



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 1 069 228 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:
19.05.2004 Bulletin 2004/21

(51) Int Cl.7: **D06F 23/02**, D06F 39/12,
D06F 95/00

(21) Application number: **00202219.2**

(22) Date of filing: **26.06.2000**

(54) **Front load washing machine with tiltable washing tub**

Von vorne beschickbare Waschmaschine mit kippbarem Laugenbehälter

Machine à laver à chargement frontal avec cuve basculable

(84) Designated Contracting States:
DE ES GB IT

(72) Inventor: **Fumagalli, Silvano, Dr.**
20052 Monza MI (IT)

(30) Priority: **15.07.1999 IT MI991566**

(74) Representative: **Mittler, Enrico et al**
Mittler & C. s.r.l.,
Viale Lombardia, 20
20131 Milano (IT)

(43) Date of publication of application:
17.01.2001 Bulletin 2001/03

(73) Proprietor: **CANDY S.p.A.**
I-20052 Monza (Milano) (IT)

(56) References cited:
DE-A- 1 813 783 **DE-A- 2 037 351**
FR-A- 2 736 942

EP 1 069 228 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The present invention refers to a front load washing machine with turnable washing tub.

[0002] It is generally known that in modern washing machines with front load a drum containing the laundry to be washed is situated in a central position of the washing machine and it has an opening toward the front of the machine. This drum is turningly mounted in a container, called washing tub, that is destined to contain the washing water and equipped with suspension elements for its anchorage that allow it to remain suspended inside the cabinet of the washing machine.

[0003] The loading of the drum obliges the operator to continuous and sudden bending over in order to take the laundry to be washed from the top plane surface of the washing machine and its positioning inside the drum that is located in a low position.

[0004] In order to facilitate the loading of laundry the washing tub of a washing machine has been provided with an upper opening instead of the frontal one thus building top load washing machines that imply complications in the building of the washing machine.

[0005] DE-A-2 037 351 discloses a front-load washing machine wherein the loading opening is swivelly mounted. FR-A-2 736 942 discloses a front-load washing machine with an inclined front wall and loading opening.

[0006] In view of the state of the art described, object of the present invention is to realise a front load washing machine that make the loading of the washing tub with the laundry to be washed easier.

[0007] According to the present invention, such object has been attained by means of a front load washing machine comprising a cabinet and a washing tub suspended inside said cabinet by means of suspension means, said washing tub being provided with a front load opening and turningly housing a drum to contain the laundry to be washed that is open frontally and said cabinet comprising a front wall with a central opening in order to introduce said laundry to be washed into said drum, characterized in that said suspension means are slidingly coupled to guides that are longitudinally fixed to the bottom plane surface and to the top plane surface of said cabinet in order to allow an inclination of said washing tub by a given angle as regards a vertical plane parallel to said front wall and said front wall of the cabinet is at least partially displaceable in a central part comprising said opening in order to allow said central part and said opening to follow the inclination of said washing tub.

[0008] Owing to the present invention it is possible to realise a front load washing machine that by rotation of the washing tub allows an inclination of the washing tub such as to make the loading of the same with the laundry to be washed easier.

[0009] The characteristics and the advantages of the present invention will be made evident by the following detailed description of some possible embodiment

thereof, that are illustrated as non limiting examples in the enclosed drawings, in which:

Figure 1 shows, in a side view, a washing machine with a washing tub in a rest condition according to a first embodiment of the present invention;

Figure 2 shows, in a side view, a washing machine as the one in Figure 1 with the washing tub in an inclined position;

Figure 3 shows, in a side view, a washing machine with a washing tub in a rest position according to a second embodiment of the present invention;

Figure 4 shows, in a side view, a washing machine as the one in Figure 3 with the washing tub in an inclined position;

Figure 5 shows, in a back view, a washing machine as the one in Figure 3 with the washing tub in rest condition;

Figure 6 shows a top plan of a washing machine as the one in Figure 3 with the washing tub in rest condition;

Figure 7 shows, in a side view, a system for the movement of the washing tub of the washing machine in Figure 3.

[0010] With reference to the attached figures, by 1 a washing machine is globally indicated comprising a cabinet 54 and a washing tub 51 that is centrally suspended inside the cabinet 54 by means of suspension means. The washing tub 51 contains a cylindrical drum 2, with axis perpendicular to the back wall 29 of the cabinet 54, destined to contain the laundry to be washed, which is turningly mounted in the same tub. The tub 51 has an opening 57 in its fore part 24 in correspondence of an analogous opening 56 of the cylindrical drum 2, that is connected with the front of the cabinet 54 by means of a round gasket 23. This opening 57 is closed by a round door 22 comprising a window 3.

[0011] A first embodiment of the present invention is shown in Figures 1 and 2 where the washing tub 51 is suspended inside the cabinet 54 by means of pairs of bottom and top suspension means 53 and 52. In particular the top suspension means 52 are made up, each one, of a hook 21 to which the tub 51 is anchored and that is connected at its upper end with a helicoidal spring 20 that is in turn connected with a first sliding shoe 19 that is free to slide 18 on a longitudinal guide whose ends, perpendicular to the same guide, are connected with the top plane surface 28 of the cabinet 54. The bottom suspension means 53 are spring shock absorbers and comprise a U-shape spring 14 that at its lower end is connected with a second sliding shoe 13 that is capable to slide on a longitudinal guide 10 whose ends are connected, one that is perpendicular to the same guide, with the bottom plane 11 of the cabinet 54 and the other one with a part 55 of the front wall 61 of the cabinet 54. A rubber pad 12 is associated with the sliding shoe 13 between the lower end of the spring 14 and the guide

10. The upper end of the spring 14 has a central opening 58 to the edge of which two curved parts 15 are connected in such a way that a cylindrical body 16 passing through said opening 58 is free to rotate by a certain angle. Said cylindrical body 16 is fixed in 17 to the washing tub 51.

[0012] The front wall 61 of the cabinet 54 comprises a upper rigid flange 9 and a lower rigid flange 55, and an articulated panel 60 that is made up of parts 6, 25. In particular the first part 25 is connected through one articulation joint 26 with the flange 9 and it contains a round gasket 23. The second part 6 is connected with the part 25 by means of an articulation joint 7 and it has a lower portion 8 that is normally set next to the lower flange 55.

[0013] When opening the door 22 that is fixed in 50 to the articulated panel 60, by exerting a pulling force an operator allows the inclination of the washing tub 51 by a certain angle as regards a vertical plane parallel to the front wall 61, as shown in Figure 2. The first sliding shoe 19 slides toward the back end of the guide 18 while the second sliding shoe 13 slides toward the lower end of the guide 10 thus determining the counter-clockwise rotation of the cylindrical body 16 passing through the opening 58. In addition there is a counter-clockwise rotation of the first part 25 of the articulated panel 60 on its articulation joints 26 and clockwise for the second part 6 on the articulation joints 7 and a lifting of the same part 6 as regards the lower flange 55. This inclined position of the washing tub 51 and therefore of the drum 2 allows an easier loading of the same for the quantity of laundry to be washed. It is also possible to provide the washing tub 51 with a balance piston system with counteracting mechanical load and springs or other elastic means, in order to assist the inclination movement of the tub and therefore to reduce the effort on behalf of the operator.

[0014] A second embodiment of the present invention is shown in Figures 3-6 where the washing tub 51 is suspended inside the cabinet 54 by means of two pairs of suspension means 40. Said suspension means 40 consist in telescopic shock absorbers made up of an internal cylindrical part 35 that is capable to slide in the part 33 and anchored to the tub 51 by means of a connection 34. The sliding shoe 32 of an upper pair of the shock absorbers 40 slides on curved longitudinal guides 31 having perpendicular ends connected with the top surface 28 of the cabinet 54 while the sliding shoe 32 of the other lower pair of shock absorbers slide on longitudinal curved guides 36 having perpendicular ends that are connected with the bottom plane 11 of the cabinet 54.

[0015] The front wall 61 of the cabinet 54 comprises an upper flange 48 that extends toward the interior of the washing machine with a curved portion 38, a lower flange 46 ending with a curved upper end, and a turnable panel 47. The latter is made up of a part 37 that contains the round gasket 23 and that has a lower curved portion 41 and a perpendicular upper portion 39. The

curved portion 41 is hooked to the sliding shoes 32 by means of forks 90. The panel 47 is fixedly mounted with two side tabs 42 that are turningly hinged in 45 to the sides walls 49 and 59 of the cabinet 54 in such a way so as to make the panel 47 turnable as regards a cross axis passing through the pins 44, as it is better visible in Figure 6.

[0016] With the washing tub 51 in the rest position illustrated in Figure 3, when opening the door 22 that is connected with the turnable panel 47, by exerting a pulling force an operator allows the counter-clockwise rotation of the panel 47 and as a consequence the inclination of the washing tub 51 by a certain angle 61 with respect to a vertical plane parallel to the front wall, as shown in Figure 4. The part 37 of the panel 47 rotates in counter-clockwise direction and its lower 41 and upper 39 portions respectively slide on the upper end of the flange 46 and on the curved portion of the flange 48. The sliding shoe 32 of the upper pair of shock absorbers 40 slide up to the back end of the guides 31 while the sliding shoe 32 of the lower pair of shock absorbers 40 slide up to the fore end of the guides 36. The forks 90 allow a better stability of the turnable panel 47 during its rotation. The greater inclination of the washing tub 51 of this embodiment as compared with the one described above allows an easier loading of the drum 2 for the quantity of laundry to be washed.

[0017] In Figure 7 there is shown a movement device 100 for the turnable panel 47 as a possible variation to the manual rotation of the same. Said device 100 is made up of extensions 101 of the side tabs 42 of the turnable panel 47 that are connected with a pair of levers 102 that can be moved vertically by means of a motor 103 for example an electric type. Position and stop sensors are provided, not visible in figure, that are controlled externally or automatically and an external control for the starting of the motor 103.

[0018] In normal washing or centrifugal conditions, in all the embodiments of the above described invention, the washing tub 51 of the washing machine 1 must be positioned with the axis of the washing tub 2 in a position perpendicular to the back wall 29 of the cabinet 54, as in Figures 1 and 3.

Claims

1. Front load washing machine comprising a cabinet (54) and a washing tub (51) that is suspended inside said cabinet by suspension means (52, 53; 40), said washing tub (51) being provided with a front load opening (57) and turningly housing a drum (2) to contain the laundry to be washed that is open frontally and said cabinet comprising a front wall (61) with a central opening in order to introduce said laundry to be washed into said drum (2), **characterized in that** said suspension means (52, 53; 40) are slidingly coupled to guides (10, 18; 31, 36) that

are longitudinally fixed to the bottom plane surface (11) and to the top plane surface (28) of said cabinet (54) in order to allow an inclination of said washing tub (51) by a given angle as regards a vertical plane parallel to said front wall (61), and said front wall (61) of the cabinet (54) is at least partially displaceable in a central part (60; 47) comprising said opening in order to allow said central part (60; 47) and said opening to follow the inclination of said washing tub (51).

2. Washing machine according to claim 1, **characterized in that** said partially displaceable central part (60) of said front wall (61) of said cabinet (54) is made up of parts (6, 25) that are connected with each other and with the fixed part (9, 55) of the front wall by means of articulation joints (7, 26) and capable to rotate on said articulation joints (7, 26) when said washing tub (51) is inclined.

3. Washing machine according to claim 2, **characterized in that** said suspension means (52, 53) comprise elastic means (14, 20) that are anchored to said washing tub by means of hooking means (21, 15-16) and sliding means (13, 19) that are capable to slide on said guides (10, 18).

4. Washing machine according to claim 3, **characterized in that** it comprises an upper pair (52) of said suspension means (52, 53) whose elastic means (14, 20) are made up of a helicoidal spring (20) and the hooking means (21, 15-16) are made up of a hook (21).

5. Washing machine according to claim 4, **characterized in that** it comprises a lower pair (53) of said suspension means (52, 53) whose elastic means (14, 20) are made up of a U-shape spring (14) and whose hooking means (21, 15-16) are made up of a cylindrical body (16) passing through an opening (58) of the upper end of said spring (14) with whose edge two curved parts (15) are connected in such a way so as to allow said cylindrical body (16) to rotate by a certain angle.

6. Washing machine according to claim 1, **characterized in that** said partially displaceable central part (47) of said front wall (61) of said cabinet (54) is made up of a panel that can be rotated (47) that is capable to slide near the top plane surface (28) and the bottom surface (11) of said cabinet (54) and fixedly mounted to side tabs (42) that are turningly hinged in pins (44) to the sides walls (49, 59) of said cabinet (54) so that said panel (47) rotates as regards a cross axis passing through said pins (44) of said sides walls (49, 59).

7. Washing machine according to claim 6, **character-**

ized in that said suspension means (40) comprise telescopic shock absorbers (40) that are connected at one end with said guides (31, 36) in order to slide on them and at the other end with said washing tub (51).

8. Washing machine according to claim 7, **characterized in that** it comprises at least a lower pair and a upper pair of said telescopic shock absorbers (40).

9. Washing machine according to claim 6, **characterized in that** means for the movement (100) of said turnable panel (47) are provided.

10. Washing machine according to claim 9, **characterized in that** said movement means (100) are made up of extensions (101) of said side tabs (42) that are connected with levers (102) that can move vertically by means of motor means (103).

Patentansprüche

1. Über die Vorderseite beschickbare Waschmaschine, welche ein Gehäuse (54) und eine Waschwanne (51) aufweist, welche im Innern des Gehäuses mit Hilfe einer Aufhängung (52, 53; 40) hängend gelagert ist, wobei die Waschwanne (51) mit einer zur vorderseitigen Beschickung vorgesehenen Öffnung (57) versehen ist, und eine Trommel (2) drehbar aufnimmt, welche das zu waschende Waschgut aufnimmt, und die in Richtung zur Vorderseite geöffnet werden kann, und wobei das Gehäuse eine Vorderwand (61) mit einer zentralen Öffnung aufweist, um die zu waschende Wäsche in die Trommel (2) einzubringen, **dadurch gekennzeichnet, daß** die Aufhängung (52, 53; 40) gleitbeweglich mit Führungen (10, 18; 31, 36) verbunden ist, welche in Längsrichtung an der ebenen Bodenfläche (11) und an der ebenen Oberfläche (28) des Gehäuses (54) festgelegt sind, um eine Neigung der Waschwanne (51) unter einem gegebenen Winkel bezüglich einer vertikalen Ebene parallel zu der Vorderwand (61) zuzulassen, und daß die Vorderwand (61) des Gehäuses (54) wenigstens teilweise an einem Mittelteil (60; 47) verschiebbar ist, welches die Öffnung aufweist, um zu ermöglichen, daß der zentrale Teil (60; 47) und die Öffnung der Neigung der Waschwanne (51) folgen können.

2. Waschmaschine nach Anspruch 1, **dadurch gekennzeichnet, daß** der teilweise verschiebbare zentrale Teil (60) der Vorderwand (61) des Gehäuses (54) von Teilen (6, 25) gebildet wird, welche miteinander und mit dem festen Teil (9, 55) der Vorderwand mit Hilfe von Gelenkeinrichtungen (7, 26) verbunden sind, und die eine Drehbewegung an den Gelenkeinrichtungen (7, 26) ausführen können,

wenn die Waschwanne (51) geneigt ist.

3. Waschmaschine nach Anspruch 2, **dadurch gekennzeichnet, daß** die Aufhängung (52, 53) elastische Einrichtungen (14, 20) aufweist, welche mit der Waschwanne mit Hilfe von Hakeneinrichtungen (21, 15-16) und Gleiteinrichtungen (13, 19) verankert sind, welche auf den Führungen (10, 18) eine Gleitbewegung ausführen können. 5
4. Waschmaschine nach Anspruch 3, **dadurch gekennzeichnet, daß** sie ein oberes Paar (52) von Aufhängungen (52, 53) aufweist, deren elastische Einrichtungen (14, 20) von einer Spiralfeder (20) und Hakeneinrichtungen (21, 15-16) gebildet werden, welche einen Hängehaken (21) bilden. 10
5. Waschmaschine nach Anspruch 4, **dadurch gekennzeichnet, daß** sie ein unteres Paar (53) von Aufhängungen (52, 53) aufweist, deren elastische Einrichtungen (14, 20) von einer U-förmigen Feder (14) gebildet werden, und deren Hakeneinrichtungen (21, 15-16) von einem zylindrischen Körper (16) gebildet werden, welcher durch eine Öffnung (58) des oberen Endes der Feder (14) geht, und deren gekrümmte Teile (15) an der Kante derart verbunden sind, daß sich der zylindrische Körper (16) um einen gewissen Winkel drehen kann. 20
6. Waschmaschine nach Anspruch 1, **dadurch gekennzeichnet, daß** der teilweise verschiebbare zentrale Teil (47) der Vorderwand (61) des Gehäuses (54) von einer Platte gebildet wird, welche sich verdrehen kann, und die eine Gleitbewegung in der Nähe der ebenen Oberfläche (28) und der Bodenfläche (11) des Gehäuses (54) ausführen kann, sowie an den Seitenleisten (42) fest angebracht ist, welche drehgelenkig mit Stiften (44) mit den Seiten (49, 59) des Gehäuses (54) derart verbunden sind, daß die Platte (47) eine Drehbewegung bezüglich einer Drehachse ausführen kann, die durch die Stifte (44) der Seitenwände (49, 59) geht. 25
7. Waschmaschine nach Anspruch 6, **dadurch gekennzeichnet, daß** die Aufhängung (40) teleskopartige Stoßdämpfer (40) aufweist, die an einem Ende mit den Führungen (31, 36) verbunden sind, um eine Gleitbewegung auszuführen, und die mit dem anderen Ende mit der Waschwanne (51) verbunden sind. 30
8. Waschmaschine nach Anspruch 7, **dadurch gekennzeichnet, daß** sie wenigstens ein unteres Paar und ein oberes Paar von teleskopartigen Stoßdämpfern (40) aufweist. 35
9. Waschmaschine nach Anspruch 6, **dadurch gekennzeichnet, daß** eine Bewegungseinrichtung 40

(100) für die drehbare Platte (47) vorgesehen ist.

10. Waschmaschine nach Anspruch 9, **dadurch gekennzeichnet, daß** die Bewegungseinrichtung (100) von der Verlängerung (101) der Seitenleisten (42) gebildet wird, welche mit Ebenen (102) verbunden sind, die mit Hilfe der Motoreinrichtung (103) eine vertikale Bewegung ausführen können. 10

Revendications

1. Lave-linge à chargement par l'avant, comprenant un coffret (54) et une cuve de lavage (51) qui est suspendue dans le coffret par un dispositif de suspension (52, 53 ; 40), la cuve de lavage (51) ayant une ouverture (57) de chargement par l'avant et longeant de manière rotative un tambour (2) destiné à contenir le linge à laver et qui est ouvert du côté frontal, le coffret comprenant une paroi avant (61) qui a une ouverture centrale pour l'introduction du linge à laver dans le tambour (2), **caractérisé en ce que** le dispositif de suspension (52, 53 ; 40) est couplé de manière coulissante à des guides (10, 18 ; 31, 36) qui sont fixés longitudinalement à la surface plane inférieure (11) et à la surface plane supérieure (28) du coffret (54) pour permettre une inclinaison de la cuve de lavage (51) d'un angle déterminé par rapport à un plan vertical parallèle à la paroi avant (61), et la paroi avant (61) du coffret (54) est au moins partiellement déplaçable dans une partie centrale (60 ; 47) qui comprend l'ouverture afin que la partie centrale (60 ; 47) et l'ouverture puissent suivre l'inclinaison de la cuve de lavage (51). 35
2. Lave-linge selon la revendication 1, **caractérisé en ce que** la partie centrale partiellement déplaçable (60) de la paroi avant (61) du coffret (54) est formée de parties (6, 25) qui sont raccordées mutuellement et à la partie fixe (9, 55) de la paroi avant par des joints d'articulation (7, 26) et capables de tourner sur les joints d'articulation (7, 26) lorsque la cuve de lavage (51) est inclinée. 40
3. Lave-linge selon la revendication 2, **caractérisé en ce que** le dispositif de suspension (52, 53) comporte des dispositifs élastiques (14, 20) qui sont fixés à la cuve de lavage par des dispositifs d'accrochage (21, 15-16) et des dispositifs coulissants (13, 19) qui peuvent coulisser sur les guides (10, 18). 45
4. Lave-linge selon la revendication 3, **caractérisé en ce qu'il** comprend une paire supérieure (52) de dispositifs de suspension (52, 53) dont les dispositifs élastiques (14, 20) sont constitués d'un ressort hélicoïdal (20), et les dispositifs d'accrochage (21, 15-16) sont constitués d'un crochet (21). 50

5. Lave-linge selon la revendication 4, **caractérisé en ce qu'il** comporte une paire inférieure (53) de dispositifs de suspension (52, 53) dont les dispositifs élastiques (14, 20) sont constitués d'un ressort en U (14) et dont les dispositifs d'accrochage (21, 15-16) sont constitués d'un corps cylindrique (16) passant dans une ouverture (58) de l'extrémité supérieure du ressort (14), deux parties courbes (15) du bord étant raccordées afin qu'elles permettent la rotation d'un certain angle du corps cylindrique (16). 5
10
6. Lave-linge selon la revendication 1, **caractérisé en ce que** la partie centrale partiellement déplaçable (47) de la paroi avant (61) du coffret (54) est formée d'un panneau qui peut être tourné (47) et qui peut coulisser près de la surface plane supérieure (28) et de la surface inférieure (11) du coffret (54) et monté de manière fixe sur des pattes latérales (42) qui sont articulées afin qu'elles puissent tourner dans des broches (44) sur des parois latérales (49, 59) du coffret (54), si bien que le panneau (47) tourne par rapport à un axe transversal passant par les broches (44) des parois latérales (49, 59). 15
20
7. Lave-linge selon la revendication 6, **caractérisé en ce que** le dispositif de suspension (40) comprend des amortisseurs télescopiques (40) qui sont raccordés à une première extrémité aux guides (31, 36) afin qu'ils puissent coulisser sur eux et, à l'autre extrémité, à la cuve de lavage (51). 25
30
8. Lave-linge selon la revendication 7, **caractérisé en ce qu'il** comprend au moins une paire inférieure et une paire supérieure d'amortisseurs télescopiques (40). 35
9. Lave-linge selon la revendication 6, **caractérisé en ce qu'un** dispositif de déplacement (100) du panneau rotatif (47) est incorporé. 40
10. Lave-linge selon la revendication 9, **caractérisé en ce que** le dispositif de déplacement (100) est constitué de prolongements (101) des pattes latérales (42) qui sont raccordées à des leviers (102) qui peuvent se déplacer verticalement sous l'action d'un dispositif à moteur (103). 45

50

55

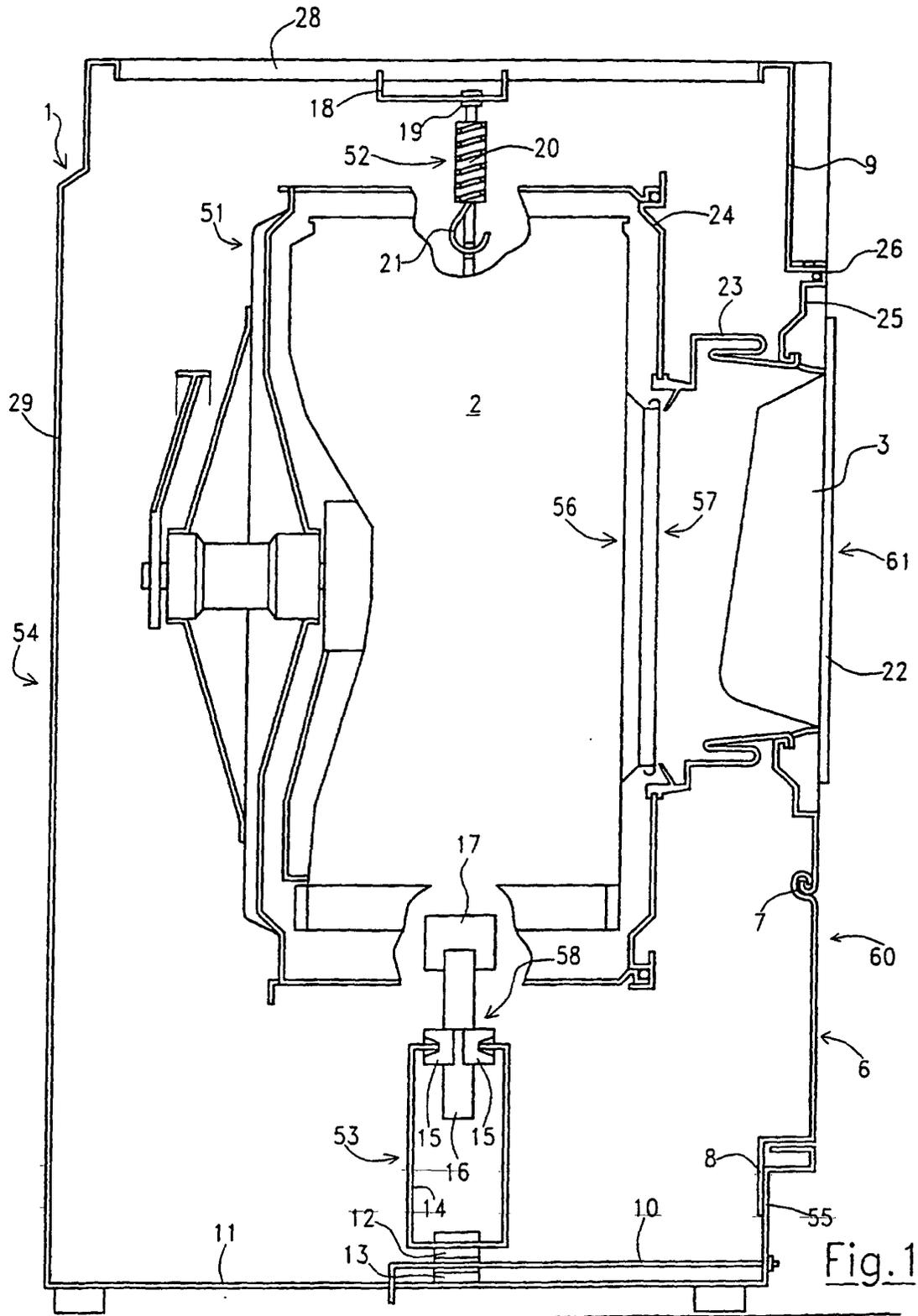


Fig.2

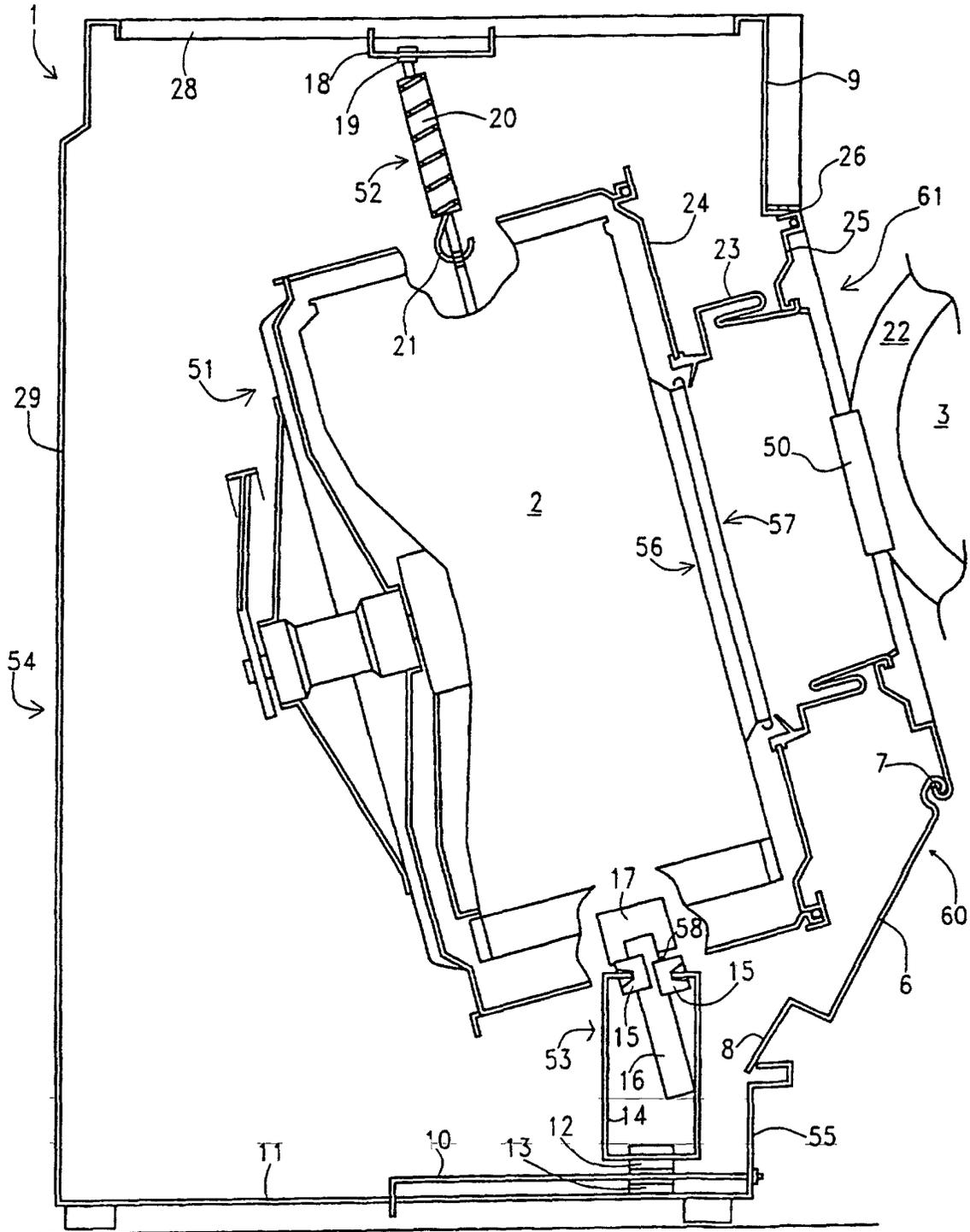


Fig.3

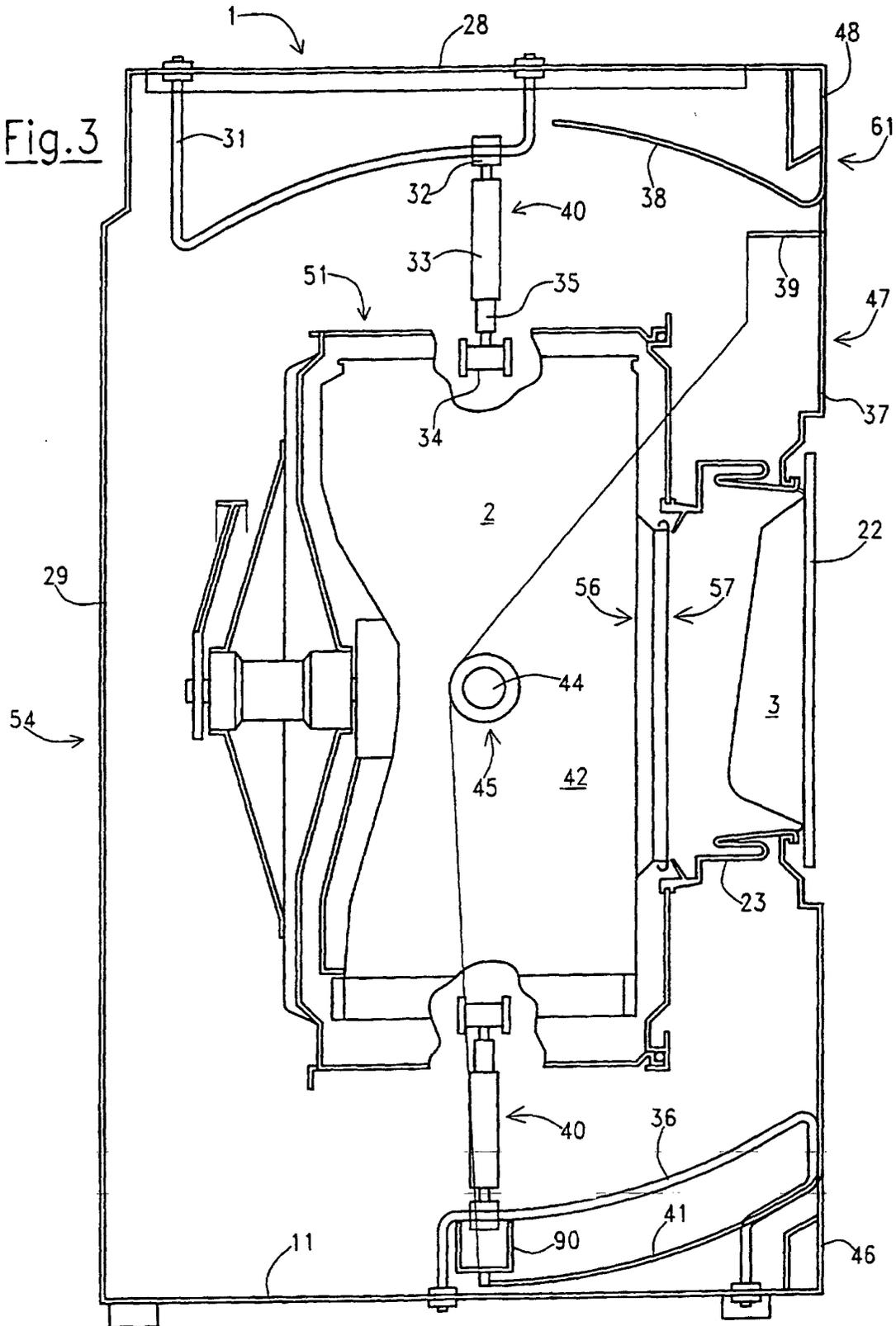
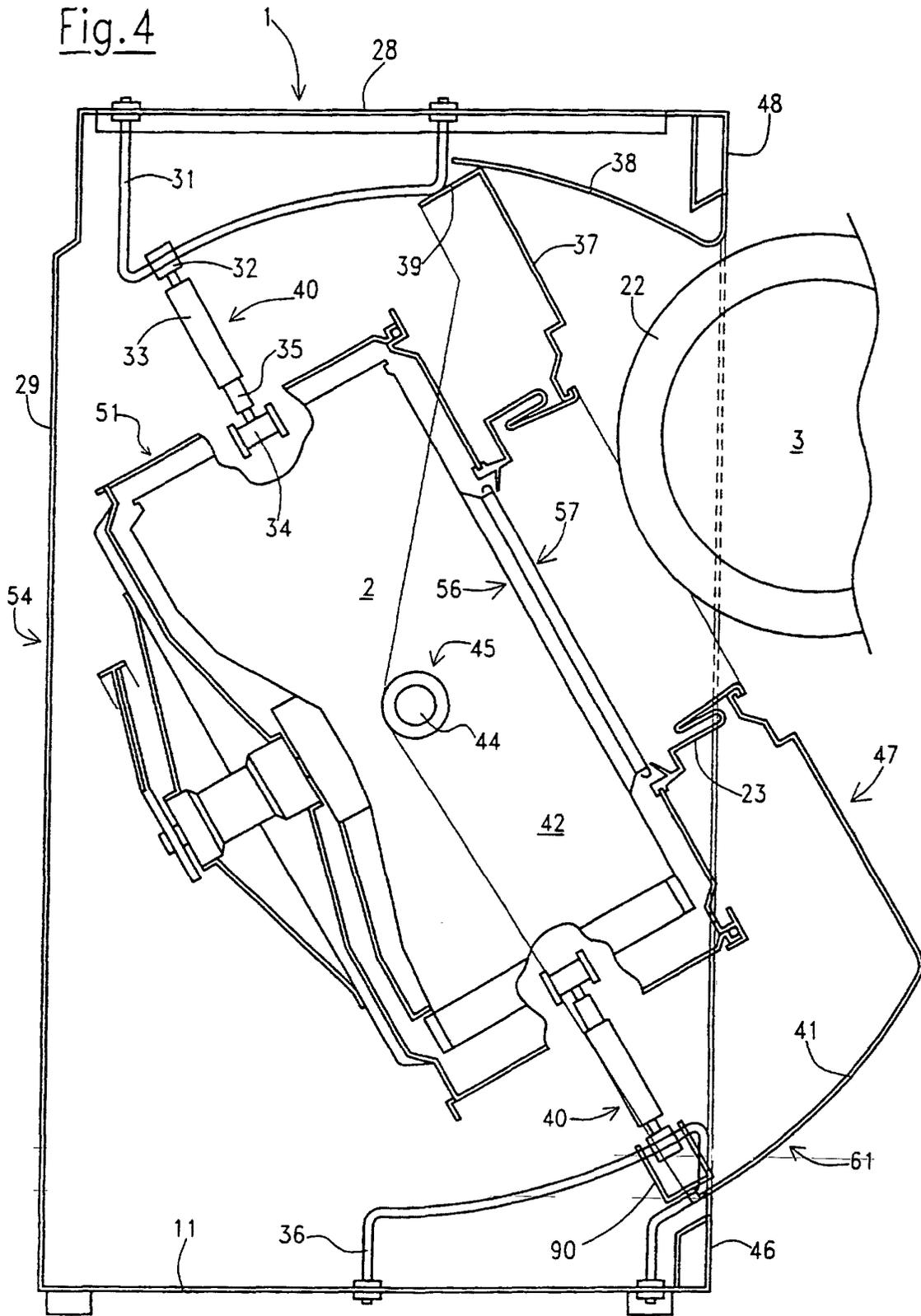


Fig.4



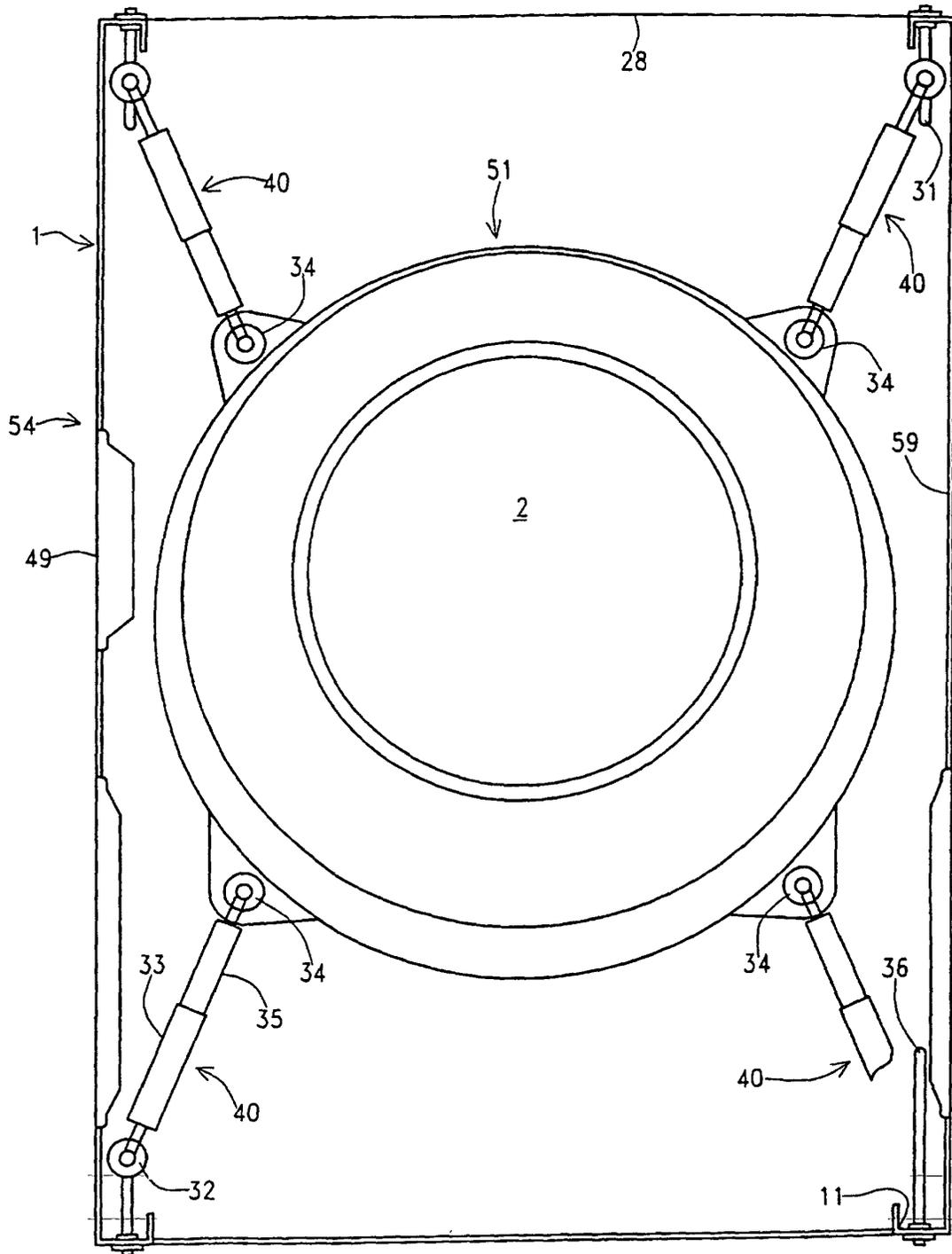


Fig.5

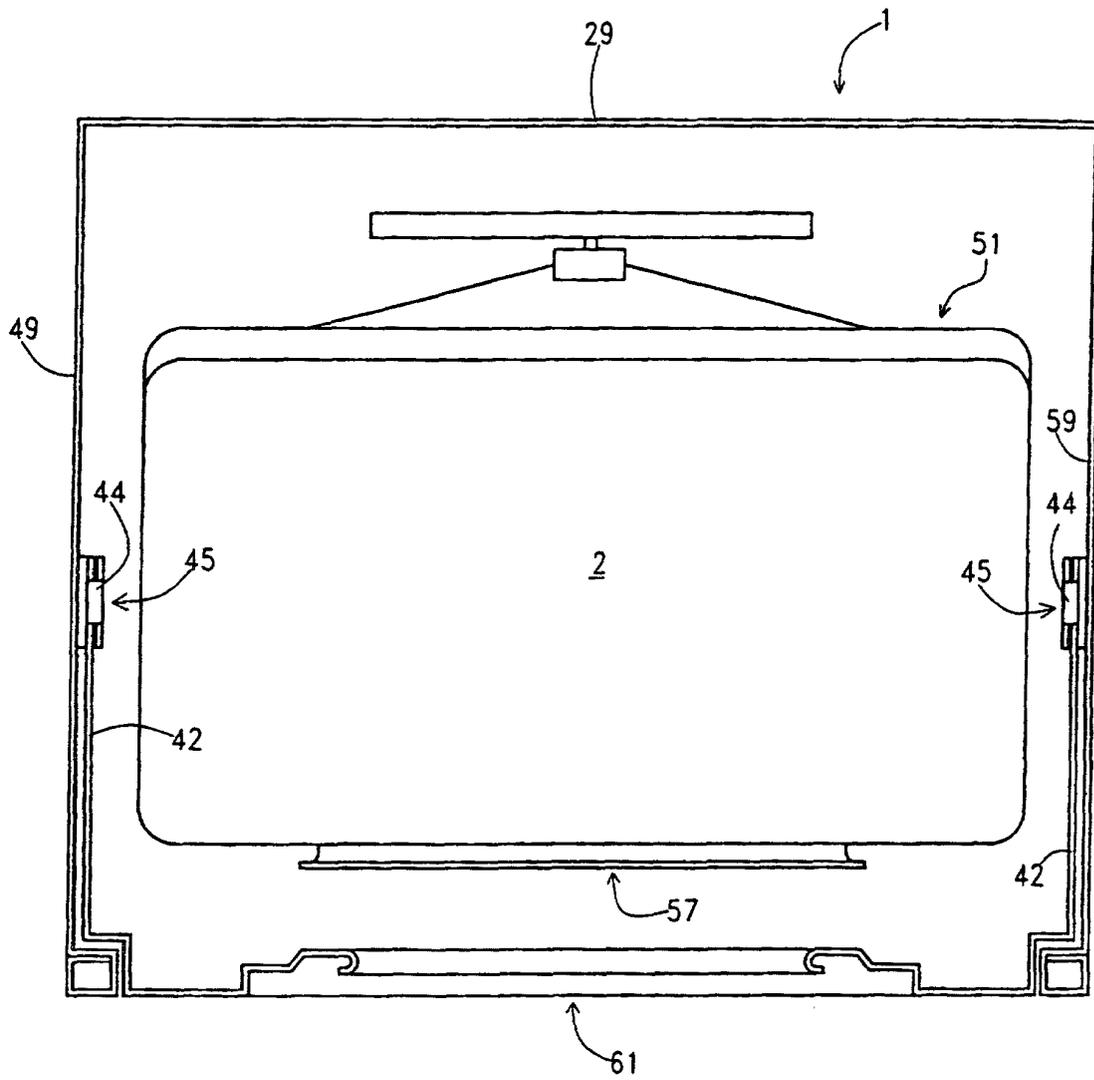


Fig. 6

