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(54) **Air conditioner**

Klimaanlage

Dispositif de conditionnement d'air

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EP 1 574 789 B1

Description

Background of the invention

[0001] The present invention relates to an air conditioner, comprising:

a housing;
 a heat exchanger disposed in the housing;
 a line flow fan disposed between the heat exchanger and the housing for blowing air heat-exchanged by the heat exchanger and provided with a boss forming a coupling fixation portion;
 a casing mounted in the housing for receiving a motor for driving the line flow fan;
 a partition plate making a partition between an air passageway in which the air is carried out by the line flow fan and a space in which the casing of the motor is mounted; and
 a receiving hole disposed in the partition plate and adapted to permit insertion therethrough of the coupling fixation portion for coupling the motor with the line flow fan;
 wherein a shielded space is formed inside the casing so that an outer circumference of a shaft of the motor is covered tubularly, and wherein the casing is disposed in close contact with the partition plate.

[0002] Such a device is known from the document JP-A-10-61964.

[0003] In the drawing Fig. 7 is a principal sectional view of a conventional indoor unit of an air conditioner which is, for example, disclosed in JP-A-10-61964. In the drawing, the reference numeral 31 designates the housing of the indoor unit; 33, a line flow fan disposed in the air passageway of the housing 31; 34, a motor for driving the line flow fan 33; 35, a casing of a motor receiving portion; 37, a partition plate for partitioning the air passageway from a motor receiving space; 49, a boss for fixedly connecting the line flow fan 33 and the motor 34; and 48, a shaft cover surrounding the shaft of the motor 34. One side of the shaft cover 48 is fitted over the outer circumference of a bearing rubber cushion of the motor 34 while the other side of the shaft cover 48 is fitted into the partition plate 37.

[0004] In this construction, the outer circumference of the motor shaft is covered with the tubular shaft cover 48. The anti-engine side of the shaft cover 48 is fitted into a receiving hole disposed between the housing 31 and the partition plate 37, which partition the air passageway for the air passing through a heat exchanger from the motor receiving space. Thus, the receiving hole is shielded so that the outside air is prevented from entering the air passageway through this receiving hole. Thus, the line flow fan and the like are prevented from sweating.

[0005] Since the receiving hole for the motor shaft was arranged to be shielded from wind as described above in the conventional air conditioner, the portion where the

line flow fan was fixed to the motor was provided on the air passageway side. In addition, the gap between the air passageway partition plate and the line flow fan therefore became so large that there might arise a fault such as high wind noise or the like. Further, for measures against such a fault, a fastening screw had to be provided inside the fan rather than the side wall of the line flow fan. Therefore, the blade of the line flow fan had to be cut to make a hole where a screw fastening tool such as a driver or the like could be inserted, or the blade of the line flow fan had to be partly omitted, so as to provide a fastening screw fixing portion. Thus, the fastening screw fixing portion was the cause to prevent stable air blowing of the line flow fan.

[0006] In the conventional device according to JP-A-10-61964, the coupling means for connecting the conventional flow fan to the motor for driving same are clearly mounted in the space occupied by the flow fan. Hence, when it is necessary to replace the flow fan and/or the motor, it is necessary to obtain access to and/or open the casing receiving the flow fan for demounting purposes. Hence, in the conventional device, a considerable gap must be provided between the air passage partition plate and the line flow fan which covers space on the one hand and may cause wind noises on the other hand.

[0007] Accordingly, the object underlying the present invention is to provide an air conditioner which is more compact and allows easier maintenance in practice.

[0008] According to the present invention, this object is solved by an air conditioner as defined in claim 1. Advantageous further developments of the air conditioner according to the invention are specified in the sub-claims.

[0009] In the air conditioner according to the invention, the fixation means for connecting/disconnecting the line flow fan on the one hand and the motor on the other hand are located outside the air passageway. Hence, the gap between the line flow fan and the air passage partition plate can be reduced resulting in that the line flow fan can provide a stable air blowing characteristic.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

Fig. 1 is a partially cutaway perspective view of an air conditioner indoor unit according to an embodiment of the present invention.

Fig. 2 is a principal enlarged perspective view showing details of the embodiment of the present invention.

Fig. 3 is a principal plan view showing details of the embodiment of the present invention.

Fig. 4 is a principal sectional view showing further details of the embodiment of the present invention.

Fig. 5 is a principal sectional view showing further details of the embodiment of the present invention.

Fig. 6 is a principal perspective view showing further details of the embodiment of the present invention.

Fig. 7 is a principal enlarged view of a conventional air conditioner indoor unit.

BEST MODE FOR CARRYING OUT THE INVENTION

[0011] Embodiments of the present invention will be described below with reference to the drawings.

[0012] An embodiment of the present invention will be described below with reference to Fig. 1. Fig. 1 is a partially cutaway perspective view showing an air conditioner according to the present invention. Fig. 2 is a principal enlarged perspective view of the air conditioner according to the present invention; Fig. 2 is a principal plan view; and Fig. 3 is a principal sectional view.

[0013] In the drawings, the reference numeral 31 designates a housing forming an air passageway of the air conditioner; 32, a heat exchanger attached to the housing 31; 33, a line flow fan for blowing the air heat-exchanged by the heat exchanger 32 to an air outlet; 34, a motor for driving the line flow fan 33; 35, a casing of a motor receiving portion; 36, a motor cover; 37, a partition plate provided in the housing 31 for partitioning the air passageway from a space where the motor 34 is mounted; 38, a receiving hole disposed in the partition plate 37; 49, a boss (coupling fixation portion) for fixing and supporting the line flow fan; 39, a fastening screw disposed in the boss 49 for fastening together the line flow fan 33 and the shaft of the motor 34; 40, a working space for fastening or loosening the fastening screw 39; 41, a cover member for shielding the working space 40; 42, an insulator applied to the cover member 41 for improving the shielding performance of the working space 40; and 43, an insulator applied to the motor cover 36 and the casing 35 of the motor receiving portion so as to fill up the gap between the partition plate 37 and each of the motor cover 36 and the casing 35.

[0014] In Fig. 1, as the flow of the air in the indoor unit of the air conditioner is shown by the white arrows, the air flows into the unit from its front and passes through the heat exchanger 32 so as to be heat-exchanged. The heat-exchanged air is directed to the air outlet in the lower front of the unit along the air passageway of the housing 31 by the line flow fan 33 so as to be blown to the outside of the indoor unit. At this time, the partition plate 37, and the insulators 42 and 43 which are applied to the cover member 41, and the casing 35 of the motor receiving portion and the motor cover 36, respectively, form a structure in which the air not passing through the heat exchanger 32 is shielded from flowing into the air passageway from such portions as shown by the black arrows.

[0015] Next, the aforementioned shielding structure will be described with reference to Figs. 2, 3 and 4. As shown in the principal enlarged perspective view of Fig. 2, the casing 35 which receives the motor 34 for driving the line flow fan 33 constitutes a substantially lower portion of the shielding structure with respect to the axis of the motor. On the other hand, the motor cover 36 is disposed on the upper portion of this motor so that the motor

34 is fixedly held from above and below. In the lower portion of the casing 35, fastening holes or ribs are provided for fastening the casing 35 to the housing 31 of the indoor unit. In addition, the wall of the casing extends on the motor-shaft side of the casing 35 up to a position adjacent to the partition plate 37, while the motor cover 36 on the upper portion is also provided with a portion extending on the motor-shaft side in the same manner. Thus, these extension portions form a shielded space on the motor-shaft side.

[0016] Further, hooks, grooves, keep plates, etc. are provided in the casing 35 and the motor cover 36 for retaining the electric wiring from the motor 34.

[0017] Fig. 3 is a principal plan view. The air passageway side where the heat exchanger 32 and the line flow fan 33 are received is located on the left side of the partition plate 37 in Fig. 3, while the casing 35 and the motor cover 36 which receive the motor 34 are located on the opposite side so that the motor shaft of the motor 34 is fixedly connected to the line flow fan 33.

[0018] Fig. 4 is a principal sectional view. The motor 34 is fixedly received in the casing 35 and the motor cover 36, and coupled with the boss (coupling fixation portion) 49 of the line flow fan 33 in the air passageway through the receiving hole provided in the partition plate 37 of the housing 31.

[0019] The boss 49 of the line flow fan 33 is projected into the motor side through the receiving hole 38 of the partition plate 37 so that the fastening screw 39 for fastening the motor 34 and the boss 49 can be located outside the air passageway. As a result, the gap between the line flow fan 33 and the air passageway partition plate 37 can be reduced so that the line flow fan 33 can obtain a stable air blowing characteristic. In addition, by loosening the fastening screw 39 of the line flow fan 33 disposed under the heat exchanger 32, the motor can be separated from the fan without removing the heat exchanger 32.

[0020] A shielded space 50 is formed by the extension portion of the casing 35 and the upper motor cover 36 so as to tubularly cover the outer circumference of the shaft of the motor 34 which extends toward the fan side. Thus, the rubber cushion of the bearing portion of the motor 34 is fixed tightly to the casing 35 and the motor cover 36. Accordingly, the air passing from the motor 34 side, not through the heat exchanger, but, through the outside of the air passageway is prevented from entering the air passageway so that the line flow fan 33 can be prevented from sweating.

[0021] When there arises any problem in the motor 34 so that the motor 34 has to be replaced to mount a new one, or when the line flow fan 33 disposed in the air passageway between the heat exchanger 32 and the housing 31 is removed, the cover member 41 attached to the motor cover 36 is removed. As a result, the working space 40 forms an opening like a window for loosening or fastening the fastening screw 39 of the boss which is the coupling portion between the line flow fan 33 and the

motor 34. After the replacement and mounting by means of the fastening screw 39, the cover member 41 is attached to the motor cover 36 by a reverse procedure so as to form the shielded space 50 again. Thus, the outside air is prevented from entering the air passageway.

[0022] Fig. 5 is a sectional view showing the attachment of a cover member in another embodiment of the present invention. In the drawing, the reference numeral 36 designates a motor cover; 44, a hook provided on the motor cover; 45, a protrusion portion of the motor cover; 41, a cover member; 46, a hook provided on the lower side of the cover member; and 47, a handle of the cover member 41.

[0023] In this construction, the cover member 41 is slid on the surface of the motor cover 36 so that the forward end of the cover member 41 is inserted into the hook 44 of the motor cover 36. Thus, the hook 46 of the cover member 41 is fitted over the protrusion portion 45 disposed on the motor cover 36 so that the cover member 41 can be fixed to the motor cover 36. Further, the cover member 41 is provided with the handle 47 on its top so as to improve the manipulating performance. On the other hand, when the cover member 41 is to be removed, the cover member 41 is slid in the direction, converse to the above-mentioned manner, in which the cover member 41 is pulled out. Thus, the hook 46 is disengaged so that the cover member 41 can be removed easily.

[0024] Fig. 6 is a principal perspective view of a still further embodiment according to the present invention. Although the cover member 41 was designed to be attached to the motor cover 36 in Embodiment 5, the similar effect can be obtained even if the cover member 41 is designed to be attached to the housing 31 closely to the partition plate 37 as shown in Fig. 6.

Claims

1. An air conditioner, comprising:

- a housing (31);
- a heat exchanger (32) disposed in the housing (31);
- a line flow fan (33) disposed between the heat exchanger (32) and the housing (31) for blowing air heat-exchanged by the heat exchanger (32) and provided with a boss (49) forming a coupling fixation portion (49);
- a casing (35) mounted in the housing (31) for receiving a motor (34) for driving the line flow fan (33);
- a partition plate (37) making a partition between an air passageway in which the air is carried out by the line flow fan (33) and a space in which the casing (35) of the motor (34) is mounted; and
- a receiving hole (38) disposed in the partition plate (37) and adapted to permit insertion thereof of the coupling fixation portion (49) for

coupling the motor (34) with the line flow fan (33);
- wherein a shielded space (50) is formed inside the casing (35) so that an outer circumference of a shaft of the motor (34) is covered tubularly; and

- wherein the casing (35) is disposed in close contact with the partition plate (37),

- **characterized in that** the line flow fan (33) projects through the receiving hole (38) in the partition plate (37) into the motor side, and

- **in that** the boss (49) is fixed to the motor (34) by a fastening screw (39) located outside of the air passageway.

2. The air conditioner according to claim 1, wherein an opening portion is provided in the shielded space (50) opposite to the coupling fixation portion (49) for coupling the motor (34) with the line flow fan (33), and a removable cover member (41) is disposed in the opening portion.

3. The air conditioner according to claim 2, wherein the cover member (41) is removable by sliding.

Patentansprüche

1. Klimaanlage, die folgendes aufweist:

- ein Gehäuse (31);
- einen in dem Gehäuse (31) angeordneten Wärmetauscher (32);
- ein Strömungsgebläse (33), das zwischen dem Wärmetauscher (32) und dem Gehäuse (31) angeordnet ist, um Luft, die einem Wärmeaustausch durch den Wärmetauscher (32) unterzogen worden ist, auszublasen, und das mit einer Nabe (49) ausgebildet ist, die einen Kopplungsfixierbereich (49) bildet;
- eine in dem Gehäuse (31) angebrachte Gehäuseeinrichtung (35) zum Aufnehmen eines Motors (34) zum Antreiben des Strömungsgebläses (33);
- eine Trennplatte (37), die eine Trennung zwischen einer Luftpassage, in der die Luft durch das Strömungsgebläse (33) ausgetragen wird, und einem Raum bildet, in dem die Gehäuseeinrichtung (35) des Motors (34) angebracht ist; und
- eine Aufnahmeöffnung (38), die in der Trennplatte (37) vorgesehen ist und dazu ausgebildet ist, ein Hindurchführen des Kopplungsfixierbereichs (49) durch diese zu ermöglichen, um den Motor (34) mit dem Strömungsgebläse (33) zu koppeln;
- wobei ein abgeschirmter Raum (50) im Inneren der Gehäuseeinrichtung (35) gebildet ist, so daß

ein Außenumfang einer Welle des Motors (34) rohrförmig umschlossen ist; und
- wobei die Gehäuseeinrichtung (35) in enger Berührung mit der Trennplatte (37) angeordnet ist,

dadurch gekennzeichnet,

daß das Strömungsgebläse (33) durch die Aufnahmeöffnung (38) in der Trennplatte (37) hindurch auf die Motorseite ragt, und

daß die Nabe (49) an dem Motor (34) mit einer Befestigungsschraube (39) festgelegt ist, die sich außerhalb der Luftpassage befindet.

2. Klimaanlage nach Anspruch 1,
wobei ein Öffnungsbereich in dem abgeschirmten Raum (50) gegenüber von dem Kopplungsfixierbereich (49) vorgesehen ist, um den Motor (34) mit dem Strömungsgebläse (33) zu koppeln, und wobei ein abnehmbares Abdeckelement (41) in dem Öffnungsbereich angeordnet ist.
3. Klimaanlage nach Anspruch 2,
wobei das Abdeckelement (41) mit einer Verschiebungsbewegung abnehmbar ist.

- dans lequel le carter (35) est disposé en contact intime avec la plaque de cloisonnement (37),

caractérisé en ce que le ventilateur à écoulement linéaire (33) se projette à travers le trou de réception (38) dans la plaque de cloisonnement (37) jusque dans le côté moteur, et

- **en ce que** le bossage (49) est fixé au moteur (34) par une vis de fixation (39) située à l'extérieur du passage d'air.

2. Appareil de conditionnement d'air selon la revendication 1,
dans lequel une portion ouverte est prévue dans l'espace protégé (50) à l'opposé de la portion de fixation-accouplement (49) pour coupler le moteur (34) au ventilateur à écoulement linéaire (33), et un élément de couverture amovible (41) est disposé dans la portion ouverte.
3. Appareil de conditionnement d'air selon la revendication 2,
dans lequel l'élément de couverture (41) est amovible par coulissement.

Revendications

1. Appareil de conditionnement d'air, comprenant :
- un boîtier (31),
- un échangeur de chaleur (32) disposé dans le boîtier (31), et
- un ventilateur à écoulement linéaire (33) disposé entre l'échangeur de chaleur (32) et le boîtier (31) pour souffler l'air ayant subi un échange de chaleur de la part de l'échangeur de chaleur (32) et pourvu d'un bossage (49) qui forme une portion de fixation-accouplement (49) ;
- un carter (35) monté dans le boîtier (31) pour recevoir un moteur (34) pour l'entraînement du ventilateur à écoulement linéaire (33) ;
- une plaque de cloisonnement (37) qui établit un cloisonnement entre un passage d'air dans lequel l'air est transporté par le ventilateur à écoulement linéaire (33) et un espace dans lequel est monté le carter (35) du moteur (34) ; et
- un trou de réception (38) ménagé dans la plaque de cloisonnement (37) et adapté à permettre l'insertion à travers lui-même de la portion de fixation-accouplement (49) pour coupler le moteur (34) au ventilateur à écoulement linéaire (33) ;
- dans lequel un espace protégé (50) est formé à l'intérieur du carter (35) de sorte qu'une circonférence extérieure d'un arbre du moteur (34) est couverte par des moyens tubulaires ; et

Fig. 1

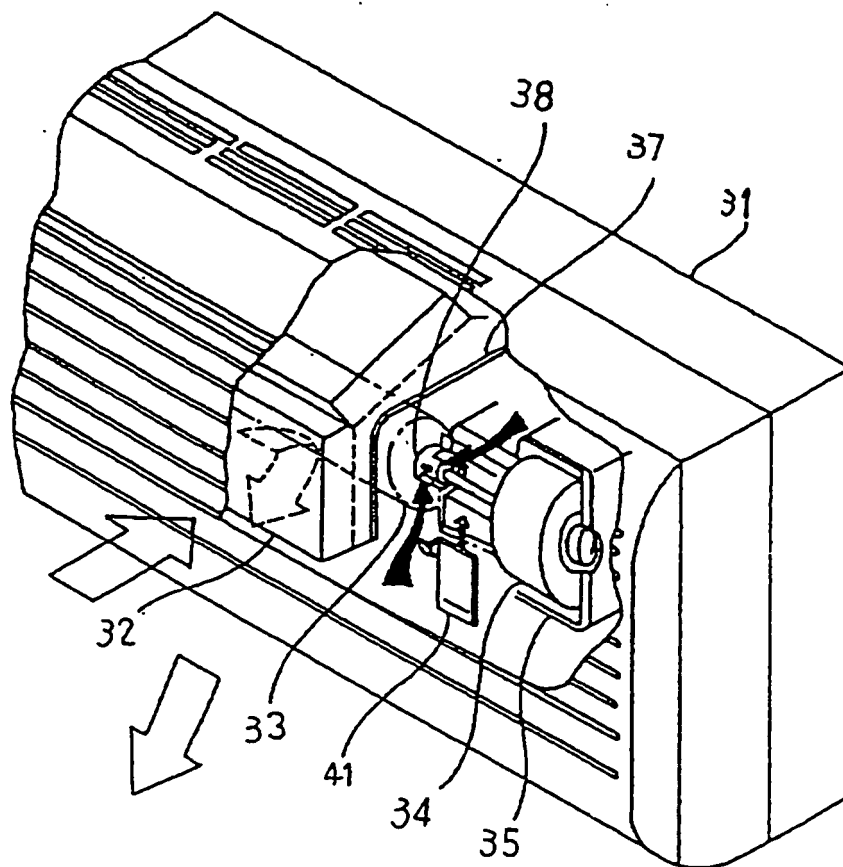


Fig. 2

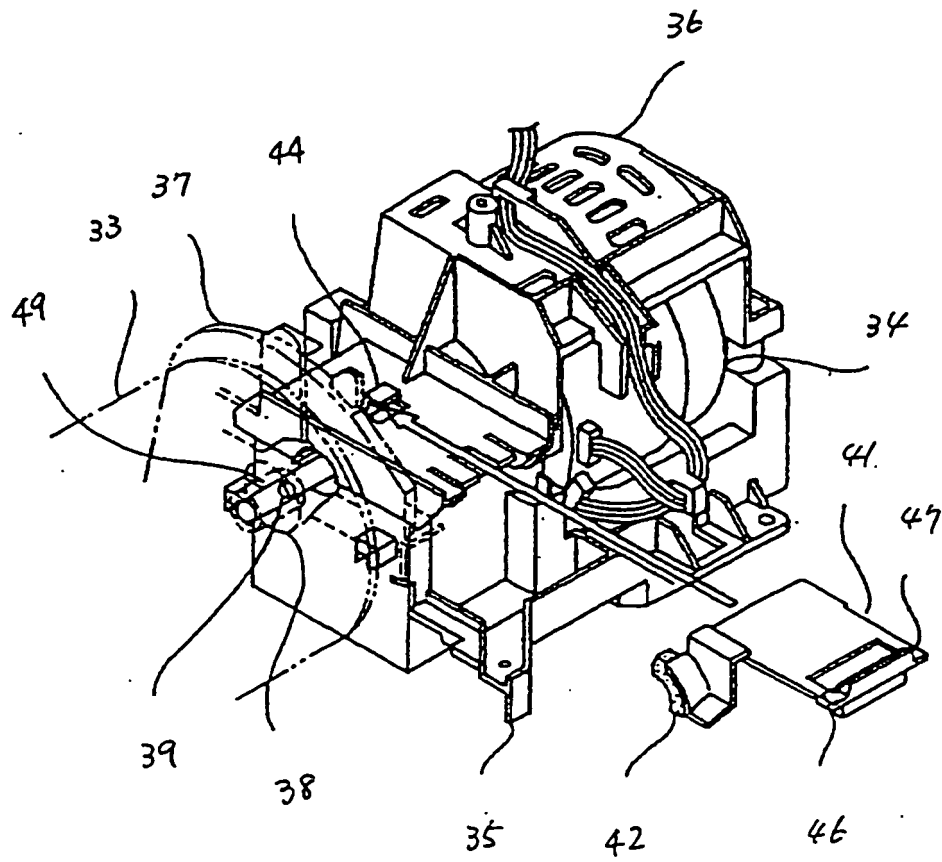


Fig. 3

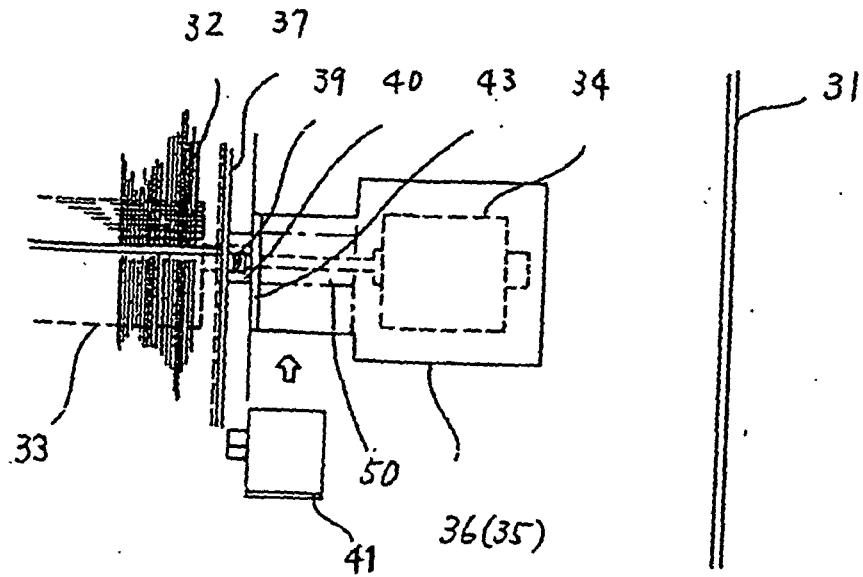


Fig. 4

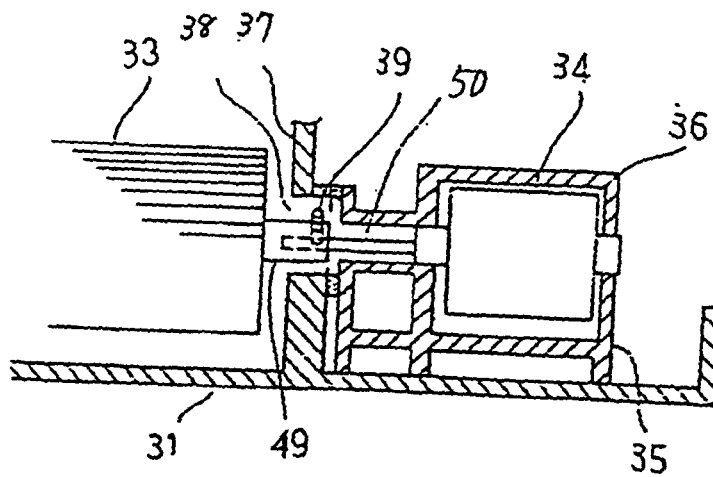


Fig. 5

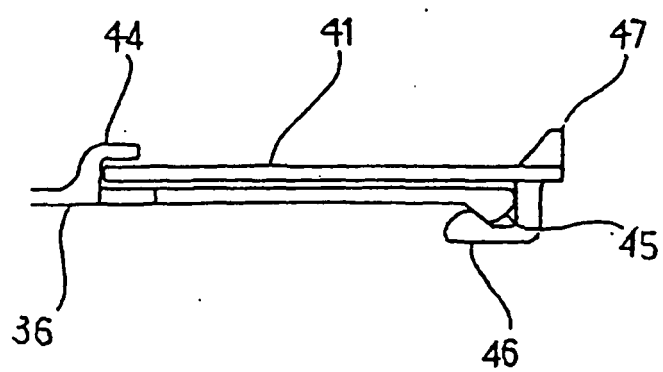


Fig. 6

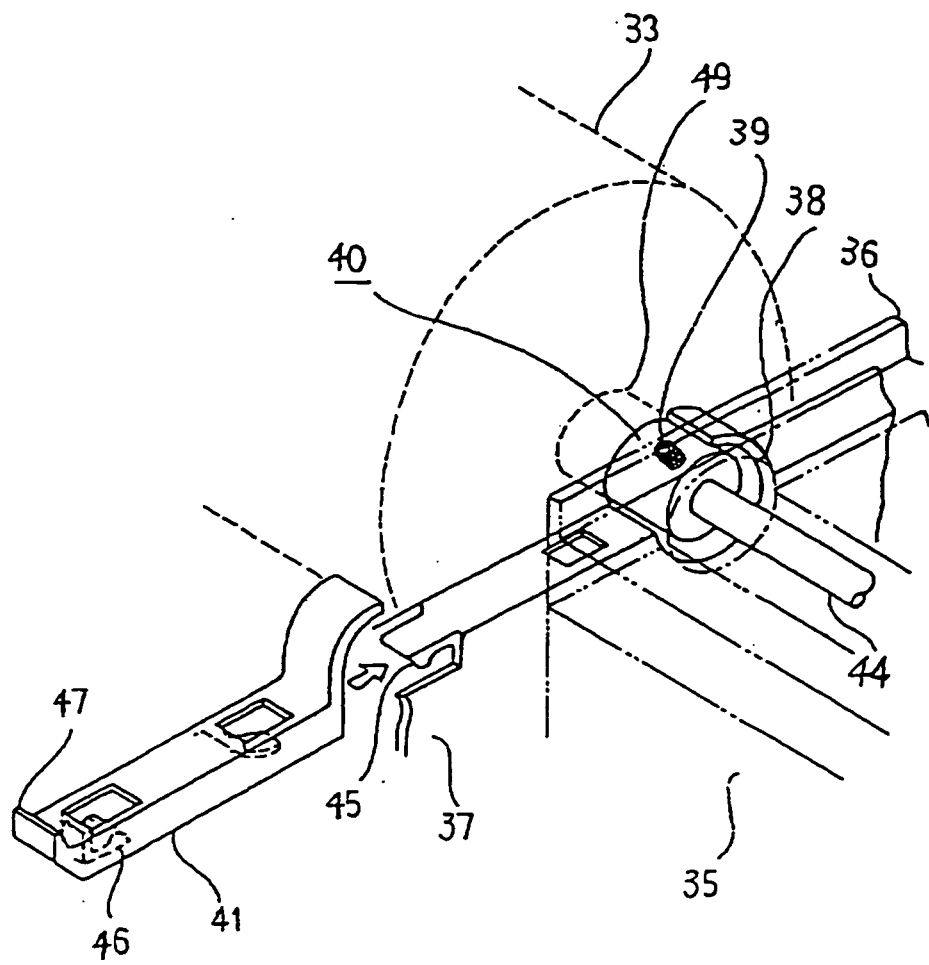
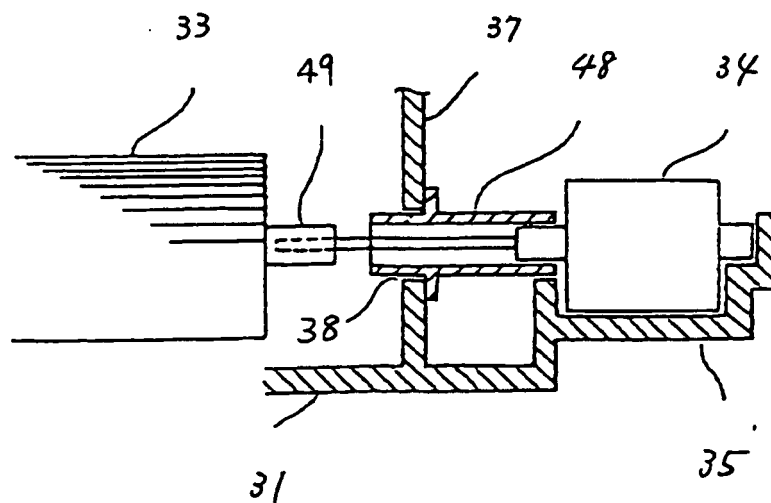


Fig. 7



REFERENCES CITED IN THE DESCRIPTION

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