



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
29.09.2010 Bulletin 2010/39

(51) Int Cl.:
F24F 13/28 (2006.01) F24F 1/00 (2006.01)

(21) Application number: **08860607.4**

(86) International application number:
PCT/JP2008/064927

(22) Date of filing: **21.08.2008**

(87) International publication number:
WO 2009/075125 (18.06.2009 Gazette 2009/25)

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

(71) Applicant: **Sharp Kabushiki Kaisha**
Osaka-shi
Osaka 545-8522 (JP)

(72) Inventor: **YAMAZAKI, Yoshinobu**
Osaka 545-8522 (JP)

(30) Priority: **13.12.2007 JP 2007322135**

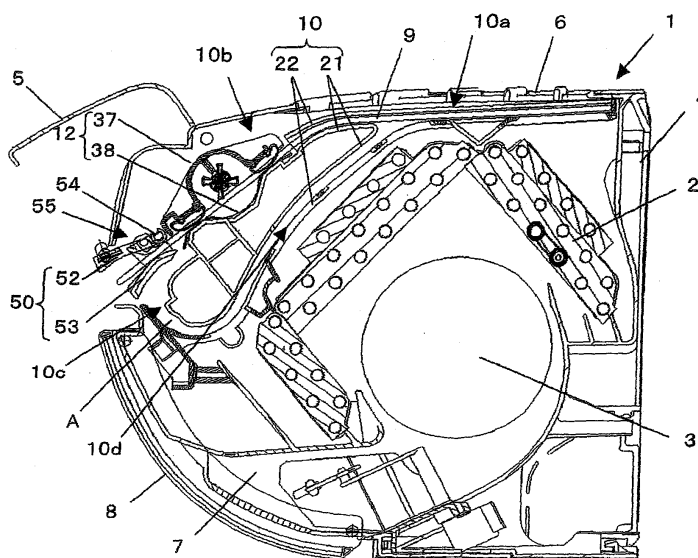
(74) Representative: **Treeby, Philip David William et al**
R.G.C. Jenkins & Co
26 Caxton Street
London SW1H 0RJ (GB)

(54) **AIR CONDITIONER**

(57) The present invention is to provide an air conditioner in which a filter can be easily inserted into an opening section. Specifically, the air conditioner includes: a filter 9 arranged along the inner surface side of a suction port 6 of a casing 4; a cleaning apparatus 12 configured to clean the filter 9; a moving path A for moving the filter 9 with respect to the cleaning apparatus 12; and a guide section 50 configuring a portion of the moving path A, and is configured to open the moving path A to

the outside of the casing 4 by rotating the other end of the guide section 50 about one end side of the guide section 50. The air conditioner is featured in that the guide section 50 is configured by a front face member 52 arranged on the surface side of the filter 9 and the rear face member 53 arranged on the rear face side of the filter 9, and in that in the state where the moving path A is opened, the width between the front face member 52 and the rear face member 53 is increased from the one end side to the other end side of the guide section 50.

FIG. 3



Description

Technical Field

[0001] The present invention relates to an air conditioner capable of cleaning a filter.

Background Art

[0002] In an air conditioner, a filter is provided along the inner surface side of a suction port of a casing of an indoor machine. The filter is able to remove dust in the air sucked from the suction port, and thereby able to prevent the dust from entering into the casing. When the filter is soiled, the air-conditioning capacity of the air conditioner is decreased due to clogging of the filter, and hence it is necessary to clean the filter.

[0003] Thus, there is an air conditioner which is capable of automatically cleaning the filter. For example, there is disclosed in patent document 1 an air conditioning apparatus (air conditioner) which includes a plate-shaped filter arranged along the inner surface side of a suction port of a casing, a cleaning apparatus configured to clean the filter, and a moving path for moving the filter with respect to the cleaning apparatus, and in which a guide piece configuring a portion of the moving path is provided so that the moving path is opened to the outside of the casing by rotating the other end of the guide piece about a rotating section provided at one end side of the guide piece.

[0004] Thereby, when the filter is reciprocated, the whole surface of the filter can be automatically cleaned by the filter cleaning apparatus. Also, the guide piece is opened to the outside of the casing, so that when the filter is again attached after being removed, the filter can be easily inserted into the moving path. Then, when the filter is reciprocated, the whole surface of the filter can be automatically cleaned by the filter cleaning apparatus.

Patent document 1: Japanese Patent Laid-Open Publication No. 2007-147122

[0005] However, in the air conditioner as disclosed in patent document 1, the guide piece is configured to be opened to the outside of the casing, but an inner guide and an outer guide, which configure the guide piece, are integrally formed. Thus, the size of the opening section of the guide piece is substantially the same as the width of the moving path of the filter. As a result, the width of the opening section is not enough to insert the filter, and hence it takes time and labor to insert the filter.

[0006] In view of the above described problem, it is an object of the present invention to provide an air conditioner in which the filter can be easily inserted in the opening section.

Disclosure of the Invention

[0007] In order to achieve the above described object, according to the present invention, there is provided an air conditioner which includes: a filter arranged along the inner surface side of a suction port of a casing; a cleaning apparatus configured to clean the filter; a moving path for moving the filter with respect to the cleaning apparatus; and a guide section configuring a portion of the moving path, and which opens the moving path to the outside of the casing by rotating the other end of the guide section about one end side of the guide section, the air conditioner being featured in that the guide section is configured by a front face member arranged on the front face side of the filter, and a rear face member arranged on the rear face side of the filter.

[0008] According to the above described configuration, the guide section is provided so as to be separated into the front face member and the rear face member. Thus, it is possible to open the moving path to the outside of the casing by respectively rotating the front face member and the rear face member. Further, when the filter is inserted, and when the filter abuts on the surface member, the front face member is rotated in the opening direction to enlarge the opening section. Thereby, the filter can be easily inserted.

[0009] Further, in the air conditioner according to the present invention, the width between the front face member and the rear face member is preferably increased from the one end side to the other end side of the guide section in the state where the moving path is opened.

[0010] That is, the width of the moving path is set to have substantially the same width as a whole in the state where the moving path is closed, and the front face member and the rear face member are arranged so as to face each other at an interval. Then, when the front face member and the rear face member is respectively rotated in the direction to open the moving path, the width (the width between the front face member and the rear face member) of the guide section which is to serve as the opening section of the moving path, can be increased from the one end side to the other end side of the guide section.

[0011] In other words, the inner surface of the guide section (opening section) can be formed in a tapered shape whose width is reduced from the inlet/outlet port side to the inside. Thereby, the filter can be easily inserted into the moving path.

[0012] Further, the air conditioner according to the present invention is preferably configured such that the rear face member is rotated via a link mechanism by rotating the front face member. In such configuration, the rear face member can also be rotated by the rotation of the front face member, and thereby the operability can be improved.

[0013] Further, in the air conditioner according to the present invention, the link mechanism is preferably configured such that after the front face member is rotated by a predetermined angle, the rear face member is ro-

tated according to the rotation of the front face member.

[0014] In the above described configuration, the rear face member is not rotated until the front face member is rotated by the predetermined angle. Therefore, it is possible to configure such that the width between the front face member and the rear face member is increased from one end side to the other end side of the guide section only by rotating the front face member.

[0015] Further, by rotating the surface member together with the rear face member in such state, the guide section can be directed toward the outside of the casing, so that the filter can be smoothly introduced into the moving path.

[0016] Further, when the guide section is made to function as the moving path, the front face member may only be rotated in the reverse direction. Thereby, it is possible to reduce the width between the front face member and the rear face member, so as to return the surface member and the rear face member to the original state (the state where the interval between the front face member and the rear face member is substantially fixed) .

[0017] The air conditioner according to the present invention is preferably provided with a holding mechanism configured to make the front face member, which is rotated by the predetermined angle together with the rear face member, held in the state rotated by the predetermined angle. In such configuration, when the filter is inserted, the width of the guide section, which serves as the opening section of the moving path, can be held sufficiently wide, and hence the filter can be easily inserted.

[0018] Further, the air conditioner according to the present invention may also be configured such that in the state where the front face member is fixed and held by the holding mechanism, the rear face member is held by the link mechanism so as to be inclined at a fixed angle with respect to the front face member.

[0019] In such configuration, the angle formed between the front face member and the rear face member can be held at the predetermined angle only by the holding mechanism configured to hold only the front face member, and the rear face member is held by the link mechanism. Thus, the holding mechanism for holding the rear face member need not be separately provided.

[0020] Further, in the air conditioner according to the present invention, the holding mechanism may also be configured so as to regulate the rotation of the front face member.

[0021] In such configuration, it is possible to prevent the front face member from being excessively rotated. Further, a rotation regulation member need not be separately provided.

[0022] Note that it may also be configured such that the front face member and the rear face member, which configure the guide section, are freely rotated about the same rotation axis.

[0023] In the air conditioner according to the present invention, a portion of the moving path for moving the filter is configured by the guide section formed by the

front face member and the rear face member, and also the other end of the guide section is rotated in the opening direction about one end of the guide section so that the moving path is opened toward the outside of the casing. Thereby, the filter can be easily inserted into the moving path.

Brief Description of the Drawings

10 [0024]

Figure 1 is a perspective view of an indoor machine of an air conditioner according to the present invention;

15 Figure 2 is a sectional view taken along line A-A in Figure 1;

Figure 3 is a sectional view showing a state where a guide section is opened in Figure 2;

20 Figure 4 is a sectional view taken along line B-B in Figure 1;

Figure 5 is a sectional view showing a state where a guide section is opened in Figure 4;

25 Figure 6 is a perspective view showing a unit configured by a guide apparatus and a cleaning apparatus;

Figure 7 is a perspective view of the guide section in the sectional view taken along line A-A in Figure 1;

30 Figure 8 is an enlarged sectional view of the guide section in the sectional view taken along line A-A in Figure 1;

Figure 9 is a figure showing a state where the guide section in Figure 7 is opened;

35 Figure 10 is a figure showing a state where the guide section in Figure 8 is opened;

Figure 11 is an enlarged perspective view showing a holding mechanism;

40 Figure 12 is a figure showing a holding state of the holding mechanism in Figure 11;

Figure 13 is a perspective view of a filter;

45 Figure 14 is an enlarged view of the main part in Figure 13; and

Figure 15 is a front view of the filter.

Description of Symbols

45 [0025]

A	Moving path
1	Indoor machine
2	Heat exchanger
3	Indoor fan
4	Casing
5	Front panel
6	Suction port
55 7	Blow-out port
8	Air guide panel
9	Filter
10	Guide apparatus

12	Cleaning apparatus
13	Filter net
13a	Resin sheet
14	Filter frame
14a	Vertical frame
14b	Lateral frame
14c	Projecting section
14d	Groove section
15	Rib
15a	Vertical rib
15b	Lateral rib
17	Side wall
18	Central body
19	Guide section
20	Stopper
21	Inner rail
22	Outer rail
30	Motor
32	Driven gear
35	Suction apparatus
37	Upper case
38	Lower case
50	Guide section
52	Front face member
53	Rear face member
54	Guide shaft
55	Link mechanism
56	Engagement pin
57	Receiving plate
58	Engagement hole
59	Locking mechanism
60	Holding mechanism
61	Holding bar
62	Opening

Best Mode for Carrying Out the Invention

[0026] In the following, an embodiment according to the present invention will be described with reference to the accompanying drawings. Figure 1 is a perspective view of an indoor machine of an air conditioner according to the present invention. Figure 2 is a sectional view taken along line A-A in Figure 1. Figure 3 is a sectional view showing a state where a guide section is opened in Figure 2. Figure 4 is a sectional view taken along line B-B in Figure 1. Figure 5 is a sectional view showing a state where a guide section is opened in Figure 4. Figure 6 is a perspective view showing a unit configured by a guide apparatus and a cleaning apparatus. Figure 7 is a perspective view of the guide section in the sectional view taken along line A-A in Figure 1. Figure 8 is an enlarged sectional view of the guide section in the sectional view taken along line A-A in Figure 1. Figure 9 is a figure showing a state where the guide section in Figure 7 is opened. Figure 10 is a figure showing a state where the guide section in Figure 8 is opened. Figure 11 is an enlarged perspective view showing a holding mechanism. Figure 12 is a figure showing a holding state of the holding mechanism in Figure 11. Figure 13 is a perspective view of a filter. Figure 14 is an enlarged view of the main part in Figure 13. Figure 15 is a front view of the filter.

[0027] An air conditioner according to the present invention is configured by an indoor machine 1 and an outdoor machine (not shown). The indoor machine 1 includes a casing 4 which houses a heat exchanger 2, an indoor fan 3, and the like. As shown in Figure 1 to Figure 6, the casing 4 includes a front panel 5 whose front opening is supported in an openable and closable manner, a suction port 6 which is formed on the top surface side of the casing 4 and which is formed in a grid shape for sucking the indoor air, and a blow-out port 7 which is formed in a front lower portion of the casing, for blowing out heat-exchanged cool and warm air.

[0028] The whole surface of the blow-out port 7 is covered by an air guide panel 8. The size of the air guide panel 8 is set so that the air guide panel 8 covers the blow-out port 7 to reach above the blow-out port 7. The air guide panel 8 is configured such that rotary shafts are respectively formed in the upper and lower ends of the air guide panel 8, and that about the rotary shaft at one end side, the other end side of the air guide panel 8 is rotated so that wind is made to blow out in a desired direction.

[0029] The front opening of the casing 4 serves as an opening through which a sheet-like filter 9 is attached into the casing 4. The upper portion of the front panel 5 is rotatably fixed to the side surface of the casing 4, so that the front surface of the casing 4 can be opened by pulling up the lower portion of the front panel 5.

[0030] As shown in Figure 2, in the casing 4, a ventilation path is formed between the suction port 6 and the blow-out port 7. In the ventilation path, the filter 9, the indoor heat exchanger 2, and the blower fan 3 are arranged in this order by taking the suction port 6 side as the upstream side. The indoor heat exchanger 2 is formed into a reverse V shape. In the casing 4, there is also provided a cleaning apparatus 12 for cleaning the filter 9.

[0031] The suction port 6 is formed in substantially the whole surface of the top surface of the casing 4 in the right and left direction. The filter 9 is arranged along the inner surface of the suction port 6. Specifically, the filter 9 has a bending property and is configured by a right filter 9b covering the right half of the suction port 6, and a left filter 9a covering the left half of the suction port 6. All the air sucked from the suction port 6 is made to pass through the filter 9, and thereby the contaminant and dust in the air are removed.

[0032] The filters 9a and 9b are supported by guide apparatuses 10, respectively. The guide apparatuses 10 are respectively provided on the inner surface side of side walls 17 of the casing 4, and on both side surfaces of a central body 18 which bridges over substantially the center of the casing 4 in the forward and rearward direction. Thereby, the guide apparatuses 10 are configured so as to support the right and left filters 9a and 9b.

[0033] The guide apparatuses 10 not only support the

filter 9 in the vicinity of the inner surface of the suction port 6, but also function as a moving path A for moving the filter 9. That is, the guide apparatus 10 is provided along the suction port 6 of the casing 4 (region 10a), and is further extended from the suction port 6 to the front side. Specifically, as shown in Figure 2 and Figure 3, the guide apparatus 10 is inclined downward on the front side of the region 10a to reach the vicinity of the front panel 5 (region 10b), from where the guide apparatus 10 is folded back in a U-shape to the inside (region 10c), so as to reach the vicinity of the suction port 6 through between the region 10b and the heat exchanger 2 (region 10d). The respective regions 10a to 10d are connected by smooth curves.

[0034] In this way, the guide apparatus 10 functions as the moving path A along which the filter 9 can be moved. The moving path A is provided so as to pass through the cleaning apparatus 12 in the region 10b, where the filter 9 being moved along the moving path A is cleaned. As shown in Figure 6, the guide apparatus 10 and the cleaning apparatus 12 are configured to be able to be integrally assembled, and thereby are handled as one unit. Therefore, the guide apparatus 10 and the cleaning apparatus 12 are attached into the casing 4 as a unit. Note that Figure 6 shows a state where among left and right guide sections 50 and 50, the left guide section 50 is closed and the right guide section 50 is opened.

[0035] The guide apparatus 10 includes an inner rail 21 which guides the inner peripheral side of the moving path A formed in the U shape, and an outer rail 22 which guides the outer peripheral side of the moving path A. When both the left and right end sections of the filter 9 are held between the inner rail 21 and the outer rail 22 of the guide apparatus 10, which are configured in this way, the filter 9 can be guided so as to be moved substantially in the U shape.

[0036] The moving path A preferably has such a length that when the filter 9 is moved to the lower side, the upper end of the filter 9 reaches the position from which the upper end of the filter 9 is introduced into the cleaning apparatus 12. With such configuration, it is possible to clean the filter 9 from the lower end to the upper end thereof.

[0037] Further, in a portion of the region 10c, which ranges from near the boundary between the region 10b and the region 10c, to the position closest to the front panel 5, the guide section 50 for opening and closing the moving path A is provided instead of the inner rail 21 and the outer rail 22. The guide section 50 is provided at a position closer to the front side of the casing (closer to the front panel 5) than the cleaning apparatus 12.

[0038] The guide section 50 is provided on each side of the left filter 9a and the right filter 9b. The guide section 50 configures a portion of the moving path A in the state where the moving path is closed, and functions as an opening section of the moving path A at the time when the moving path A is opened.

[0039] The guide section 50 is configured by a front face member 52 and a rear face member 53. The front face member 52 and the rear face member 53 are formed in a plate shape elongated in the left and right direction of the filter 9 (in the left and right longitudinal direction of the air conditioner). In the state where the moving path A is closed, the front face member 52 functions as the outer rail 22, and the rear face member 53 functions as the inner rail 21. Therefore, in the front face member 52 and the rear face member 53, the surface for guiding the filter 9 is formed into a curved shape in correspondence with the curved shape in the region 10c.

[0040] Bearings 52a having a C-shaped cross section are provided at the rear end sections (upper end sections seen from the front of the air conditioner) of the longitudinal end sections of the front face member 52.

On the front side of the cleaning apparatus 12, there is provided a guide shaft 54 whose axial direction is in parallel with the left and right longitudinal direction of the air conditioner. The bearing 52a is attached to the guide shaft 54 so as to be rotatable about the guide shaft 54. That is, the lower end (the other end) of the front face member 52 is made rotatable about the upper end side (one end side).

[0041] The guide shaft 54 is fixed to the cleaning apparatus 12. Note that the cleaning apparatus 12 is fixed to the guide apparatus 10 at the both end sections in the left and right longitudinal direction, and thereby the positional relationship between the guide shaft 54 and the guide apparatus 10 is fixed.

[0042] Further, bearings 53a having a substantially C-shaped cross section are similarly provided at the rear end sections (at the upper end sections when seen from the front of the air conditioner) of the longitudinal end sections of the rear face member 53, so that the rear face member 53 is made rotatable about the guide shaft 54. That is, the front face member 52 and the rear face member 53 are configured such that the lower end (the other end) is made rotatable about the same rotation axis at the upper end side (one end side).

[0043] When the front face member 52 and the rear face member 53 are made to function as a part of the moving path A in the state where the members are not rotated (in a closed attitude), the front face member 52 and the rear face member 53 are arranged so as to face each other at an interval. Thereby, a gap for guiding the filter 9 is provided between the front face member 52 and the rear face member 53. The gap is set substantially equal to a width X of the moving path A except the guide section 50 so that the filter 9 guided by the inner rail 21 and the outer rail 22 can be made to smoothly and continuously pass through the guide section 50.

[0044] The guide section 50 is able to open the moving path A by rotating (by opening rotation of) the front face member 52 and the rear face member 53 so that the other end side (lower end side) of the surface member 52 and the rear face member 53 is directed toward the front of the casing. At this time, the guide section 50 and

the region 10b are linearly arranged. Thus, the filter 9 can be easily introduced into and extracted from the moving path A by using the guide section 50 as an inlet/outlet port.

[0045] In order to actually rotate the guide section 50 in the opening direction, the lower end section of the front face member 52 is rotated so as to be pulled up, and thereby the rear face member 53 is rotated together with the front face member 52 via a link mechanism 55.

[0046] The link mechanism 55 will be described. At both the left and right ends of the front face member 52, engagement pins 56 are provided substantially in parallel with the longitudinal direction of the front face member 52. Further, receiving plates 57 extended substantially in the perpendicular direction from the rear face member 53 are provided at both the left and right ends of the rear face member 53. In the receiving plate 57, there is provided a long hole-shaped engagement hole 58, into which the engagement pin 56 of the front face member is made to loosely fit. The engagement hole 58 is configured so as to have a play in the direction of rotation of the engagement pin 56 at the time when the front face member 52 is rotated in the opening direction in the state where the engagement pin 56 is loosely fitted in the engagement hole 58. The link mechanism 55 is configured by the engagement pin 56 and the engagement hole 58.

[0047] Note that although the engagement pin 56 and the receiving plate 57 are respectively provided on the side close to the guide shaft 54, but the engagement pin 56 and the receiving plate 57 may be provided on the side away from the guide shaft 54. Note that in the configuration in which the engagement pin 56 and the receiving plate 57 are provided on the side close to the guide shaft 54, the height of play necessary for obtaining a predetermined angle θ_1 can be reduced as compared with the case where the engagement pin 56 and the receiving plate 57 are provided on the side away from the guide shaft 54. Therefore, the engagement pin 56 and the receiving plate 57 hardly become an obstacle inside the air conditioner.

[0048] There will be described the operation of the guide section 50 configured as described above. Now, it is assumed that the guide section 50 is in the closed attitude. When the filter 9 is taken out from the indoor machine in order to perform cleaning, exchange, or the like, of the filter 9, the front panel 5 is first opened. Then, the front face member 52 is exposed. In the surface member 52, there is provided a locking mechanism 59 configured to lock the front face member 52 and the rear face member 53 in the closed attitude.

[0049] As shown in Figure 6, the locking mechanism 59 in the present embodiment is configured as a mechanism in which lock and release can be switched by sliding an operation lever in the left and right direction. However, the locking mechanism 59 is not limited to this, and a known mechanism may be adopted as the locking mechanism 59. The front face member 52 is made rotatable by releasing the locking mechanism 59.

[0050] As shown in Figure 8, when the front face member 52 which is made rotatable is rotated in the opening direction (rotated clockwise in the figure), the engagement pin 56 is also rotated. The engagement pin 56 is brought into contact with the engagement hole 58 at an intermediate position M at which the angle formed between the front face member 52 and the rear face member 53 becomes the predetermined angle θ_1 .

[0051] The rear face member 53 tends to be rotated (rotated in the closing direction) by the gravity. However, when the front face member 52 continues to be rotated in the opening direction in the state where the engagement pin 56 is brought into contact with the engagement hole 58, the rear face member 53 is also rotated in the opening direction according to the front face member 52.

[0052] That is, as shown in Figure 10, when the front face member 52 is further rotated from the intermediate position M, the rear face member 53 is simultaneously rotated in the opening direction in the state where the engagement pin 56 is brought into contact with the engagement hole 58, in other words, in the state where the predetermined angle θ_1 is maintained. Then, when the front face member 52 is further rotated by a predetermined angle θ_2 from the intermediate position M, the front face member 52 and the rear face member 53 are set in an opened attitude.

[0053] In the present embodiment, when the front face member 52 is rotated simultaneously with the rear face member 53, the front face member 52 and the rear face member 53 are rotated about the same axis (guide shaft 54). Thus, the relative positional relationship between the front face member 52 and the rear face member 53 is not changed, so that the link mechanism can be simply configured.

[0054] As described above, in the opened attitude of the guide section 50, the width between the front face member 52 and the rear face member 53 is about the width X on the upper end side (one end side) and is a width X1 ($X1 > X$) on the lower end side (the other end side). Thus, the width between the front face member 52 and the rear face member 53 is increased from the upper end side to the lower end side. That is, the inner surface of the guide section 50 can be formed in a tapered shape which is narrowed from the side of the inlet/outlet port 50a to the inside, so that the filter 9 can be easily inserted into the moving path A.

[0055] In the present embodiment, there is provided a holding mechanism 60 for holding the front face member 52 in the opened attitude. The holding mechanism 60 includes a holding bar 61 which is formed so as to interfere with the rotational orbit of the front face member 52. The base section of the holding bar 61 is fixed to the cleaning apparatus 12. The distal end section 61a of the holding bar 61 is formed in a semispherical shape and is bent so as to become substantially perpendicular to a main body section 61b of the holding bar 61. That is, the holding bar 61 is formed such that the axial direction of the distal end section 61a is substantially in parallel with

the longitudinal direction of the front face member 52.

[0056] On the other hand, the front face member 52 has an opening 62 formed at the position where the holding bar 61 is brought into contact with the front face member 52. The opening 62 is formed so that the main body section 61b of the holding bar 61 is able to pass through the opening 62, but that the distal end section 61a of the holding bar 61 is brought into contact with the opening edge of the opening 62. Further, the holding bar 61 is formed so as to be inclined with respect to the front face member 52 in the opened attitude, and is formed so that the distal end section 61a is brought into contact with the edge of the opening 62 just before the front face member 52 reaches the opened attitude.

[0057] There will be described the operation of the holding mechanism 60 including the holding bar 61 and the opening 62. When the guide section 50 is rotated in the opening direction and when the front face member 52 approaches the opened attitude, the distal end section 61a of the holding bar 61 is, as shown in Figure 11, brought into contact with the edge of the opening 62 formed in the front face member 52. The holding bar 61 is formed of a synthetic resin and has elasticity. Thus, when an external force is applied to the distal end section 61a, the holding bar 61 is easily deformed and bent.

[0058] Thus, when the front face member 52 continues to be rotated as it is in the state where the distal end section 61a is brought into contact with the opening edge, the distal end section 61a is bent backward while riding onto the edge of the opening 62. The distal end section 61a is quickly returned to the original state at the time when riding across the opening 62, so that the guide section 50 is held in this attitude by the holding bar 61 (Figure 12).

[0059] Thereby, the distal end section 61a of the holding bar 61 is left in the state of being hooked by the opening 62 of the front face member 52. Thus, the front face member 52 holds the opened attitude even when the hand is released from the front face member 52. At this time, the rear face member 53 is made to be rotated in the closing direction by the gravity. However, since the engagement pin 56 is in contact with the engagement hole 58, the rear face member 53 cannot be rotated in the closing direction. In other words, the rear face member 53 is in the state of being held by the link mechanism 55.

[0060] Then, when the front face member 52 is held by the holding mechanism 60, the angle formed between the front face member 52 and the rear face member 53 can be kept at the predetermined angle $\theta 1$. In this holding state, the filter 9 is taken out from the moving path A.

[0061] Note that when the front face member 52 in the opened attitude is forced to be further rotated in the opening direction, the rotation of the front face member 52 is regulated because the edge of the opening 62 on the side closest to the bearing 52a is brought into contact with the holding bar 61. That is, the holding mechanism 60 also plays a role of stopper which regulates the rota-

tion of the front face member 52.

[0062] The filter 9 is configured to have such a length that the end of the filter 9 is set at substantially the same position as that of the lower end of the guide section 50 in the use state of the air conditioner (in the state where the filter 9 is arranged so as to cover the suction port 6). In the opened attitude of the guide section 50, as shown in Figure 3 and Figure 5, the rear face member 53 is rotated together with the front face member 52, so that the filter 9 is also rotated in the state of being pressed by the rear face member. Therefore, when the guide section 50 is opened, the end of the filter 9 is directed toward the front of the casing 4, so as to be easily taken out.

[0063] In this way, the end of the filter 9 (the end on the front panel side) can be moved by the rear face member 53 from the inside place of the air conditioner to the place where the end can be easily taken out. Thereby, the filter 9 can be easily taken out by holding the end of the filter 9.

[0064] In the state where the front face member 52 is held by the holding mechanism 60, the interval between the front face member 52 and the rear face member 53 is set in a funnel-shape (in side view) in which the interval is reduced from the side of the inlet/outlet port 50a to the inside. The interval on the side of the inside is set to the width X which is substantially the same as the width of the moving paths A other than the guide section 50, and the interval on the side of the inlet/outlet port 50a is set larger than the width on the side of the inside.

[0065] Therefore, the filter 9 can be easily inserted into the moving path A from the inlet/outlet port 50a having the width larger than the width of the moving path A. In many cases, the indoor machine of the separate type air conditioner as in the present embodiment is installed at a high position on the wall surface. This often makes it difficult to take out and insert the filter 9.

[0066] The filter 9 is thin and flexible, and hence is easily bent. Thus, when the filter 9 is inserted from the inlet/outlet port 50a by holding the lower portion of the filter 9, the filter 9 is easily bent. This makes it difficult to insert the filter in the case where the width of the inlet/outlet port is substantially the same as the width of the moving path A as in the prior art form.

[0067] However, in the case where the opening width of the inlet/outlet port is made larger than the width X of the moving path A as in the present invention, even when the filter is bent to a certain extent, the filter 9 can be easily inserted into the opening. Further, the opening width is gradually reduced from the opening distal end to the inside. Thus, the filter is inserted into the inside according to such change, so as to reach the moving path.

[0068] In this way, the filter 9 can be easily inserted and taken out. Note that when the guide section 50 is to be returned to the state of the moving path, the surface member 52 is pressed in the closing rotation direction, so that the holding bar 61 is bent to come off from the opening 62. Then, when the surface member 52 contin-

ues to be pressed as it is, the guide section 50 is returned to the state of the moving path. Then, the guide section 50 may be locked by the locking mechanism.

[0069] Note that in the present embodiment, the link mechanism 55 is configured by the engagement pin 56 and the engagement hole 58. However, the link mechanism 55 may also be configured in such a manner that a projecting section is provided in the receiving plate 57 instead of the engagement hole 58, and that the projecting section is brought into contact with the engagement pin 56. In this case, when the lower surface of the projecting section is located at the position where the engagement hole 58 is brought into contact with the engagement pin 56, the front face member and the rear face member can be brought into contact with each other at the predetermined angle $\theta 1$.

[0070] Alternatively, the link mechanism may also be configured in such a manner that a projecting section is provided only in the receiving plate 57, and that the projection section is brought into contact with the front face side of the front face member 52 in the state where the surface member and the rear face member are set to form the predetermined angle $\theta 1$.

[0071] In the present embodiment, only the holding mechanism 60 for holding the front face member is described, but a holding mechanism for holding the rear face member may also be provided at the same time. Further, in the present embodiment, the holding mechanism 60 for holding the front face member is used, but the holding mechanism 60 for holding the front face member may not be used. In this case, the front face member is not held, but instead of the holding mechanism 60, a holding mechanism for holding the rear face member is provided.

[0072] When the guide is in the opened state, the front face member is made to be rotated in the closing direction by the gravity, so that the interval between the front face member and the rear face member of the guide section 50 becomes the same as the width in the state of the moving path. At this time, when the filter is inserted so as to be brought into contact with the front face member, the front face member is rotated by the filter in the opening direction because the front face member is rotatable in the opening direction. As a result, the interval between the front face member and the rear face member is increased. Therefore, even in such configuration, the filter can be easily inserted.

[0073] Note that in the present embodiment, the front face member and the rear face member which configure the above described guide section are freely rotated about the same rotation shaft 54 provided on the side of the outer rail 22, but the rotation shaft may be separately provided for each of the front face member and the rear face member. For example, it is configured such that the front face member is rotated about the rotation shaft provided on the side of the outer rail 22, and that the rear face member is rotated about the rotation shaft provided on the side of the inner rail 21.

[0074] As shown in Figure 13 and Figure 15, the filter 9 is configured by a filter net 13 and a filter frame 14 for supporting the four sides of the filter net 13. The filter frame 14 is configured by a vertical frame 14a for supporting the left and right sides, and a lateral frame 14b for supporting the upper and lower sides.

[0075] As shown in Figure 14, the vertical frame 14a is formed in a corrugated shape in side view. When the vertical frame 14a is formed in the corrugated shape, recessions and projections are formed in the vertical direction (moving direction) on the inner surface side of the vertical frame 14a. On the other hand, in the region 10c, a gear 32 rotated by a motor 30 is provided on the inner side of the rear face member 53. Both the left and right end sections of the rear face member are cut out so as to expose the gear 32 in the moving path A (see Figure 6) from the cut out sections.

[0076] Also, the recessions and projections of the vertical frame 14a are configured to mesh with the gear 32. Thereby, the filter 9 can be moved forward and rearward by the rotation of the gear 32. Further, the filter 9 can be easily bent in the vertical direction by forming the recessions and projections into the corrugated shape. Thereby, the filter 9 can be easily folded back in the U-shape.

[0077] The recessed and projected surface formed on the inner surface side of the vertical frame 14a may only have a shape which can be meshed with the teeth of the driven gear 32. However, it is preferred that the pitch of the recessions and projections is set to be equal to the pitch of the teeth of the driven gear 32. Thus, the tooth skip can be more effectively prevented.

[0078] Further, a rib 15 is provided so that the inside of the filter frame 14 is divided in a grid shape. The rib 15 is fixed to the filter net 13 so as to support the filter net 13. Thereby, the bending and waving of the filter 9 can be prevented. The rib 15 is configured by a vertical rib 15a arranged in the vertical direction and a lateral rib 15b arranged in the lateral direction. The vertical rib 15a is formed to have a small thickness, and the lateral rib 15b has a thickness larger than the thickness of the vertical rib 15a. By being configured in this way, the filter 9 can be easily bent in the vertical direction while maintaining the lateral rigidity.

[0079] Further, as shown in Figure 14, a slit 16 is provided between the lateral rib 15b and the vertical frame 14a of the filter frame 14, so that the lateral rib 15 and the vertical frame 14a are discontinuous from each other. When the vertical frame 14a and the lateral rib 15b are configured to be discontinuous from each other, the vertical frame 14a is hardly influenced by the lateral rib 15b, so that the bending property of the filter 9 in the vertical direction can be held. Further, any material only having flexibility can be used as the material of the filter frame 14, and hence any of polypropylene (PP), polyethylene terephthalate (PET), synthetic resin such as soft resin, rubber and paper may be used.

[0080] The filter net 13 for passing the air sucked from the suction port 6 is stretched in the upper portion of the

filter 9. However, a thin resin sheet 13a is stretched in the lower portion of the filter 9 instead of the filter net 13, so that the lower portion of the filter 9 is configured to prevent the passage of the air. Note that the resin sheet 13a is formed to have a small thickness similarly to the vertical rib 15a. Thereby, the bending property in the vertical direction is secured for the filter 9 as a whole. Note that the filter net 13 may be stretched on the whole surface of the filter 9.

[0081] The cleaning apparatus 12 is provided in the region 10b of the guide apparatus 10. Since the region 10b is formed in the linear shape, the filter 9 can be easily attached to the cleaning apparatus 12. Further, since the cleaning apparatus 12 is provided on the front side of the casing 4, the filter 9 can be easily attached to the cleaning apparatus 12.

[0082] The cleaning apparatus 12 is configured by an upper case 37 and a lower case 38 which have a substantially U-shaped cross section, and is fixed to the casing 4 so as to laterally bridge the front of the casing 4 in the state where the recessed sections of the upper case 37 and the lower case 38 are set to face each other.

[0083] There is a gap is between the upper case 37 and the lower case 38, so that the filter 9 can be moved through the gap. A very narrow interval is maintained between the upper case 37 and the surface of the filter 9 and between the lower case 38 and the surface of the filter 9. The left and right ends of a suction section 34 are opened. That is, it is configured such that the filter 9 can be made to pass through the cleaning apparatus 12 formed in the box shape as a whole.

[0084] One of the both longitudinal ends of the cleaning apparatus 12 is opened, and the other end is connected to a suction apparatus 35. The suction apparatus 35 is configured by a suction fan, and is connected to a duct (not shown) communicating the outside. A suction force is generated by rotating the suction fan, so that dust in the filter 9 can be sucked by the cleaning apparatus 12. The sucked air is exhausted to the outside from the duct.

[0085] Further, the interval between the upper case 37 and the lower case 38 is set to be substantially equal to the width of the lateral ribs 15b of the filter 9. When the side walls of the upper case 37 and the lower case 38 are overlapped with the lateral ribs 15b, the inside of the cleaning apparatus 12 becomes a substantially closed space, so that the suction force is increased.

[0086] In the above described configuration, when the filter 9 is cleaned, the filter 9 is moved forward by the rotation of the gear 32. At this time, the moving path A is formed by the guide apparatus 10 so as to be folded back into the U-shape in the front portion of the casing 4. Thereby, the front end of the filter 9 is guided backward (on the downstream side) while the filter 9 is bent according to the forward movement. As a result, the whole surface of the filter 9 can be cleaned.

Industrial Applicability

[0087] The present invention can be effectively used for an air conditioner which is capable of blowing off conditioned air at the time of cooling and warming operation.

Claims

1. An air conditioner which includes a filter arranged along the inner surface side of a suction port of a casing, a cleaning apparatus configured to clean the filter, a moving path for moving the filter with respect to the cleaning apparatus, and a guide section configuring a portion of the moving path, and which is configured to open the moving path to the outside of the casing by rotating the other end of the guide section about one end side of the guide section, **characterized in that** the guide section comprises: a front face member arranged on the front face side of the filter; and a rear face member arranged on the rear face side of the filter.
2. The air conditioner according to claim 1, **characterized in that** in the state where the moving path is opened, the width between the front face member and the rear face member is increased from the one end side to the other end side of the guide section.
3. The air conditioner according to claim 2, **characterized in that** the rear face member is rotated via a link mechanism by rotating the front face member.
4. The air conditioner according to claim 3, **characterized in that** the link mechanism is configured, after the front face member is rotated by a predetermined angle, to rotate the rear face member according to the rotation of the front face member.
5. The air conditioner according to claim 4, **characterized by** further comprising a holding mechanism configured to fix and hold the front face member which is rotated by a predetermined angle together with the rear face member, in the state rotated by the predetermined angle.
6. The air conditioner according to claim 5, **characterized in that** in the state where the front face member is fixed and held by the holding mechanism, the rear face member is held by the link mechanism in the state of being inclined at a fixed angle with respect to the front face member.
7. The air conditioner according to one of claim 5 and claim 6, **characterized in that** the holding mechanism regulates the rotation of the front face member.

FIG. 1

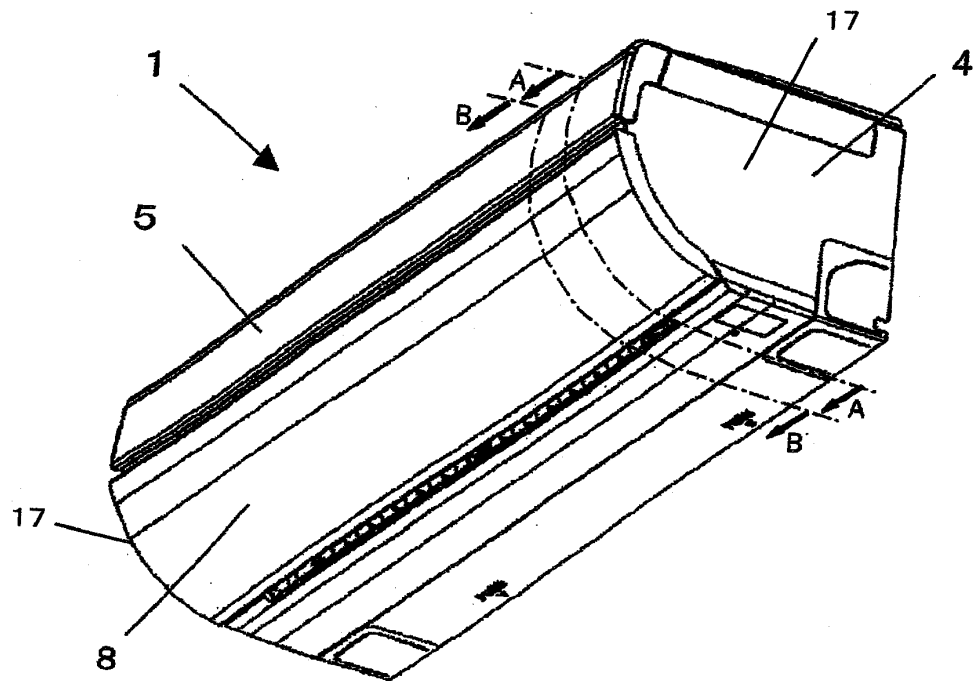


FIG. 2

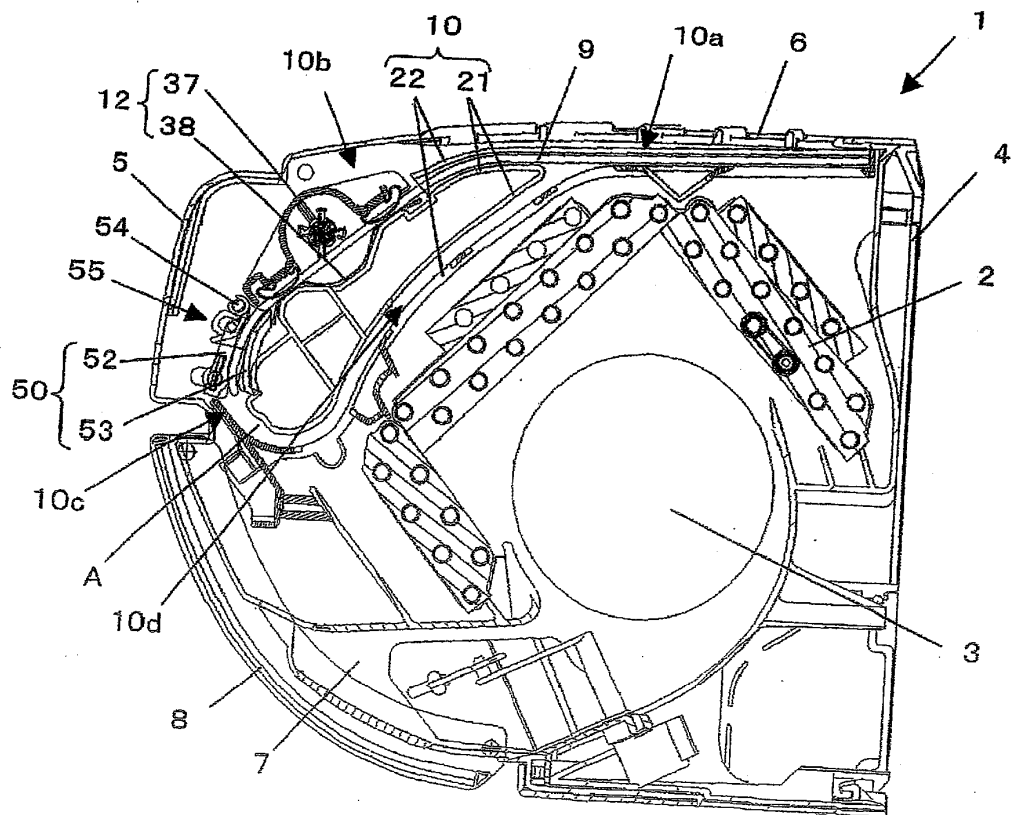


FIG. 3

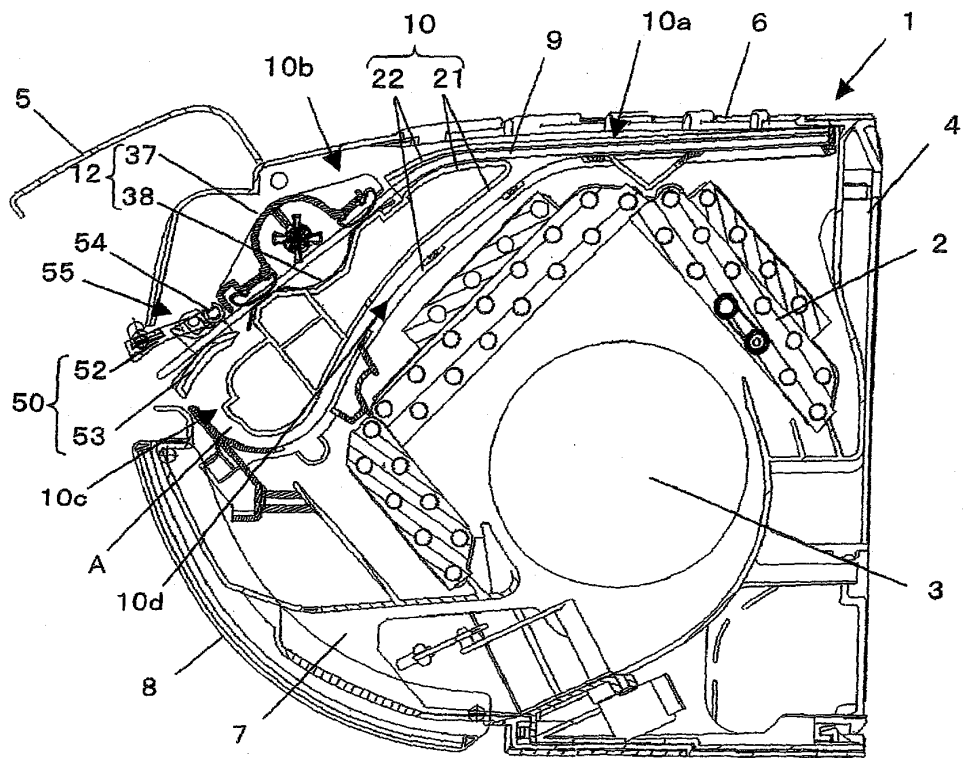


FIG. 4

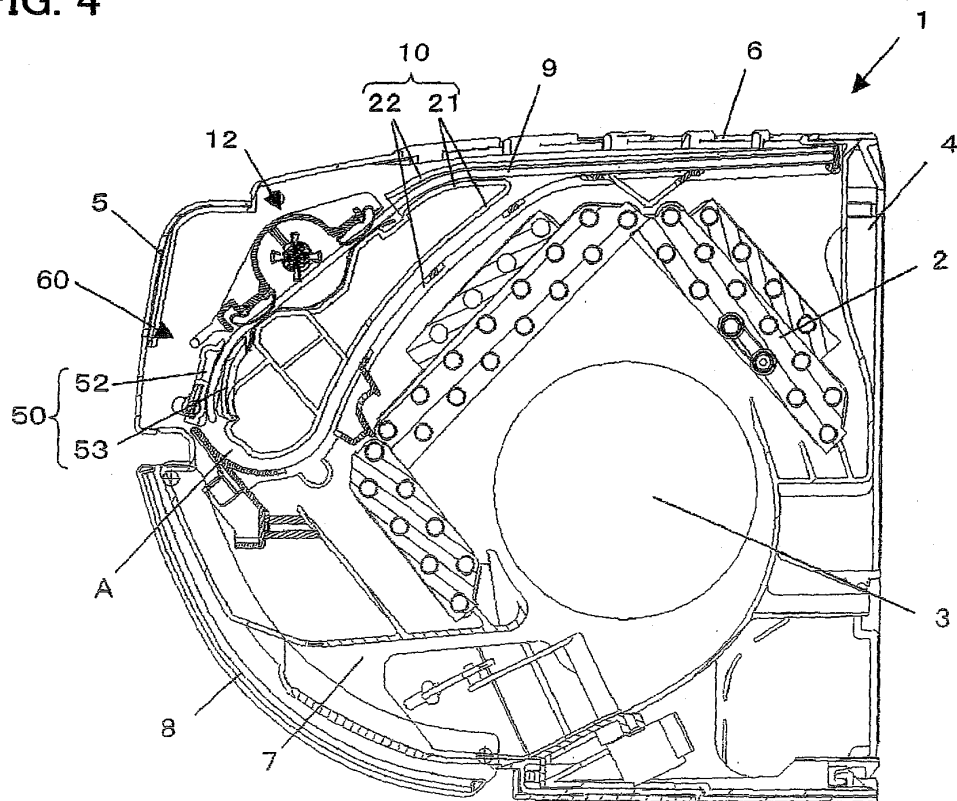


FIG. 5

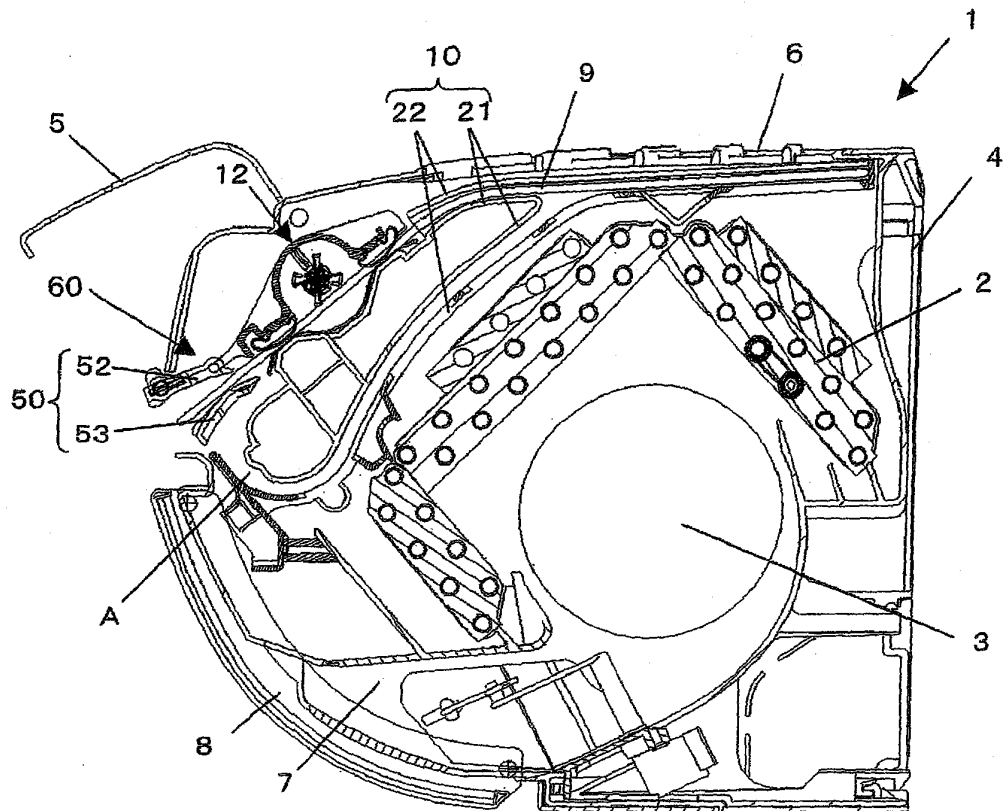


FIG. 6

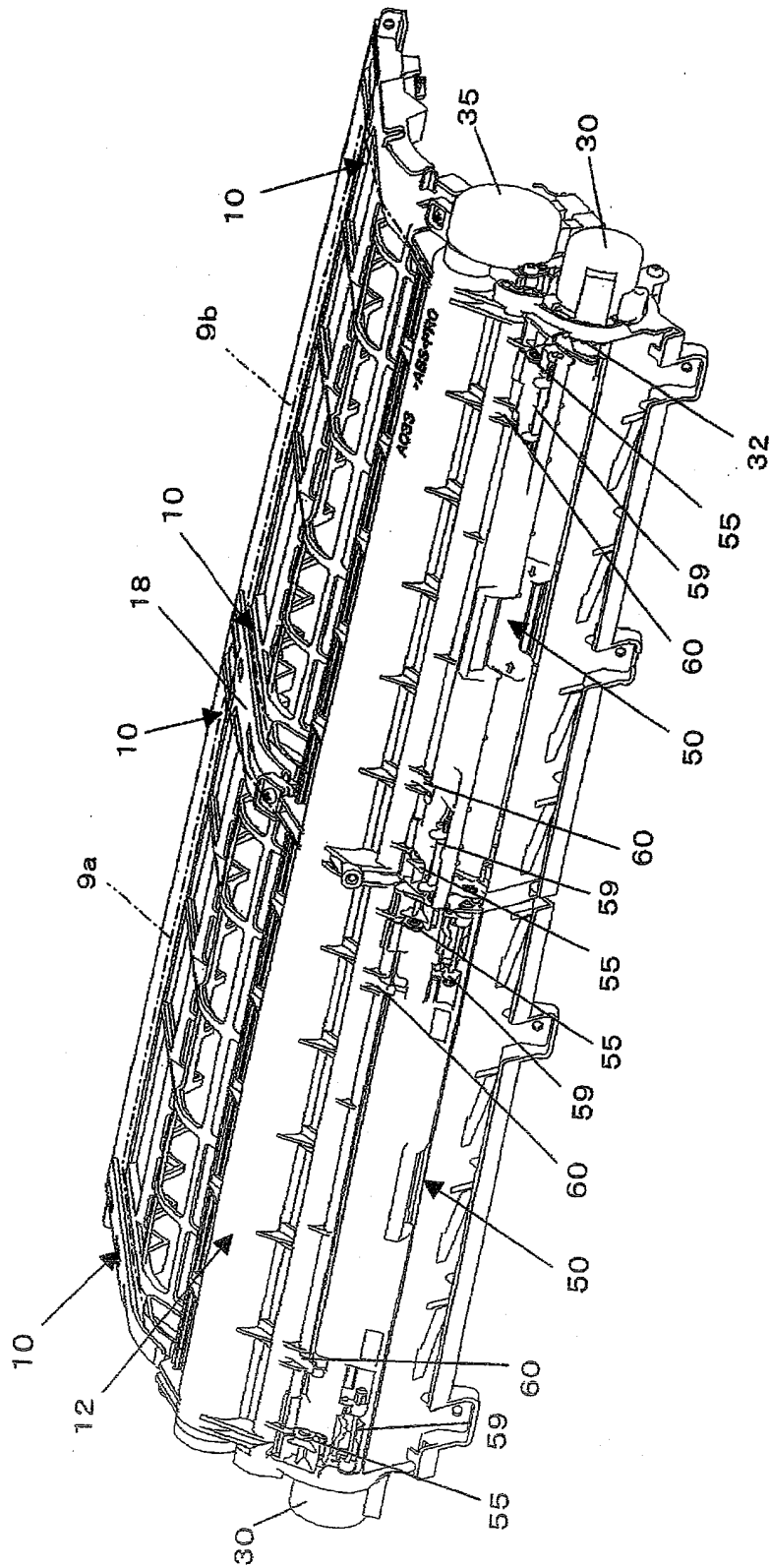


FIG. 7

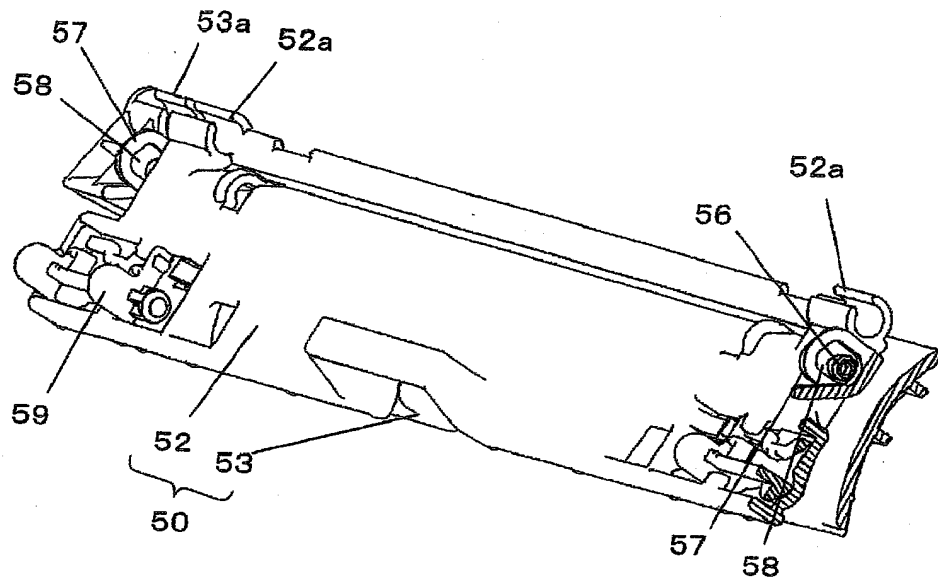


FIG. 8

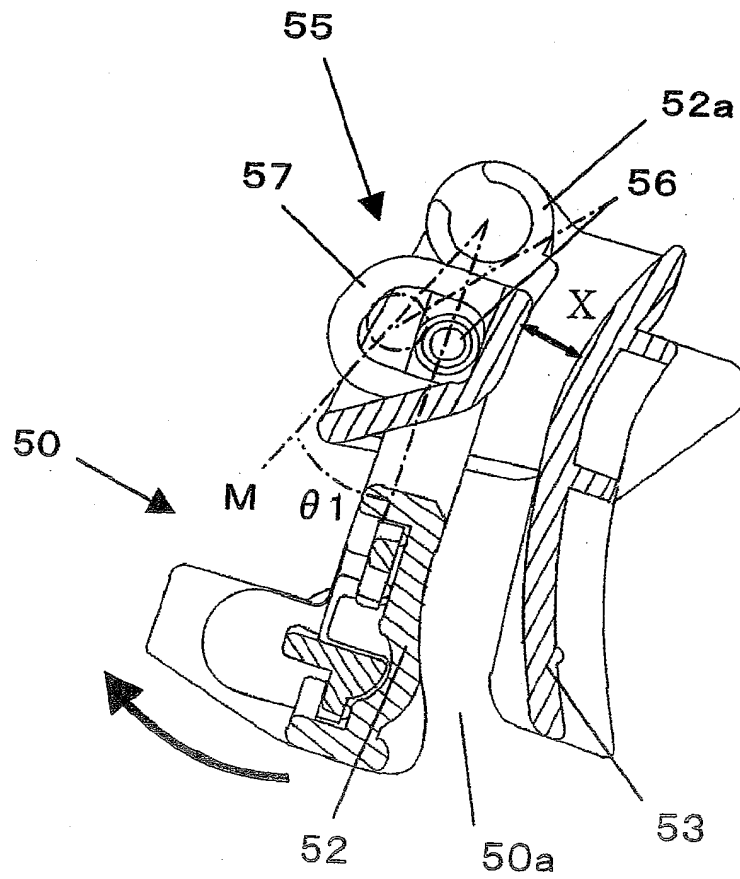


FIG. 9

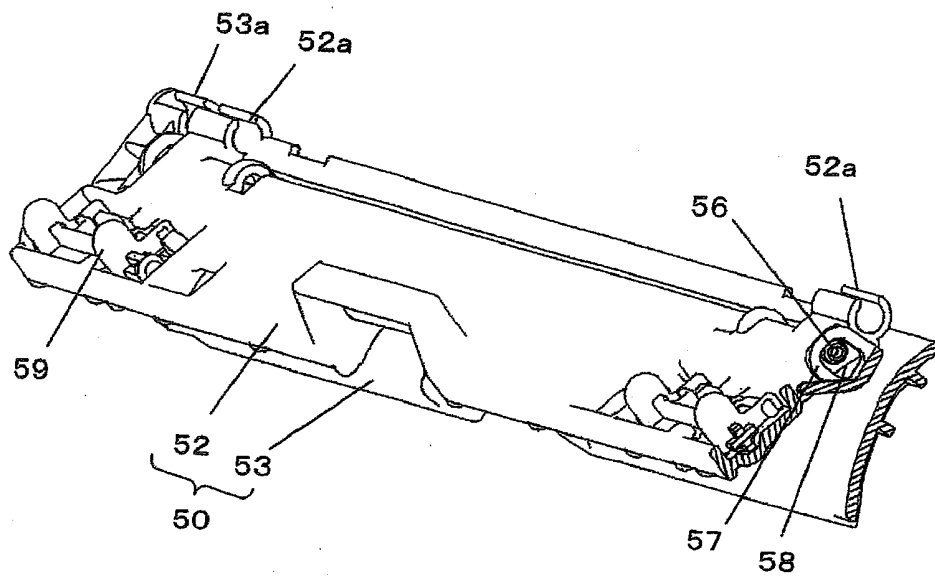


FIG. 10

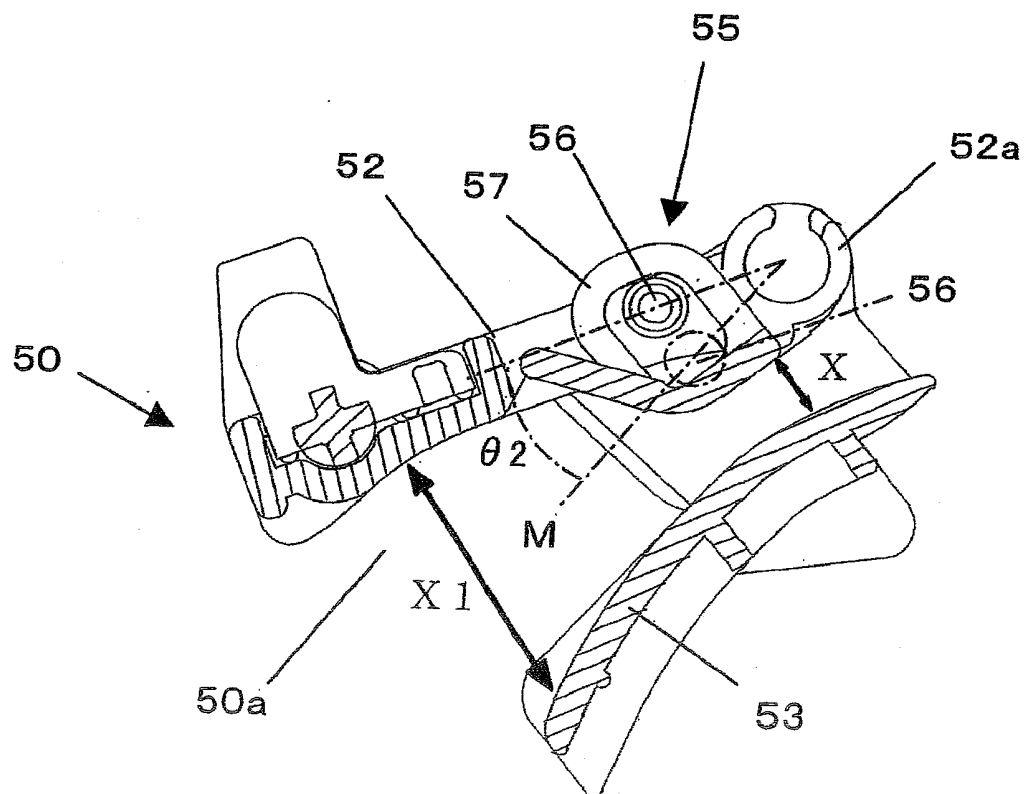


FIG. 11

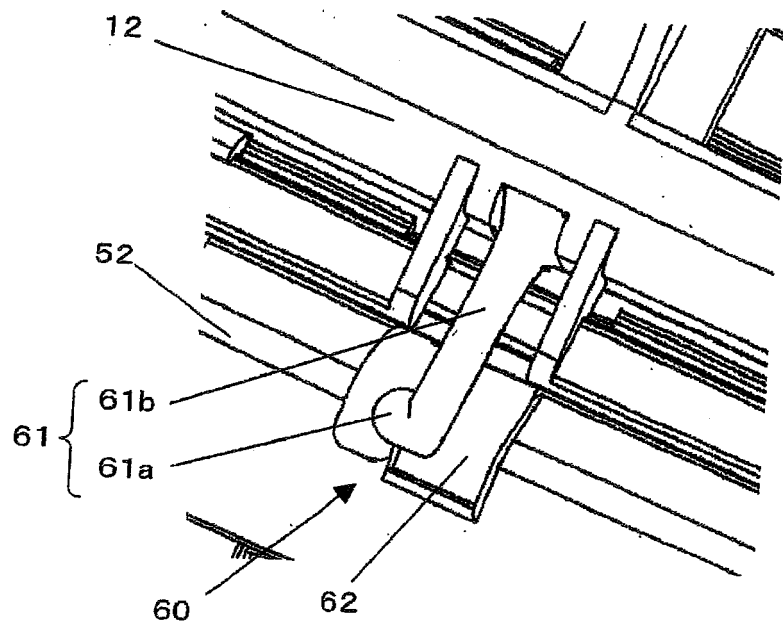


FIG. 12

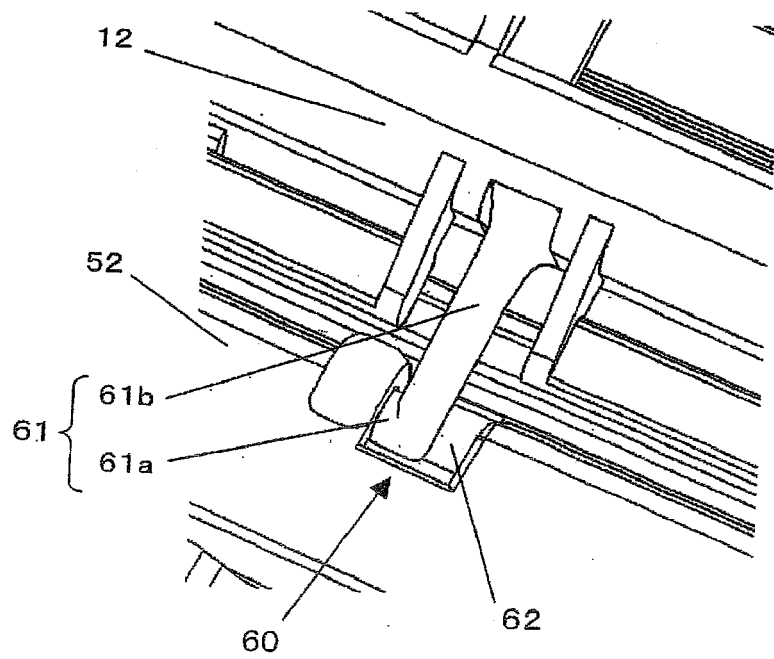


FIG. 13

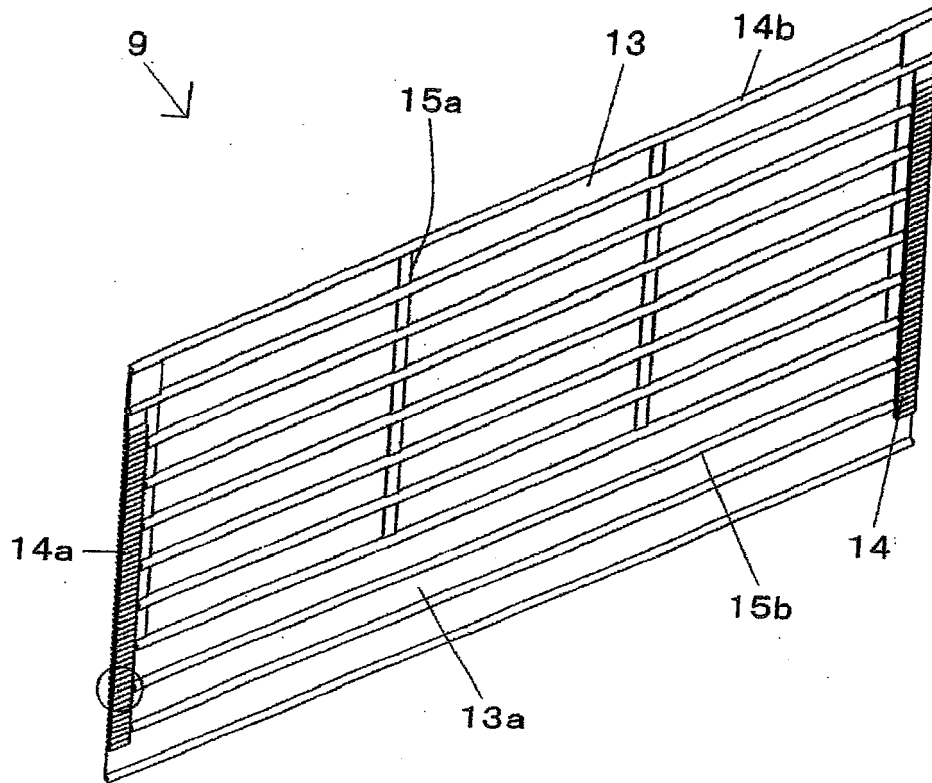


FIG. 14

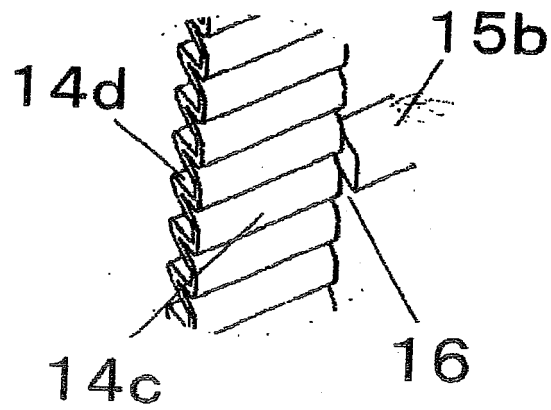
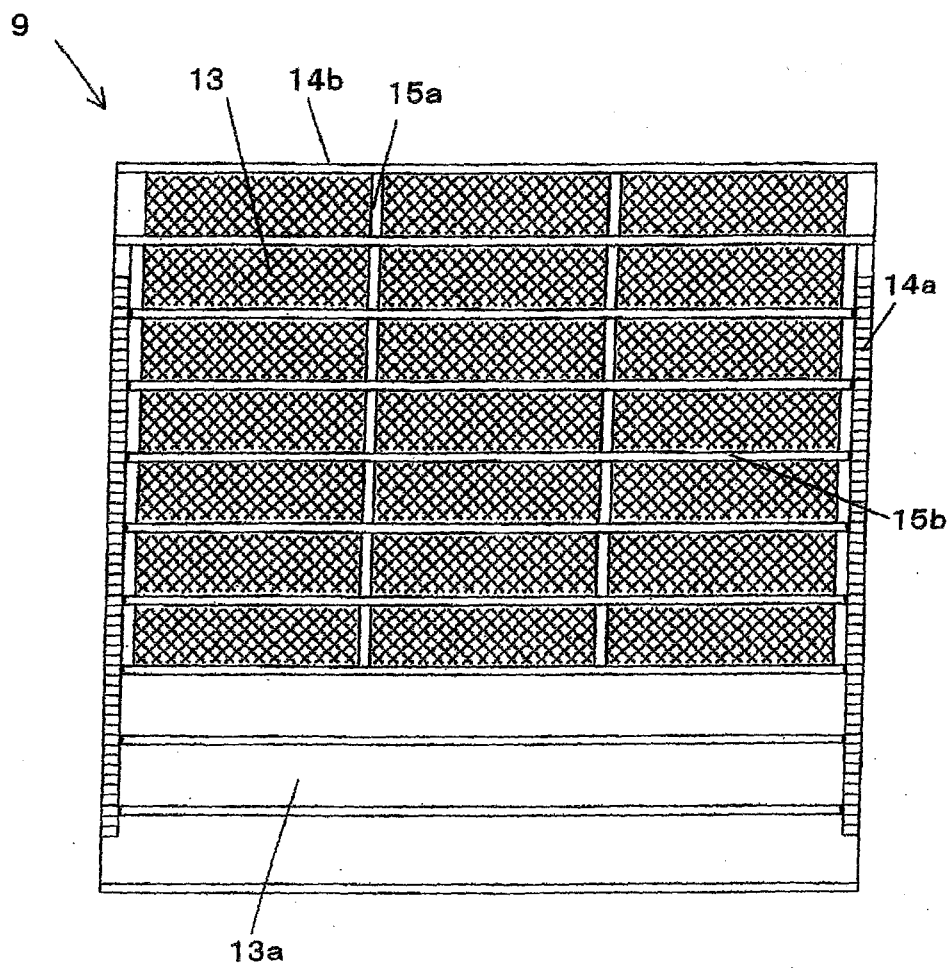


FIG. 15



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2008/064927

A. CLASSIFICATION OF SUBJECT MATTER F24F13/28(2006.01)i, F24F1/00(2006.01)i		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) F24F13/28, F24F1/00		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2008 Kokai Jitsuyo Shinan Koho 1971-2008 Toroku Jitsuyo Shinan Koho 1994-2008		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	JP 2007-147122 A (Sharp Corp.), 14 June, 2007 (14.06.07), Par. No. [0031]; Fig. 4 & WO 2007/040074 A1	1, 2 3-7
Y A	JP 2001-208687 A (Sharp Corp.), 10 October, 2001 (10.10.01), Par. No. [0019]; Fig. 13 & US 6534769 B1 & EP 1112716 A2 & DE 60028916 D & DE 60028916 T	1, 2 3-7
☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 26 September, 2008 (26.09.08)		Date of mailing of the international search report 21 October, 2008 (21.10.08)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

Form PCT/ISA/210 (second sheet) (April 2007)

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2007147122 A [0004]