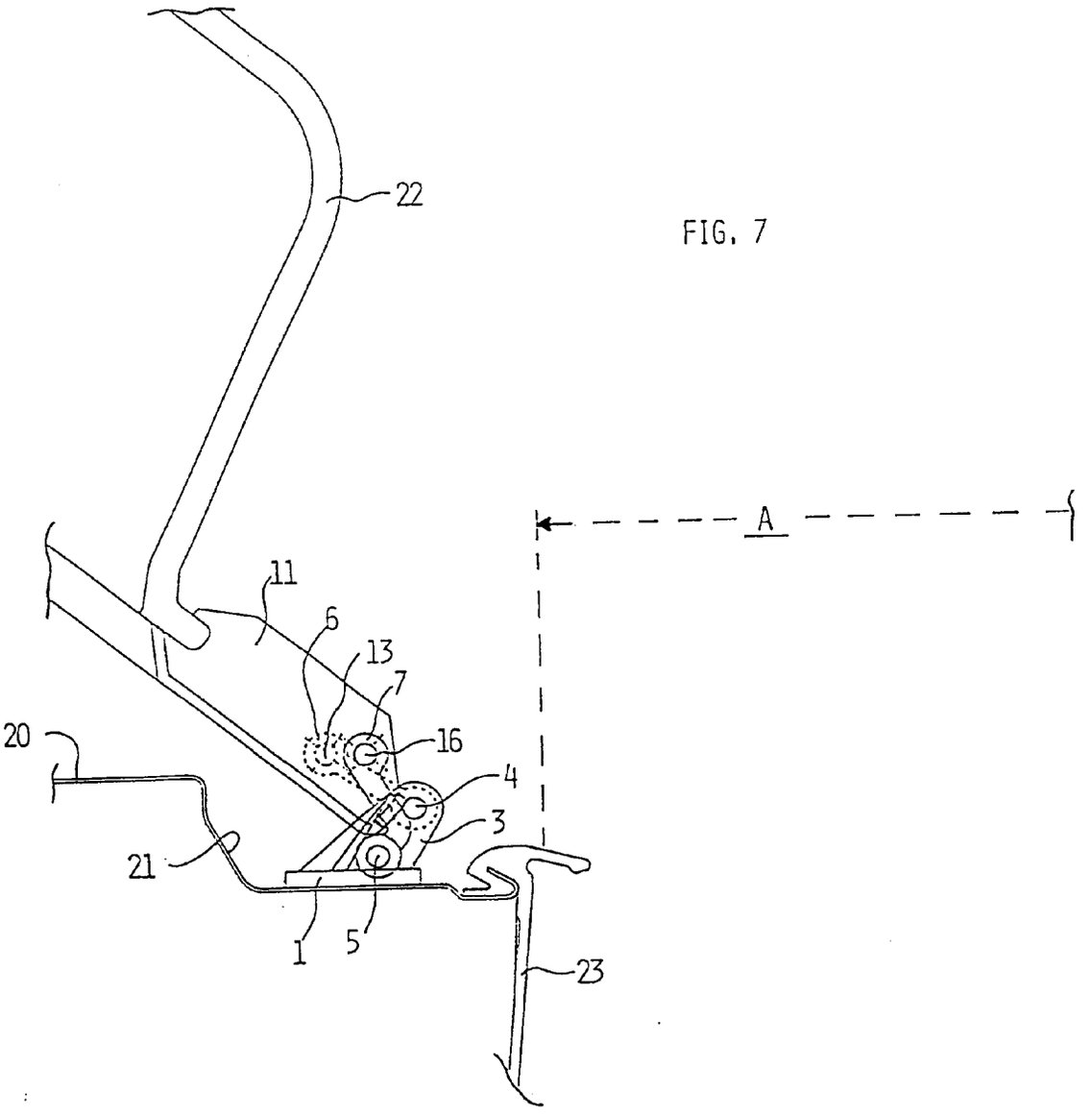


FIG. 7

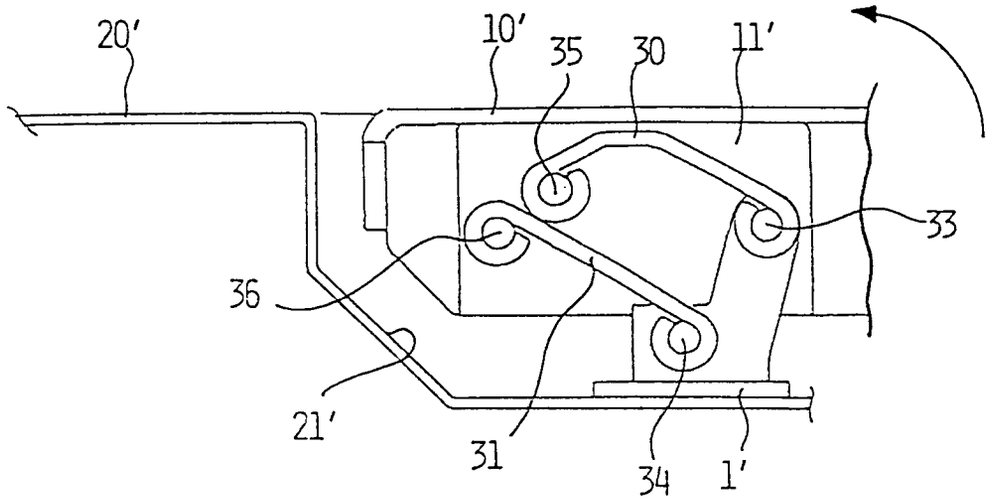


FIG. 8

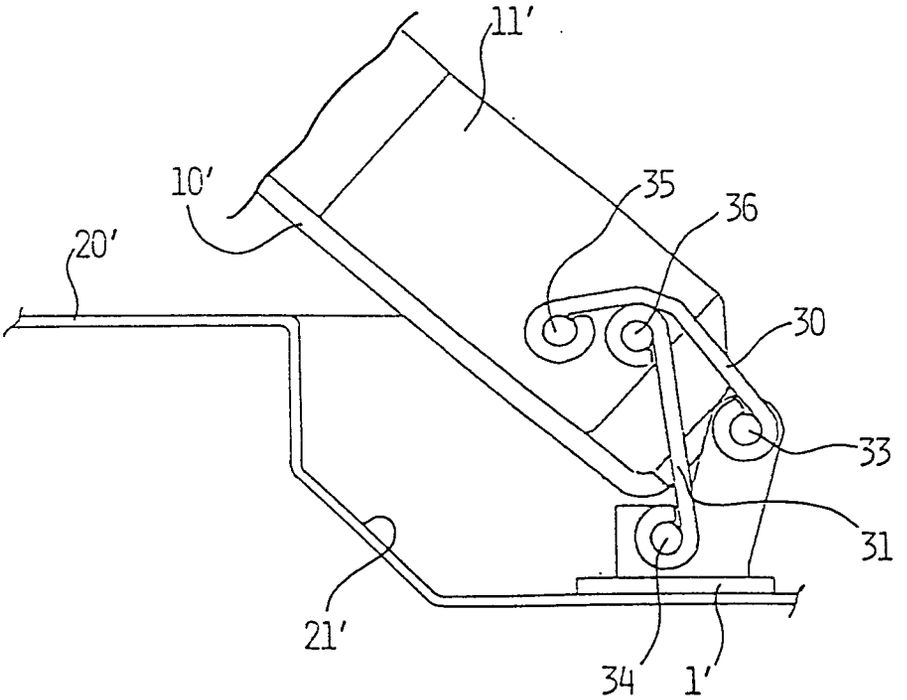


FIG. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 94 10 3929

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
A	AT-B-389 717 (EUDORAWERKE WELS K. & J. STEININGER) * the whole document *	1,10-12	D06F39/14 D06F37/28
A	US-A-2 766 902 (SPEED QUEEN CORPORATION) * the whole document *	1-9,11, 13,14	

TECHNICAL FIELDS SEARCHED (Int.Cl.5)

D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21 June 1994	Courrier, G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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