

[DESCRIPTION]

[Title]

IMAGE BLURRING CORRECTION DEVICE AND IMAGING APPARATUS

[Technical Field]

[0001]

The present technology relates to an image blurring correction device for correcting image blurring by moving a movable body including an imaging element in a direction orthogonal to an optical axis direction with respect to a fixed body and an imaging apparatus including the same.

[Background Art]

[0002]

There are cases in which an image blurring correction device for correcting image blurring occurring at the time of imaging to promote improvement of image quality is provided in imaging apparatuses such as video cameras and still cameras.

[0003]

There is an image blurring correction device having a configuration in which a movable body having an imaging element moves with respect to a fixed body in a direction orthogonal to an optical axis direction to perform image blurring correction, and heat generated in the movable body at the time of movement of the movable body with respect to the fixed body is transferred to the fixed body through a heat transfer member (refer to PTL 1, for example).

[0004]

An imaging element is configured as a part of an element unit along with a circuit board for driving the imaging element, heat is generated from the imaging element, the circuit board, and the like at the time of driving the imaging element, and the generated heat may affect driving of the imaging element or affect a stable driving state of the circuit board. Accordingly, by transferring heat from the movable body to the fixed body, as described above, the influence of the heat on the movable body is reduced to secure a satisfactory operating state of the movable body and secure a stable driving state of the imaging element and circuit board.

[0005]

In an imaging apparatus disclosed in PTL 1, the fixed body and the movable body are connected through four flexible members serving as heat transfer members, and heat is transferred from the movable body to the fixed body through the flexible members and radiated from the fixed body that also serves as a heat radiation member. At the time of movement of the movable body with respect to the fixed body in the direction orthogonal to the optical axis direction, the flexible members are bent in accordance with the direction and amount of movement of the movable body to maintain the connecting state of the fixed body and the movable body.

[Citation List]

[Patent Literature]

[0006]

[PTL 1]

JP 5168047B

[Summary]

[Technical Problem]

[0007]

However, in the structure in which the fixed body and the movable body are connected through the heat transfer members, torsion is generated due to bending of the heat transfer members according to movement of the movable body at the time of movement of the movable body with respect to the fixed body in the direction orthogonal to the optical axis direction, and thus reaction to bending of the heat transfer members is generated and the generated reaction is applied from the heat transfer members to the movable body as a load for the movement.

[0008]

Such a load for the movement of the movable body becomes a driving load in the movable body, power necessary for the movement of the movable body needs to be increased in accordance with the size of the load, and increase in the load causes increase in power consumption.

[0009]

Accordingly, an object of an image blurring correction device and an imaging apparatus of the present technology is to promote reduction in power consumption by securing a state of satisfactory transfer of heat from a movable body to a fixed body and then curbing a load applied to the movable body at the time of movement of the movable body with respect to the fixed body.

[Solution to Problem]

[0010]

Firstly, an image blurring correction device according to the present technology includes a fixed body fixed inside a casing, a movable body that includes an imaging element and moves with respect to the fixed body in a direction orthogonal to an optical axis direction, and a bendable heat transfer sheet that has parts mounted on the fixed body and the movable body and transfers heat generated in the movable body to the fixed body, wherein a thickness direction of the heat transfer sheet is orthogonal to the optical axis direction.

[0011]

Accordingly, torsion is not generated in the heat transfer sheet when the movable body has moved with respect to the fixed body in a direction orthogonal to the optical axis direction.

[0012]

Secondly, in the above-described image blurring correction device, it is desirable that a fixed side mounting part mounted on the fixed body, a movable side mounting part mounted on the movable body, and a deformation part positioned between the fixed side mounting part and the movable side mounting part be provided in the heat transfer sheet, wherein the deformation part is formed in a bent shape.

[0013]

Accordingly, the deformation part is liable to be deformed conforming to movement of the movable body with respect to the fixed body.

[0014]

Thirdly, in the above-described image blurring correction device, it is desirable that the heat transfer sheet be formed by superimposing a plurality of sheet members in the thickness direction.

[0015]

Accordingly, the sheet members can be separated in the thickness direction when the deformation part has been deformed and the amount of heat transfer can be increased without the deformation part becoming excessively rigid even when the thickness increases.

[0016]

Fourthly, in the above-described image blurring correction device, it is desirable that the fixed side mounting part and the movable side mounting part be positioned facing each other, and the deformation part have both ends respectively connected to one end of the fixed side mounting part and one end of the movable side mounting part and include a first part connected to the fixed side mounting part and a second part connected to the movable side mounting part, wherein the first part is bent at an acute angle with respect to the fixed side mounting part, and the second part is bent at an acute angle with respect to the movable side mounting part.

[0017]

Accordingly, the sheet members are liable to be separated in the thickness direction when the deformation part has been deformed.

[0018]

Fifthly, in the above-described image blurring correction device, it is desirable that the heat transfer sheet be formed in a ring shape, the deformation part be provided as a pair, both ends of one of the deformation parts be respectively connected to one end of the fixed side mounting part and one end of the movable side mounting part, and both ends of the other deformation part be respectively connected to the other end of the fixed side mounting part and the other end of the movable side mounting part.

[0019]

Accordingly, a pair of deformation parts is liable to be equally deformed.

[0020]

Sixthly, in the above-described image blurring correction device, it is desirable that at least two heat transfer sheets be provided, and at least one of the heat transfer sheets and at least one of the other heat transfer sheets be disposed in orthogonal directions orthogonal to the optical axis direction.

[0021]

Accordingly, biasing of a load in a specific movement direction of the movable body is reduced at the time of movement of the movable body with respect to the fixed body.

[0022]

Seventhly, in the above-described image blurring correction device, it is desirable that a flexible printed wiring board be connected to the movable body, the flexible printed wiring board be bent in the optical axis direction such that parts face each other, and the fixed side mounting part and the movable side mounting part be positioned facing each other in a direction orthogonal to the optical axis direction and a width direction of the flexible printed wiring board.

[0023]

Accordingly, a load applied to the movable body from the flexible printed wiring board at the time of movement of the movable body with respect to the fixed body in a width direction of the flexible printed wiring board is hardly amplified.

[0024]

Eighthly, in the above-described image blurring correction device, it is desirable that at least two heat transfer sheets be provided on a side of a rear surface of the imaging element, and the two heat transfer sheets be disposed on opposite sides of a center of the imaging element therebetween on a diagonal line of the imaging element.

[0025]

Accordingly, loads generated in the two heat transfer sheets with the center of the imaging element therebetween are disposed on the diagonal line of the imaging element.

[0026]

Ninthly, in the above-described image blurring correction device, it is desirable that a fixed side heat transfer plate be provided in the fixed body, a movable side heat transfer plate be provided in the movable body, and parts of the heat transfer sheet be provided on the fixed side heat transfer plate and the movable side heat transfer plate.

[0027]

Accordingly, heat generated in the movable body is transferred to the fixed body through the fixed side heat transfer plate, the heat transfer sheet, and the movable side heat transfer plate.

[0028]

Tenthly, in the above-described image blurring correction device, it is desirable that a graphite sheet be used as the heat transfer sheet.

[0029]

Accordingly, the heat transfer sheet has a high thermal resistance, a low weight, and a high strength against tensile force.

[0030]

Eleventhly, an imaging apparatus according to the present technology includes an image blurring correction device that corrects image blurring in such a manner that a movable body including an imaging element moves with respect to a fixed body fixed inside a casing in a direction orthogonal to an optical axis direction, wherein the image blurring correction device includes a bendable heat transfer sheet that has parts mounted on the fixed body and the movable body and transfers heat generated in the movable body to the fixed body, and wherein a thickness direction of the heat transfer sheet is orthogonal to the optical axis direction.

[0031]

Accordingly, torsion is not generated in the heat transfer sheet when the movable body has moved with respect to the fixed body in a direction orthogonal to the optical axis direction in the image blurring correction device.

[Brief Description of the Drawings]

[0032]

[Fig. 1]

Fig. 1 is a diagram showing an image blurring correction device and an imaging apparatus of the present technology along with Fig. 2 to Fig. 24 and is a perspective view of the imaging apparatus.

[Fig. 2]

Fig. 2 is an exploded perspective view of the image blurring correction device.

[Fig. 3]

Fig. 3 is a perspective view of the image blurring correction device.

[Fig. 4]

Fig. 4 is an exploded perspective view of the image blurring correction device from which a second flexible printed wiring board and a third flexible printed wiring board have been omitted, viewed in a direction opposite to that of Fig. 2.

[Fig. 5]

Fig. 5 is a perspective view of the image blurring correction device from which the second flexible printed wiring board and the third flexible printed wiring board have been omitted, viewed in a direction opposite to that of Fig. 3.

[Fig. 6]

Fig. 6 is a perspective view of the image blurring correction device viewed in the direction opposite to that of Fig. 3.

[Fig. 7]

Fig. 7 is a perspective view of heat transfer sheets.

[Fig. 8]

Fig. 8 is a diagram showing an example in which an entire heat transfer sheet is formed as one body and a state in which the heat transfer sheet is unfolded.

[Fig. 9]

Fig. 9 is a diagram illustrating a deformed state of the heat transfer sheet along with Fig. 10 to Fig. 14 and is a rear view showing the heat transfer sheet before deformation.

[Fig. 10]

Fig. 10 is a rear view showing a state of sheet members when the heat transfer sheet has been deformed at the time of movement of a movable body in a lateral direction.

[Fig. 11]

Fig. 11 is a rear view showing an angle and reaction in the heat transfer sheet before deformation.

[Fig. 12]

Fig. 12 is a rear view showing an angle in the heat transfer sheet when the heat transfer sheet has been deformed at the time of movement of the movable body in the lateral direction.

[Fig. 13]

Fig. 13 is a rear view showing a state when the movable body has moved in one of upward and downward directions and thus the heat transfer sheet has been deformed.

[Fig. 14]

Fig. 14 is a rear view showing a state when the movable body has moved in the other one of the upward and downward directions and thus the heat transfer sheet has been deformed.

[Fig. 15]

Fig. 15 is a rear view showing a first arrangement example of heat transfer sheets.

[Fig. 16]

Fig. 16 is a rear view showing a second arrangement example of heat transfer sheets.

[Fig. 17]

Fig. 17 is a diagram showing a modified example of a heat transfer sheet along with Fig. 18 to Fig. 23 and is a perspective view showing a first modified example.

[Fig. 18]

Fig. 18 is a perspective view showing a second modified example.

[Fig. 19]

Fig. 19 is a perspective view showing a third modified example.

[Fig. 20]

Fig. 20 is a rear view of a fourth modified example.

[Fig. 21]

Fig. 21 is a rear view of a fifth modified example.

[Fig. 22]

Fig. 22 is a rear view of a sixth modified example.

[Fig. 23]

Fig. 23 is a rear view of a seventh modified example.

[Fig. 24]

Fig. 24 is a block diagram of an imaging apparatus.

[Description of Embodiments]

[0033]

Hereinafter, forms for implementing an image blurring correction device and an imaging apparatus of the present technology will be described with reference to the attached drawings.

[0034]

In the forms for implementing the invention described below, the imaging apparatus of the present technology is applied to a still camera and the image blurring correction device of the present technology is applied to an image blurring correction device provided in this still camera.

[0035]

Further, application ranges of the imaging apparatus and the image blurring correction device of the present technology are not limited to a still camera and an image blurring correction device provided in a still camera. The imaging apparatus and the image blurring correction device of the present technology can be widely applied to imaging apparatuses incorporated in various electronic apparatuses such as cellular phones and portable information terminals or image blurring correction devices provided in these imaging apparatuses.

[0036]

In the following description, it is assumed that forward, backward, upward, downward, and lateral directions are indicated in a direction viewed from a photographer at the time of imaging with the still camera. Accordingly, a subject side becomes the front and a photographer side becomes the back.

[0037]

However, forward, backward, upward, downward, and lateral directions which will be represented below are for convenience of description, and the implementation of the present technology is not limited to these directions.

[0038]

In addition, a lens which will be represented below includes both a lens configured as a single lens and a lens configured as a lens group of a plurality of lenses.

[0039]

<Schematic configuration of imaging apparatus>

An imaging apparatus 1 includes a main body 2 and a lens barrel 60 (refer to Fig. 1). The lens barrel 60 is, for example, an interchangeable lens detachably attached to the main body 2. Further, the present technology can also be

applied to a type in which a lens unit having the same structure as the internal structure of the lens barrel 60 is incorporated inside the main body and a collapsible type in which the lens unit projects from or retracts into the main body.

[0040]

The main body 2 includes each necessary part disposed inside or outside a casing 3.

[0041]

For example, various operating parts 4, 4, ... are disposed on the upper surface and the rear surface of the casing 3. As the operating parts 4, 4, ..., for example, a power button, a shutter button, a zoom knob, a mode switching knob, and the like are provided.

[0042]

A display (display part) which is not illustrated is disposed on the rear surface of the casing 3.

[0043]

A circular opening 3a is formed in the front surface of the casing 3, and the circumferential part of the opening 3a is provided as a mount part 5 for mounting the lens barrel 60.

[0044]

The lens barrel 60 includes an approximately cylindrical outer barrel 61 having an axial direction corresponding to the forward-backward direction and each necessary part mounted on or supported by the inside and outside the outer barrel 61. The axial direction of the lens barrel 60 corresponds to the optical axis direction of the entire imaging apparatus 1.

[0045]

A protruding part 62 for mounting is provided at the rear end of the outer barrel 61. The lens barrel 60 is fitted into the main body 2 by coupling the protruding part 62 for mounting to the mount part 5, for example, according to bayonet coupling.

[0046]

Operation rings 63, 63 serving as a zoom ring and a focus ring are provided in the lens barrel 60. The operation rings 63, 63 are rotatably supported by the outer barrel 61, and zooming and focusing are performed by rotating the operation rings 63, 63.

[0047]

The lens barrel 60 includes, for example, a plurality of lenses (lens group) 64, 64, Further, Fig. 1 illustrates only the foremost lens 64. The lenses 64, 64, ... are separately positioned in the optical axis direction (forward-backward direction) and include movable lenses (movable lens group) that can move in the optical axis direction and fixed lenses (fixed lens group) that cannot move in the optical axis direction.

[0048]

<Configuration of image blurring correction device>

An image blurring correction device 6 that corrects image blurring is disposed inside the main body 2 (refer to Fig. 1). The image blurring correction device 6 includes a fixed body 7 and a movable body 8 (refer to Fig. 2 to Fig. 5). The image blurring correction device 6 corrects image blurring by the movable body 8 moving in a direction orthogonal to the optical axis direction with respect to the fixed body 7.

[0049]

The fixed body 7 includes a base board 9, first magnets 10, 10, second magnets 11, 11, ..., a first fixed side heat transfer plate 12, and a second fixed side heat transfer plate 13.

[0050]

The base board 9 includes a base part 14 formed in a plate shape facing in the forward-backward direction, a first restricting part 15 projected forward from the upper end of the base part 14, and a second restricting part 16 projected forward from the lateral part of one side of the base part 14.

[0051]

An opening 14a is formed to penetrate the base part 14 forward and backward. A lateral part on a side opposite to the side on which the second restricting part 16 of the base part 14 is provided is provided as a first magnet mounting part 14b, and the lower end of the base part 14 is provided as a second magnet mounting part 14c.

[0052]

Cylindrical restricting protrusions 17, 17, ... are mounted on the periphery of the front surface of the base part 14. For example, four restricting protrusions 17, 17 ... are provided, one is mounted on the upper end in the lateral part of the side opposite to the side on which the second restricting part 16 of the base part 14 is provided, and three are mounted on the lower end of the base part 14 separately and laterally.

[0053]

The two first magnets 10 are formed in a longitudinally elongate shape, laterally arranged and mounted on the first magnet mounting part 14b of the base board 9. The second magnets 11 are formed in a laterally elongate shape and laterally separated, each two being vertically arranged and mounted on the second magnet mounting part 14c of the base board 9.

[0054]

The first fixed side heat transfer plate 12 is formed of, for example, a metal material having high thermal conductivity and composed of a laterally elongate mounted plate part 12a facing in the forward-backward direction and a mounting plate part 12b protruding forward from the lower end of the mounted plate part 12a. In the first fixed side heat transfer plate 12, the mounted plate part 12a is

mounted on the base part 14 from the back on the upper side of the opening 14a in the base board 9 and the mounting plate part 12b protrudes from the opening 14a to side in front of the base part 14.

[0055]

The second fixed side heat transfer plate 13 is formed of, for example, a metal material having high thermal conductivity and composed of a laterally elongate mounted plate part 13a facing in the forward-backward direction and a mounting plate part 13b protruding forward from the upper end of the mounted plate part 13a. In the second fixed side heat transfer plate 13, the mounted plate part 13a is mounted on the base part 14 from the back on the lower side of the opening 14a in the base board 9 and the mounting plate part 13b protrudes from the opening 14a to the side in front of the base part 14. Further, the first fixed side heat transfer plate 12 and the second fixed side heat transfer plate 13 may be formed integrally with the base board 9.

[0056]

The movable body 8 includes an element unit 18, a first movable side heat transfer plate 19, and a second movable side heat transfer plate 20.

[0057]

The element unit 18 is configured in such a manner that each necessary part is mounted on or supported by a holding base 21. The holding base 21 is formed in an approximately rectangular frame shape. A holding frame 22 in an approximately rectangular shape is mounted on the front surface of the holding base 21.

[0058]

An imaging element 23 is held on the inner sides of the holding base 21 and the holding frame 22. As the imaging element 23, for example, a charge coupled device (CCD), a complementary metal-oxide semiconductor (CMOS), or the like may be used.

[0059]

A board base 24 formed in a rectangular plate shape is mounted on the rear surface of the holding base 21. A circuit board 25 is mounted on a part other than the outer periphery on the rear surface of the board base 24.

[0060]

A frame 26 covering the circumference of the circuit board 25 is mounted on the outer periphery of the rear surface of the holding base 21. The frame 26 includes a frame-shaped part 27 in a rectangular shape, a first coil mounting part 28 laterally protruding from a part near the rear end of the frame-shaped part 27, and a second coil mounting part 29 downwardly protruding from a part near the rear end of the frame-shaped part 27.

[0061]

Arrangement notches 26a, 26a, ... are formed in the first coil mounting part 28 and the second coil mounting part 29 in the frame 26. The arrangement notches 26a, 26a, ... are positioned to be separated vertically or laterally.

[0062]

A longitudinally elongate first coil 30 is mounted on the first coil mounting part 28 and laterally elongate second coils 31, 31 are laterally separated and mounted on the second coil mounting part 29.

[0063]

The first movable side heat transfer plate 19 is formed of, for example, a metal material having high thermal conductivity and composed of a laterally elongate mounted plate part 19a facing in the forward-backward direction and a mounting plate part 19b protruding backward from the lower end of the mounted plate part 19a. In the first movable side heat transfer plate 19, the mounted plate part 19a is mounted on a part on the upper end side of the circuit board 25 from the back through a heat radiation sheet which is not illustrated.

[0064]

The second movable side heat transfer plate 20 is formed of, for example, a metal material having high thermal conductivity and composed of a laterally elongate mounted plate part 20a facing in the forward-backward direction and a mounting plate part 20b protruding backward from the upper end of the mounted plate part 20a. In the second movable side heat transfer plate 20, the mounted plate part 20a is mounted on a part on the lower end side of the circuit board 25 from the back through a heat radiation sheet which is not illustrated. Further, the first movable side heat transfer plate 19 and the second movable side heat transfer plate 20 may be formed integrally with a part of the element unit 18, for example, the frame 26.

[0065]

The movable body 8 configured as above is supported by the fixed body 7 on the front surface side of the base board 9 such that the movable body 8 can move in a direction orthogonal to the optical axis direction.

[0066]

In a state in which the movable body 8 is supported by the fixed body 7, the frame-shaped part 27 of the frame 26 is positioned on the inner surface sides of the first restricting part 15 and the second restricting part 16 of the base board 9, and the restricting protrusions 17, 17, ... mounted on the base board 9 are respectively positioned at the arrangement notches 26a, 26a, ... Accordingly, excessive movement of the movable body 8 with respect to the fixed body 7 in the direction orthogonal to the optical axis direction is restricted by the first restricting part 15, the second restricting part 16, and the restricting protrusions 17, 17, ...

[0067]

In addition, in the state in which the movable body 8 is supported by the fixed body 7, a press plate 32 is mounted on the restricting protrusions 17, 17, ... from the side in front through screwing or the like. The press plate 32 is formed of a vertically extending longitudinally elongate part 32a and a laterally extending laterally elongate part 32b in an approximately L shape. In a state in which the press plate 32 is mounted on the restricting protrusions 17, 17, ..., the first coil 30 is blocked from the side in front by the longitudinally elongate part 32a and the second coils 31, 31 are blocked from the side in front by the laterally elongate part 32b.

[0068]

The press plate 32 is mounted on the restricting protrusions 17, 17, ... from the side in front to prevent the movable body 8 from being detached from the fixed body 7 to the side in front.

[0069]

The first coil 30 and the second coils 31 and 31 of the movable body 8 are positioned opposite to first magnet 10 and the second magnets 11, 11, ... of the fixed body 7, respectively.

[0070]

In the state in which the movable body 8 is supported by the fixed body 7, a first flexible printed wiring board 33 is connected to each predetermined part. The first flexible printed wiring board 33 has a thickness direction corresponding to the forward-backward direction and includes a vertically extending first connecting part 34, a laterally extending second connecting part 35, and a conducting part 36 arranged in a line with the first connecting part 34 in the lateral direction, and the lower end of the first connecting part 34 and the lower end of the conducting part 36 are connected to one end of the second connecting part 35 in the lateral direction.

[0071]

In the first flexible printed wiring board 33, the first connecting part 34 is connected to the first coil 30 from the side in front and the second connecting part 35 is connected to the second coils 31 and 31 from the side in front. The conducting part 36 is bent such that parts face each other in the optical axis direction (forward-backward direction), a part thereof extends backward from the opening 14a of the base board 9, and the end part thereof is connected to a driving circuit board (power supply board) disposed on the rear side of the fixed body 7, which is not illustrated.

[0072]

Current is supplied from the driving circuit board to the first coil 30 and the second coils 31 and 31 through the first flexible printed wiring board 33.

[0073]

The movable body 8 moves in the lateral direction with respect to the fixed body 7 in a relationship with magnetic fields generated by the first magnet 10 when the

current is supplied to the first coil 30, and the movable body 8 moves in the upward-downward direction with respect to the fixed body 7 in a relationship with magnetic fields generated by the second magnets 11 when the current is supplied to the second coils 31 and 31. Here, when the current is supplied to the second coils 31 and 31 in the reverse direction, upward thrust is generated by one of the second coils 31 and one of the second magnets 11 and 11, downward thrust is generated by the other second coil 31 and the other second magnet 11 and 11, and the movable body 8 moves with respect to the fixed body 7 in directions inclining in upward, downward, and lateral directions Accordingly, the movable body 8 can move with respect to the fixed body 7 in an arbitrary direction within a plane orthogonal to the optical axis direction.

[0074]

In addition, in the state in which the movable body 8 is supported by the fixed body 7, a second flexible printed wiring board 37 and a third flexible printed wiring board 38 are connected to the circuit board 25 in a state in which they are arranged in the lateral direction (refer to Fig. 6). The second flexible printed wiring board 37 and the third flexible printed wiring board 38 have a thickness direction corresponding to the forward-backward direction and are bent such that parts face each other in the optical axis direction, parts thereof extend backward from the opening 14a of the base board 9, and other ends thereof are connected to the driving circuit board (power supply board). For example, signal transfer between the circuit board 25 and the driving circuit board is performed by the second flexible printed wiring board 37 and the third flexible printed wiring board 38.

[0075]

A first heat transfer sheet 39 is mounted on the first fixed side heat transfer plate 12 mounted on the base board 9 in the fixed body 7 and the first movable side heat transfer plate 19 mounted on the circuit board 25 in the movable body 8 (refer to Fig. 4 to Fig. 6).

[0076]

The first heat transfer sheet 39 is formed of a plurality of sheet members 40, 40, ... made of, for example, graphite (refer to Fig. 7). The first heat transfer sheet 39 is formed by superimposing the sheet members 40, 40, ... in the thickness direction, bending them into a predetermined shape, and bonding both ends thereof in the longitudinal direction of the sheet members 40, 40, ... to form a ring shape penetrating forward and backward.

[0077]

The first heat transfer sheet 39 is composed of a fixed side mounting part 43 and a movable side mounting part 44 positioned vertically opposite to each other, and a pair of deformation parts 45 and 45 positioned between the fixed side mounting part 43 and the movable side mounting part 44.

[0078]

The fixed side mounting part 43 and the movable side mounting part 44 face in the upward and downward directions, the fixed side mounting part 43 is positioned above the movable side mounting part 44, the fixed side mounting part 43 is bonded to the bottom surface of the mounting plate part 12b in the first fixed side heat transfer plate 12, and the movable side mounting part 44 is bonded to the top surface of the mounting plate part 19b in the first movable side heat transfer plate 19.

[0079]

The deformation parts 45 and 45 are positioned to be laterally separated, the upper ends thereof are respectively connected to the left and right ends of the fixed side mounting part 43, and the lower ends thereof are respectively connected to the left and right ends of the movable side mounting part 44. The approximate upper half of the deformation part 45 is provided as a first part 45a, the approximate lower half thereof is provided as a second part 45b, the first part 45a is bent at an acute angle with respect to the fixed side mounting part 43, and the second part 45b is bent at an acute angle with respect to the movable side mounting part 44. The lower end of the first part 45a and the upper end of the second part 45b of the deformation part 45 are connected, and this connected part 45c is bent in a direction opposite to the bending direction of the first part 45a with respect to the fixed side mounting part 43 and the bending direction of the second part 45b with respect to the movable side mounting part 44. Accordingly, the deformation parts 45, 45 are formed in a V shape that opens outward in the lateral direction, and the distance between the connected parts 45c, 45c is shorter than the length of the fixed side mounting part 43 and the movable side mounting part 44 in the lateral direction.

[0080]

Since the deformation parts 45 and 45 of the first heat transfer sheet 39 are not bonded to any part of the fixed body 7 and the movable body 8 as described above, the deformation parts 45 and 45 can be deformed when the movable body 8 has moved with respect to the fixed body 7 in the direction orthogonal to the optical axis direction.

[0081]

In the first heat transfer sheet 39, at least the deformation parts 45, 45 are superimposed in a state in which the plurality of sheet members 40, 40, ... are not bonded. The fixed side mounting part 43 and the movable side mounting part 44 are superimposed in a state in which the plurality of sheet members 40, 40, ... are bonded or in a state in which they are not bonded.

[0082]

In addition, a second heat transfer sheet 46 is mounted on the second fixed side heat transfer plate 13 mounted on the base board 9 in the fixed body 7 and the second movable side heat transfer plate 20 mounted on the circuit board 25 in the movable body 8 in a state in which the second heat transfer sheet 46 is laterally

arranged. The second heat transfer sheet 46 has the same configuration as the first heat transfer sheet 39 and is disposed in a state in which it is upside down with respect to the first heat transfer sheet 39.

[0083]

The second heat transfer sheet 46 is formed by superimposing of a plurality of sheet members 47 and 47, ... made of, for example, graphite in the thickness direction, bending them into a predetermined shape, and bonding both ends thereof in the longitudinal direction of the sheet members 47, 47, ... to form a ring shape penetrating forward and backward.

[0084]

The second heat transfer sheet 46 is composed of a fixed side mounting part 50 and a movable side mounting part 51 positioned vertically opposite to each other, and a pair of deformation parts 52 and 52 positioned between the fixed side mounting part 50 and the movable side mounting part 51.

[0085]

The fixed side mounting part 50 and the movable side mounting part 51 face in the upward and downward directions, the fixed side mounting part 50 is positioned under the movable side mounting part 51, the fixed side mounting part 50 is bonded to the top surface of the mounting plate part 13b in the second fixed side heat transfer plate 13, and the movable side mounting part 51 is bonded to the bottom surface of the mounting plate part 20b in the second movable side heat transfer plate 20.

[0086]

The deformation parts 52 and 52 are positioned to be laterally separated, the lower ends thereof are respectively connected to the left and right ends of the fixed side mounting part 50, and the upper ends thereof are respectively connected to the left and right ends of the movable side mounting part 51. The approximate lower half of the deformation part 52 is provided as a first part 52a, the approximate upper half thereof is provided as a second part 52b, the first part 52a is bent at an acute angle with respect to the fixed side mounting part 50, and the second part 52b is bent at an acute angle with respect to the movable side mounting part 51. The upper end of the first part 52a and the lower end of the second part 52b of the deformation part 52 are connected, and this connected part 52c is bent in a direction opposite to the bending direction of the first part 52a with respect to the fixed side mounting part 50 and the bending direction of the second part 52b with respect to the movable side mounting part 51.

Accordingly, the deformation parts 52, 52 are formed in a V shape that opens outward in the lateral direction, and the distance between the connected parts 52c, 52c is shorter than the length of the fixed side mounting part 50 and the movable side mounting part 51 in the lateral direction.

[0087]

Since the deformation parts 52 and 52 of the second heat transfer sheet 46 are not bonded to any part of the fixed body 7 and the movable body 8 as described above, the deformation parts 52 and 52 can be deformed when the movable body 8 has moved with respect to the fixed body 7 in the direction orthogonal to the optical axis direction.

[0088]

In the second heat transfer sheet 46, at least the deformation parts 52, 52 are superimposed in a state in which the plurality of sheet members 47, 47, ... are not bonded. The fixed side mounting part 50 and the movable side mounting part 51 are superimposed in a state in which the plurality of sheet members 47, 47, ... are bonded or in a state in which they are not bonded.

[0089]

As described above, each part of the first heat transfer sheet 39 is bonded to the first fixed side heat transfer plate 12 mounted on the base board 9 and the first movable side heat transfer plate 19 mounted on the circuit board 25, and thus the fixed body 7 and the movable body 8 are connected through the first heat transfer sheet 39. In addition, each part of the second heat transfer sheet 46 is bonded to the second fixed side heat transfer plate 13 mounted on the base board 9 and the second movable side heat transfer plate 20 mounted on the circuit board 25, and thus the fixed body 7 and the movable body 8 are also connected through the second heat transfer sheet 46.

[0090]

One end of a first heat conduction sheet formed of graphite or the like, which is not illustrated, is mounted on the mounted plate part 12a of the first fixed side heat transfer plate 12 from the back. One end of a second heat conduction sheet formed of graphite or the like, which is not illustrated, is mounted on the mounted plate part 13a of the second fixed side heat transfer plate 13 from the back. The other end of the first heat conduction sheet and the other end of the second heat conduction sheet are mounted on, for example, the inner surface of the casing 3.

[0091]

The whole first heat transfer sheet 39 and the whole second heat transfer sheet 46 are integrally formed, for example (refer to Fig. 8).

[0092]

In this case, each of the whole first heat transfer sheet 39 and the whole second heat transfer sheet 46 can be integrally formed, for example, by superimposing graphite sheets formed in a predetermined shape in a plate shape to form a base body 53 and bending predetermined parts of the base body 53 in predetermined directions.

[0093]

By integrally forming the whole first heat transfer sheet 39 and the whole second heat transfer sheet 46, it is possible to promote improvement of workability in a

manufacturing process of the image blurring correction device 6 and reduction in the number of parts of the image blurring correction device 6.

[0094]

<Operations in imaging apparatus>

In the imaging apparatus 1 configured as above, the imaging element 23 is in a driving state and thus heat is generated from the movable body 8, particularly, the imaging element 23 and the circuit board 25 in a state power has been applied at the time of imaging and the like. The heat generated in the movable body 8 is transferred from the first movable side heat transfer plate 19 and the second movable side heat transfer plate 20 to the first fixed side heat transfer plate 12 and the second fixed side heat transfer plate 13 through the first heat transfer sheet 39 and the second heat transfer sheet 46. The heat transferred to the first fixed side heat transfer plate 12 and the second fixed side heat transfer plate 13 is transferred from the first heat conduction sheet mounted on the mounted plate part 12a of the first fixed side heat transfer plate 12 and the second heat conduction sheet mounted on the mounted plate part 13a of the second fixed side heat transfer plate 13 to the casing 3 and radiated to the outside from the casing 3.

[0095]

Accordingly, temperature increase in the movable body 8, particularly, the imaging element 23 and the circuit board 25 is curved and thus satisfactory driving states of the imaging element 23, the circuit board 25, and the like are secured.

[0096]

At the time of imaging and the like described above, a blurring correction operation is performed according to movement of the movable body 8 with respect to the fixed body 7 in the direction orthogonal to the optical axis direction. In the blurring correction operation, the deformation parts 45, 45, 52, and 52 of the first heat transfer sheet 39 and the second heat transfer sheet 46 are deformed according to movement of the movable body 8 with respect to the fixed body 7.

[0097]

Here, since the thickness direction of the first heat transfer sheet 39 and the second heat transfer sheet 46 is orthogonal to the optical axis direction and torsion is not generated in the deformed deformation parts 45 and 52, a load generated in the first heat transfer sheet 39 and the second heat transfer sheet 46 is small and a load (driving load) applied to the movable body 8 from the first heat transfer sheet 39 and the second heat transfer sheet 46 is small.

[0098]

<Deformed state of heat transfer sheet>

Hereinafter, deformed states of the first heat transfer sheet 39 and the second heat transfer sheet 46 will be described (refer to Fig. 9 to Fig. 14). Further, the deformed states of the first heat transfer sheet 39 and the second heat transfer

sheet 46 are identical because the first heat transfer sheet 39 and the second heat transfer sheet 46 have only a difference of upside down arrangement therebetween, and thus only the deformed state of the first heat transfer sheet 39 will be described below.

[0099]

In the first heat transfer sheet 39, the deformation part 45 is superimposed in a state in which the plurality of sheet members 40, 40, ... are not bonded, the first part 45a and the second part 45b of the deformation parts 45 are bent at an acute angle to the fixed side mounting part 43 and the movable side mounting part 44, respectively, and the connected parts 45c are bent in a direction opposite to the bending direction of the first part 45a with respect to the fixed side mounting part 43 and the bending direction of the second part 45b with respect to the movable side mounting part 44 (refer to Fig. 9).

[0100]

Accordingly, the sheet members 40, 40, ... in the deformation part 45 are liable to have a gap therebetween in the thickness direction and a gap between the sheet members 40, 40, ... is hardly generated at the edges 45d on one side and the edges 45e on the other side in the upward-downward direction, but a gap between the sheet members 40, 40, ... is maximized in the connected part 45c and thus the deformation part 45 is in a flexible state, that is, a state in which it is liable to be deformed.

[0101]

When the movable body 8 moves with respect to the fixed body 7 in the lateral direction and force F is applied to the first heat transfer sheet 39 in the lateral direction, the movable side mounting part 44 is displaced with respect to the fixed side mounting part 43 in the lateral direction and the deformation parts 45 and 45 are deformed (refer to Fig. 10). Here, although the sheet members 40, 40, ... have a gap therebetween in the deformation part 45, particularly, the connected part 45c has a large gap, and the gap between the sheet members 40, 40, ... decreases according to deformation of the deformation part 45, the gap between the sheet members 40, 40, ... is also held in a state in which the deformation part 45 has been deformed.

[0102]

Accordingly, the deformation part 45 is held in a flexible state as a whole, a load generated in the deformation part 45 is small, and a load (driving load) applied to the movable body 8 from the first heat transfer sheet 39 when the movable body 8 has moved with respect to the fixed body 7 in the lateral direction is small.

[0103]

In addition, the first heat transfer sheet 39 is formed by superimposing the plurality of sheet members 40, 40, ... in a state in which they are not bonded and bonding both ends of the sheet members 40, 40, ... in the longitudinal direction to form a ring shape penetrating forward and backward.

[0104]

Accordingly, reaction from the inside to the outside of the ring shape, that is, reaction to return to an equilibrium length state before both ends of the sheet members 40, 40, ... in the longitudinal direction are bonded, is generated in the first heat transfer sheet 39. Accordingly, in the deformation part 45, reaction P by which the edges 45d on one side and the edges 45e on the other side in the upward-downward direction are displaced in opposite directions is generated (refer to Fig. 11).

[0105]

When the movable body 8 moves with respect to the fixed body 7 in the lateral direction and force F is applied to the first heat transfer sheet 39 in the lateral direction, the movable side mounting part 44 is displaced with respect to the fixed side mounting part 43 in the lateral direction and the deformation parts 45 and 45 are deformed (refer to Fig. 12). Here, when it is assumed that angles of the first parts 45a and 45a with respect to the fixed side mounting part 43 are A1 and A2 and angles of the second parts 45b and 45b with respect to the movable side mounting part 44 are B1 and B2, the first part 45a on one side and the second part 45b on the other side are displaced in a state in which the angles A1 and B2 increase and the first part 45a on the other side and the second part 45b on one side are displaced in a state the angle A2 and B1 decrease when the deformation part 45 has been deformed.

[0106]

Here, the force of the reaction P becomes force assisting force in a direction in which the angles A1 and B2 increase and becomes force opposing the assisting force in a direction in which the angles A2 and B1 decrease.

[0107]

Although the reaction P becomes force assisting force when the movable body 8 moves with respect to the fixed body 7 in the lateral direction and force opposing the assisting force in this manner, a load generated in the first heat transfer sheet 39 is small because the reaction P does not become only the assisting force.

[0108]

Accordingly, generation of the reaction P in the first heat transfer sheet 39 does not cause a large load to be generated in the deformation part 45, and thus a load (driving load) applied to the movable body 8 from the first heat transfer sheet 39 when the movable body 8 has moved with respect to the fixed body 7 in the lateral direction is small.

[0109]

In addition, as described above, all of the conducting part 36 of the first flexible printed wiring board 33, the second flexible printed wiring board 37, and the third flexible printed wiring board 38 are bent such that parts face each other in the optical axis direction (forward-backward direction) in the image blurring correction device 6. Accordingly, torsion is generated in all of the conducting

part 36 of the first flexible printed wiring board 33, the second flexible printed wiring board 37, and the third flexible printed wiring board 38 when the movable body 8 has moved with respect to the fixed body 7 in the lateral direction, and the generated torsion becomes a load to movement of the movable body 8.

[0110]

However, since the fixed side mounting part 43 and the movable side mounting part 44 are positioned vertically facing each other and the first heat transfer sheet 39 is disposed in a state in which the deformation parts 45 and 45 are laterally arranged in the image blurring correction device 6, a load generated in the lateral direction in the first heat transfer sheet 39 is small and a load applied to the movable body 8 from the first heat transfer sheet 39 in the movement direction of the movable body 8 is small, as described above. Accordingly, a load applied to the movable body 8 from the conducting part 36 and the like at the time of movement of the movable body 8 with respect to the fixed body 7 in the width direction (lateral direction) of the conducting part 36 and the like is hardly amplified, and thus a smooth movement state of the movable body 8 with respect to the fixed body 7 can be secured.

[0111]

Meanwhile, although the force generated when the first heat transfer sheet 39 is disposed in a state in which the deformation parts 45 and 45 are laterally arranged and the movable body 8 has moved with respect to the fixed body 7 in the lateral direction has been described, the first heat transfer sheet 39 may be disposed in a state in which the deformation parts 45 and 45 are vertically arranged, and in this case, a load (driving load) applied to the movable body 8 from the first heat transfer sheet 39 when the movable body 8 has moved with respect to the fixed body 7 in the upward-downward direction decreases.

[0112]

On the other hand, when the movable body 8 has moved with respect to the fixed body 7 in the upward-downward direction in a state in which the first heat transfer sheet 39 having the deformation parts 45 and 45 laterally arranged is disposed, the deformation parts 45 and 45 are deformed to expand/contract (refer to Fig. 13 and Fig. 14).

[0113]

In this case, when the deformation part 45 is in a contraction state, as shown in Fig. 13, force Q1 to push back the movable body 8 is generated in the deformation part 45, a load is applied to the movable body 8 in a direction opposite to the movement direction, and the load applied to the movable body 8 from the first heat transfer sheet 39 when the movable body 8 has moved in the lateral direction is liable to increase. However, since the gap between the sheet members 40, 40, ... increases in the deformation part 45, the deformation part 45 is held in a flexible state as a whole, a large load is hardly generated in the deformation part 45, and the load (driving load) applied to the movable body 8

from the first heat transfer sheet 39 when the movable body 8 has moved with respect to the fixed body 7 in the upward-downward direction does not excessively increase.

[0114]

On the contrary, when the deformation part 45 is in an expansion state, as shown in Fig. 14, force Q2 to pull back the movable body 8 is generated in the deformation part 45, a load is applied to the movable body 8 in a direction opposite to the movement direction, and the load applied to the movable body 8 from the first heat transfer sheet 39 when the movable body 8 has moved in the lateral direction is liable to increase. However, both an angle A formed between the first part 45a and the fixed side mounting part 43 and an angle B formed between the second part 45b and the fixed side mounting part 43 increase, and thus the reaction P becomes force assisting the force when the movable body 8 has moved with respect to the fixed body 7 in the upward-downward direction.

[0115]

Accordingly, the reaction P generated in the first heat transfer sheet 39 does not cause a load to be generated in the deformation part 45, and the load (driving load) applied to the movable body 8 from the first heat transfer sheet 39 when the movable body 8 has moved with respect to the fixed body 7 in the upward-downward direction does not excessively increase.

[0116]

Further, the movable body 8 also moves with respect to the fixed body 7 in a direction inclining to upward, downward, and lateral directions, as described above. In this case, a composite operation state of the aforementioned movement operation of the movable body 8 in the lateral direction and movement operation in the upward-downward direction is generated, but the load (driving load) applied to the movable body 8 from the first heat transfer sheet 39 is small in both the movement operation of the movable body 8 in the lateral direction and the movement operation in the upward-downward direction, as described above. Accordingly, when the movable body 8 has moved in a direction inclining to upward, downward, and lateral directions, the load (driving load) applied to the movable body 8 from the first heat transfer sheet 39 is also small.

[0117]

Meanwhile, since the second heat transfer sheet 46 differs from the first heat transfer sheet 39 only with respect to upside down disposition and have the same configuration as the first heat transfer sheet 39, a load generated in the second heat transfer sheet 46 is the same as the load generated in the first heat transfer sheet 39, and a load generated when the movable body 8 has moved with respect to the fixed body 7 is small.

[0118]

<Effects and the like according to configuration of heat transfer sheet>

As described above, the first heat transfer sheet 39 and the second heat transfer sheet 46 are formed by superimposing the plurality of sheet members 40, 40, ..., 47, 47, ... in the thickness direction.

[0119]

Accordingly, the sheet members 40, 40, ..., 47, 47, ... can be separated in the thickness direction when the deformation parts 45 and 52 have been deformed, and thus loads of the first heat transfer sheet 39 and the second heat transfer sheet 46 with respect to movement of the movable body 8 can be reduced at the time of movement of the movable body 8 with respect to the fixed body 7 and decrease in power consumption can be promoted. In addition, since the plurality of sheet members 40, 40, ..., 47, 47, ... are superimposed in the thickness direction, the deformation parts 45 and 52 do not become excessively rigid even when the thickness thereof increases and thus the flexible state of the deformation parts 45 and 52 can be held to curb generation of load and increase the amount of heat transfer.

[0120]

In addition, in the deformation parts 45 and 52, the first parts 45a and 52a are bent at an acute angle with respect to the fixed side mounting parts 43 and 50 and the second parts 45b and 52b are bent at an acute angle with respect to the movable side mounting parts 44 and 51.

[0121]

Accordingly, the sheet members 40, 40, ..., 47, 47, ... are liable to be separated in the thickness direction when the deformation parts 45 and 52 have been deformed, and thus loads of the first heat transfer sheet 39 and the second heat transfer sheet 46 with respect to movement of the movable body 8 can be further reduced at the time of movement of the movable body 8 with respect to the fixed body 7 and further decrease in power consumption can be promoted.

[0122]

Furthermore, the first heat transfer sheet 39 and the second heat transfer sheet 46 are formed in a ring shape, the deformation parts 45 and 52 are provided as a pair, both ends of one of the deformation parts 45 and 52 are respectively connected to one end of the fixed side mounting parts 43 and 50 and one end of the movable side mounting parts 44 and 51, and both ends of the other of the deformation parts 45 and 52 are respectively connected to the other end of the fixed side mounting parts 43 and 50 and the other end of the movable side mounting parts 44 and 51.

[0123]

Accordingly, since the pair of deformation parts 45 and 52 are equally deformed, load biased to the first heat transfer sheet 39 and the second heat transfer sheet 46 is hardly generated and thus a smooth movement state of the movable body 8 with respect to the fixed body 7 can be secured.

[0124]

Moreover, the first fixed side heat transfer plate 12 and the second fixed side heat transfer plate 13 are provided in the fixed body 7, the first movable side heat transfer plate 19 and the second movable side heat transfer plate 20 are provided in the movable body 8, and a part of the first heat transfer sheet 39 and a part of the second heat transfer sheet 46 are respectively mounted on the first fixed side heat transfer plate 12 or the second fixed side heat transfer plate 13 and the first movable side heat transfer plate 19 or the second movable side heat transfer plate 20.

[0125]

Accordingly, heat generated in the movable body 8 is transferred to the fixed body 7 through the first fixed side heat transfer plate 12 or the second fixed side heat transfer plate 13, the first heat transfer sheet 39 or the second heat transfer sheet 46, and the first movable side heat transfer plate 19 or the second movable side heat transfer plate 20. Accordingly, the first fixed side heat transfer plate 12, the second fixed side heat transfer plate 13, the first movable side heat transfer plate 19, and the second movable side heat transfer plate 20 may be formed in a shape corresponding to the shape of the first heat transfer sheet 39 and the second heat transfer sheet 46, and heat generated in the movable body 8 can be efficiently transferred to the fixed body 7 irrespective of the shape of the first heat transfer sheet 39 and the second heat transfer sheet 46.

[0126]

Further, although an example in which one first heat transfer sheet 39 and one second heat transfer sheet 46 are disposed has been represented above, the number of first heat transfer sheets 39 and second heat transfer sheets 46 disposed in the image blurring correction device 6 is arbitrary, and at least one of the first heat transfer sheet 39 and the second heat transfer sheet 46 may be disposed. In addition, a plurality of first heat transfer sheets 39 and a plurality of second heat transfer sheets 46 may be disposed.

[0127]

In addition, positions at which the first heat transfer sheet 39 and the second heat transfer sheet 46 are disposed are also arbitrary, and thus the first heat transfer sheet 39 and the second heat transfer sheet 46 may be vertically separately disposed, the first heat transfer sheet 39 and the second heat transfer sheet 46 may be laterally separately disposed, or the first heat transfer sheet 39 and the second heat transfer sheet 46 may be disposed separately in a direction inclining to upward, downward, and lateral directions.

[0128]

Further, only any one of the first heat transfer sheet 39 and the second heat transfer sheet 46 may be disposed, only a plurality of first heat transfer sheets 39 may be disposed, or only a plurality of second heat transfer sheets 46 may be disposed. In this case, positions at which each of the first heat transfer sheets 39 and the second heat transfer sheets 46 are also arbitrary.

[0129]

Moreover, although an example of the first heat transfer sheet 39 composed of the fixed side mounting part 43, the movable side mounting part 44, and the pair of deformation parts 45 and 45, and the second heat transfer sheet 46 composed of the fixed side mounting part 50, the movable side mounting part 51, and the pair of deformation parts 52 and 52 has been represented above, each of the first heat transfer sheet and the second heat transfer sheet may be configured to have one or at least three deformation parts 45 or deformation parts 52.

[0130]

<Disposition examples of heat transfer sheets>

Hereinafter, disposition examples of heat transfer sheets will be described (refer to Fig. 15 and Fig. 16). Further, to simplify the following description, the first heat transfer sheet 39 and the second heat transfer sheet 46 will be described as a heat transfer sheet 70, the fixed side mounting parts 43 and 50 will be described as a fixed side mounting part 71, the movable side mounting parts 44 and 51 will be described as a movable side mounting part 72, and the deformation parts 45 and 52 will be described as a deformation part 73.

[0131]

In a first disposition example, the fixed side mounting part 71 and the movable side mounting part 72 of at least one heat transfer sheet 70 are vertically arranged, the deformation parts 73 and 73 thereof are laterally arranged, the fixed side mounting part 71 and the movable side mounting part 72 of at least another heat transfer sheet 70 are laterally arranged, the deformation parts 73 and 73 thereof are vertically arranged, and the at least two heat transfer sheets 70 and 70 are disposed in orthogonal directions orthogonal to the optical axis direction (refer to Fig. 15). Accordingly, the fixed side mounting part 71 and the movable side mounting part 72 of one of the heat transfer sheets 70 are disposed in parallel to a first direction orthogonal to the optical axis direction, and the fixed side mounting part 71 and the movable side mounting part 72 of the other heat transfer sheet 70 are disposed in parallel to a second direction orthogonal to the optical axis direction and the first direction.

[0132]

In this case, a load applied to the movable body 8 from the heat transfer sheet 70 having the deformation parts 73 and 73 laterally arranged is small when the movable body 8 has moved with respect to the fixed body 7 in the lateral direction, and a load applied to the movable body 8 from the heat transfer sheet 70 having the deformation parts 73 and 73 vertically arranged is small when the movable body 8 has moved with respect to the fixed body 7 in the upward-downward direction.

[0133]

Accordingly, a load applied to the movable body 8 from the heat transfer sheet 70 does not excessively increase when the movable body 8 has moved with respect to

the fixed body 7 in any of the lateral direction and the upward-downward direction.

[0134]

When at least the heat transfer sheets 70 and 70 are disposed in orthogonal directions in this manner, load biasing in a specific movement direction of the movable body 8 is reduced at the time of movement of the movable body 8 with respect to the fixed body 7 and thus a smooth movement state of the movable body 8 with respect to the fixed body 7 can be secured.

[0135]

In a second disposition example, two heat transfer sheets 70 and 70 are disposed on opposite sides of the center S of the imaging element 23 therebetween on a diagonal line T of the imaging element 23 (refer to Fig. 16).

[0136]

In this case, loads generated in the two heat transfer sheets 70 and 70 are dispersed having the center S of the imaging element 23 therebetween on the diagonal line T of the imaging element 23, and thus a load biased to the movable body 8 is hardly generated and a smooth movement state of the movable body 8 with respect to the fixed body 7 can be secured.

[0137]

Particularly, in the image blurring correction device 6, a driving unit is composed of the second magnets 11 and 11 and the second coils 31 in order to move the movable body 8 with respect to the fixed body 7 in the upward-downward direction, and two driving units are provided and disposed in a state in which they are laterally separated. Accordingly, since two heat transfer sheets 70 and 70 are configured to be disposed on opposite sides of the center S of the imaging element 23 therebetween on the diagonal line T of the imaging element 23, loads applied to both driving units from the heat transfer sheets 70 and 70 are distributed and thus reduction in power consumption can be promoted.

[0138]

Further, the number of heat transfer sheets 70 disposed in the image blurring correction device 6 is arbitrary, and at least one heat transfer sheet 70 may be disposed. In addition, when a plurality of heat transfer sheets 70 are disposed, disposition positions are also arbitrary and thus the plurality of heat transfer sheets 70 may be vertically separately disposed, the plurality of heat transfer sheets 70 may be laterally separately disposed, or the plurality of heat transfer sheets 70 may be disposed in directions inclining to upward, downward, and lateral directions.

[0139]

<Modified examples of heat transfer sheet>

Hereinafter, modified examples of the heat transfer sheet will be described (refer to Fig. 17 to Fig. 23). Further, to simplify the following description, the first heat transfer sheet 39 and the second heat transfer sheet 46 will be described as

a heat transfer sheet 70 (70A, 70B,...), the fixed side mounting parts 43 and 50 will be described as a fixed side mounting part 71 (71A, 71B, ...), the movable side mounting parts 44 and 51 will be described as a movable side mounting part 72 (72A, 72B, ...), and the deformation parts 45 and 52 will be described as a deformation part 73 (73A, 73B, ...). In addition, the first fixed side heat transfer plate 12 and the second fixed side heat transfer plate 13 will be described as a first heat transfer plate 80 (80A, 80B, ...) and the first movable side heat transfer plate 19 and the second movable side heat transfer plate 20 will be described as a second heat transfer plate 90 (90A, 90B, ...).

[0140]

All of a heat transfer sheet 70A according to a first modified example to a heat transfer sheet 80G according to a seventh modified example represented below have a thickness direction orthogonal to the optical axis direction (forward-backward direction).

[0141]

The heat transfer sheet 70A according to the first modified example includes a fixed side mounting part 71A, a movable side mounting part 72A, and a deformation part 73A and is mounted on the first heat transfer plate 80A and the second heat transfer plate 90A (refer to Fig. 17). The first heat transfer plate 80A includes a mounted plate part 80x facing in the forward-backward direction and a mounting plate part 80y facing in the upward-downward direction, and the second heat transfer plate 90A includes a mounted plate part 90x facing in the forward-backward direction and a mounting plate part 90y facing in the upward-downward direction. In the heat transfer sheet 70A, the fixed side mounting part 71A and the movable side mounting part 72A are respectively mounted on the mounting plate part 80y and the mounting plate part 90y and the deformation part 73A is formed in a curved shape. In the heat transfer sheet 70A, the fixed side mounting part 71A and the movable side mounting part 72A are mounted on the first heat transfer plate 80A and the second heat transfer plate 90A in a state in which the fixed side mounting part 71A and the movable side mounting part 72A face in the upward-downward direction.

[0142]

A heat transfer sheet 70B according to the second modified example includes a fixed side mounting part 71B, a movable side mounting part 72B, and a deformation part 73B and is mounted on a first heat transfer plate 80B and a second heat transfer plate 90B (refer to Fig. 18). The first heat transfer plate 80B includes a mounted plate part 80x facing in the forward-backward direction, a connecting part 80z facing in the upward-downward direction, and a mounting plate part 80y facing in the lateral direction, and the second heat transfer plate 90B includes a mounted plate part 90x facing in the forward-backward direction and a mounting plate part 90y facing in the upward-downward direction. In the heat transfer sheet 70B, the fixed side mounting part 71B and the movable side

mounting part 72B are respectively mounted on the mounting plate part 80y and the mounting plate part 90y and the deformation part 73B is formed in a curved shape. In the heat transfer sheet 70B, the fixed side mounting part 71B is mounted on the first heat transfer plate 80B in a state in which the fixed side mounting part 71B faces in the lateral direction, and the movable side mounting part 72B is mounted on the second heat transfer plate 90B in a state in which the movable side mounting part 72B faces in the upward-downward direction.

[0143]

Further, in the heat transfer sheet 70B according to the second modified example, the fixed side mounting part 71B may be mounted on the first heat transfer plate 80B in a state in which the fixed side mounting part 71B faces in the upward-downward direction, and the movable side mounting part 72B may be mounted on the second heat transfer plate 90B in a state in which the movable side mounting part 72B faces in the lateral direction.

[0144]

A heat transfer sheet 70C according to the third modified example includes a fixed side mounting part 71C, a movable side mounting part 72C, and a deformation part 73C and is mounted on a first heat transfer plate 80C and a second heat transfer plate 90C (refer to Fig. 19). The first heat transfer plate 80C includes a mounted plate part 80x facing in the forward-backward direction, a connecting part 80z facing in the upward-downward direction, and a mounting plate part 80y facing in the lateral direction, and the second heat transfer plate 90C includes a mounted plate part 90x facing in the forward-backward direction, a connecting part 90z facing in the upward-downward direction, and a mounting plate part 90y facing in the lateral direction. In the heat transfer sheet 70C, the fixed side mounting part 71C and the movable side mounting part 72C are respectively mounted on the mounting plate part 80y and the mounting plate part 90y and the deformation part 73C is formed in a curved shape. In the heat transfer sheet 70C, the fixed side mounting part 71C and the movable side mounting part 72C are respectively mounted on the first heat transfer plate 80C and the second heat transfer plate 90C in a state in which the fixed side mounting part 71C and the movable side mounting part 72C face in the lateral direction.

[0145]

Further, in the heat transfer sheet 70A according to the first modified example, the heat transfer sheet 70B according to the second modified example, and the heat transfer sheet 70C according to the third modified example, the fixed side mounting parts 71A, 71B and 71C and the movable side mounting parts 72A, 72B, and 72C may be mounted on the first heat transfer plates 80A, 80B, and 80C and the second heat transfer plates 90A, 90B, and 90C in a state in which one or both of the fixed side mounting parts 71A, 71B and 71C and the movable

side mounting parts 72A, 72B, and 72C incline to the upward-downward direction and the lateral direction.

[0146]

A heat transfer sheet 70D according to the fourth modified example includes a fixed side mounting part 71D, a movable side mounting part 72D, and a deformation part 73D and is mounted on a first heat transfer plate 80D and a second heat transfer plate 90D (refer to Fig. 20). In the fourth modified example, for example, a pair of heat transfer sheets 70D and 70D are provided. The first heat transfer plate 80D includes a mounted plate part 80x facing in the forward-backward direction, a connecting part 80z facing in the upward-downward direction, and mounting plate parts 80y and 80y inclining to the upward-downward direction and the lateral direction, and the second heat transfer plate 90D includes a mounted plate part 90x facing in the forward-backward direction, a connecting part 90z facing in the upward-downward direction, and mounting plate parts 90y and 90y inclining to the upward-downward direction and the lateral direction. The inclination directions of the mounting plate parts 80y and 80y and the mounting plate parts 90y and 90y are opposite directions and incline, for example, 45 degrees, to the upward-downward direction.

[0147]

In the heat transfer sheet 70D, the fixed side mounting part 71D and the movable side mounting part 72D are respectively mounted on the mounting plate part 80y and the mounting plate part 90y, and the deformation part 73D is bent at the middle part thereof and formed in a V shape lying sideways. In the heat transfer sheets 70D and 70D, the middle parts of the deformation parts 73D and 73D are bent in directions in which they approach each other in the lateral direction. In the heat transfer sheet 70D, the fixed side mounting part 71D and the movable side mounting part 72D are mounted on the first heat transfer plate 80D and the second heat transfer plate 90D in a state in which the fixed side mounting part 71D and the movable side mounting part 72D respectively incline to the upward-downward direction and the lateral direction. Accordingly, the heat transfer sheet 70D is formed in a W shape lying sideways as a whole.

[0148]

A heat transfer sheet 70E according to the fifth modified example includes a fixed side mounting part 71E, a movable side mounting part 72E, and a deformation part 73E and is mounted on a first heat transfer plate 80E and a second heat transfer plate 90E (refer to Fig. 21). In the fifth modified example, for example, a pair of heat transfer sheets 70E and 70E are provided. The first heat transfer plate 80E includes a mounted plate part 80x facing in the forward-backward direction, a connecting part 80z facing in the upward-downward direction, and mounting plate parts 80y and 80y facing in the lateral direction, and the second heat transfer plate 90E includes a mounted plate part 90x facing in the forward-

backward direction, a connecting part 90z facing in the upward-downward direction, and mounting plate parts 90y and 90y facing in the lateral direction.
[0149]

In the heat transfer sheet 70E, the fixed side mounting part 71E and the movable side mounting part 72E are respectively mounted on the mounting plate part 80y and the mounting plate part 90y, and the deformation part 73E is bent at the middle part thereof and formed in a V shape lying sideways. In the heat transfer sheets 70E and 70E, the middle parts of the deformation parts 73E and 73E are bent in directions in which they approach each other in the lateral direction. In the heat transfer sheet 70E, the fixed side mounting part 71E and the movable side mounting part 72E are respectively mounted on the first heat transfer plate 80E and the second heat transfer plate 90E in a state in which the fixed side mounting part 71C and the movable side mounting part 72C face in the lateral direction.

[0150]

A heat transfer sheet 70F according to the sixth modified example includes a fixed side mounting part 71F, a movable side mounting part 72F, and a deformation part 73F and is mounted on a first heat transfer plate 80F and a second heat transfer plate 90F (refer to Fig. 22). In the sixth modified example, for example, a pair of heat transfer sheets 70F and 70F are provided. The first heat transfer plate 80F includes a mounted plate part 80x facing in the forward-backward direction and a mounting plate part 80y facing in the upward-downward direction, and the second heat transfer plate 90F includes a mounted plate part 90x facing in the forward-backward direction and a mounting plate part 90y facing in the upward-downward direction.

[0151]

In the heat transfer sheets 70F and 70F, the fixed side mounting parts 71F and 71F and the movable side mounting parts 72F and 72F are superimposed in the thickness direction, the fixed side mounting parts 71F and 71F and the movable side mounting parts 72F and 72F in the superimposed state are mounted on the mounting plate part 80y and the mounting plate part 90y, and the deformation parts 73F and 73F are bent at the middle parts thereof and formed in a V shape lying sideways. In the heat transfer sheets 70F and 70F, the middle parts of the deformation parts 73F and 73F are bent in directions in which they are separated from each other in the lateral direction. In the heat transfer sheet 70F, the fixed side mounting part 71F and the movable side mounting part 72F are mounted on the first heat transfer plate 80F and the second heat transfer plate 90F in a state in which the fixed side mounting part 71A and the movable side mounting part 72A face in the upward-downward direction. The deformation parts 73F and 73F of the heat transfer sheets 70F and 70F are formed in a parallelogram as a whole.

[0152]

The heat transfer sheet 70G according to the seventh modified example includes a fixed side mounting part 71G, a movable side mounting part 72G, and a deformation part 73G and is mounted on a first heat transfer plate 80G and a second heat transfer plate 90G (refer to Fig. 23). In the seventh modified example, for example, two sets of a pair of heat transfer sheets 70G and 70G are provided. The first heat transfer plate 80G includes a mounted plate part 80x facing in the forward-backward direction, a connecting part 80z facing in the upward-downward direction, and mounting plate parts 80y and 80y facing in the lateral direction, and the second heat transfer plate 90G includes a mounted plate part 90x facing in the forward-backward direction, a connecting part 90z facing in the upward-downward direction, and mounting plate parts 90y and 90y facing in the lateral direction.

[0153]

In the heat transfer sheets 70G and 70G, the fixed side mounting parts 71G and 71G and the movable side mounting parts 72G and 72G are superimposed in the thickness direction, the fixed side mounting parts 71G and 71G and the movable side mounting parts 72G and 72G in the superimposed state are mounted on the mounting plate part 80y and the mounting plate part 90y, and the deformation parts 73G and 73G are bent at the middle parts thereof and formed in a V shape lying sideways. In one set of the heat transfer sheets 70G and 70G, the middle parts of the deformation parts 73G and 73G are bent in directions in which they are separated from each other in the lateral direction. In the heat transfer sheet 70G, the fixed side mounting part 71G and the movable side mounting part 72G are respectively mounted on the first heat transfer plate 80G and the second heat transfer plate 90G in a state in which the fixed side mounting part 71C and the movable side mounting part 72C face in the lateral direction. The deformation parts 73G and 73G of the heat transfer sheets 70G and 70G are formed in a diamond shape as a whole.

[0154]

<Conclusion>

As described above, in the imaging apparatus 1 and the image blurring correction device 6, a bendable heat transfer sheet (including the first heat transfer sheet 39, the second heat transfer sheet 46, and the heat transfer sheet 70. This similarly applies hereinafter) that has parts mounted on the fixed body 7 and the movable body 8 and transfers heat generated in the movable body 8 to the fixed body 7 is included, and the thickness direction of the heat transfer sheet is orthogonal to the optical axis direction.

[0155]

Accordingly, torsion is not generated in the heat transfer sheet when the movable body 8 has moved with respect to the fixed body 7 in a direction orthogonal to the optical axis direction, and thus a load applied to the movable body 8 at the time of movement of the movable body 8 with respect to the fixed body 7 can be curbed

after a satisfactory state of transfer of heat from the movable body 8 to the fixed body 7 is secured to promote reduction in power consumption.

[0156]

In addition, the fixed side mounting parts 43, 50, and 71 mounted on the fixed body 7, the movable side mounting parts 44, 51, and 72 mounted on the movable body 8, and the deformation parts 45, 52, and 73 positioned between the fixed side mounting parts 43, 50, and 71 and the movable side mounting parts 44, 51, and 72 are provided on the heat transfer sheet, and the deformation parts 45, 52, and 73 are formed in a bent shape.

[0157]

Accordingly, since the deformation parts 45, 52, and 73 are liable to be deformed conforming to movement of the movable body 8 with respect to the fixed body 7, a load of the heat transfer sheet with respect to movement of the movable body 8 is further decreased and thus further reduction in power consumption can be promoted.

[0158]

Further, by using a graphite sheet as the heat transfer sheet, it is possible to promote improvement of efficiency of heat transfer from the movable body 8 to the fixed body 7, reduction in load applied to the movable body 8 from the heat transfer sheet, and improvement of the strength of the heat transfer sheet because the graphite is a material having a high thermal resistance, a light weight, and a high strength against tensile force.

[0159]

<Embodiment of imaging apparatus>

Fig. 24 is a block diagram of a still camera according to an embodiment of the imaging apparatus of the present technology.

[0160]

The imaging apparatus (still camera) 100 (corresponding to the imaging apparatus 1) includes a lens unit 101 having an imaging function, a camera signal processing unit 102 that performs signal processing such as analog-to-digital conversion of a captured image signal, and an image processing unit 103 that performs recording/reproduction processing of an image signal.

[0161]

In addition, the imaging apparatus 1 includes an image display unit 104 such as a liquid crystal panel which displays a captured image and the like, a reader/writer (R/W) 105 that performs writing and reading of image signals to/from a memory 1000, a central processing unit (CPU) 106 that controls the entire imaging apparatus 1, an input unit 107 (corresponding to the operating part 4) composed of various switches and the like, by which a user performs a necessary operation, and a lens driving control unit 108 that controls driving of lenses disposed in the lens unit 101.

[0162]

The lens unit 101 are composed of an optical system including a lens group 109 (corresponding to the lenses 64), an imaging element 110 (corresponding to the imaging element 23) such as a charge coupled device (CCD) or a complementary metal-oxide semiconductor (CMOS), and the like.

[0163]

The camera signal processing unit 102 performs various types of signal processing such as conversion of an output signal from the imaging element 110 into an analog signal, noise removal, image quality correction, and conversion into luminance and color difference signals.

[0164]

The image processing unit 103 performs compression encoding processing and decompression encoding processing on image signals based on a predetermined image data format, processing of converting data specifications such as resolution, and the like.

[0165]

The image display unit 104 has a function of displaying various types of data such as an operation state applied to the input unit 107 by a user, and captured images.

[0166]

The R/W 105 writes image data encoded by the image processing unit 103 to the memory 1000 and reads image data recorded in the memory 1000.

[0167]

The CPU 106 serves as a control processing unit that controls each circuit block provided in the imaging apparatus 1 and controls each circuit block on the basis of an instruction input signal and the like from the input unit 107.

[0168]

The input unit 107 is composed of a shutter release button for performing a shutter operation, a selection switch for selecting an operation mode, and the like and outputs an instruction input signal according to an operation of a user to the CPU 106.

[0169]

The lens driving control unit 108 controls a motor and the like that are not illustrated, which drive each lens of the lens group 109 on the basis of a control signal from the CPU 106.

[0170]

The memory 1000 is, for example, a semiconductor memory (memory card) detachably inserted into a slot connected to the R/W 105 or an internal memory disposed inside the imaging apparatus 1.

[0171]

Hereinafter, operations in the imaging apparatus 1 will be described.

[0172]

In an imaging standby state, an image signal captured in the lens unit 101 is output to the image display unit 104 through the camera signal processing unit 102 and displayed as a camera still image under the control of the CPU 106. In addition, when an instruction input signal for zooming is input from the input unit 107, the CPU 106 outputs a control signal to the lens driving control unit 108, and a predetermined lens of the lens group 109 moves on the basis of control of the lens driving control unit 108.

[0173]

When a shutter that is not illustrated in the lens unit 101 is operated according to an instruction input signal from the input unit 107, a captured image signal is output from the camera signal processing unit 102 to the image processing unit 103 and compressively encoded to be converted into digital data in a predetermined data format. The converted data is output to the R/W 105 and written to the memory 1000.

[0174]

Focusing or zooming is performed by the lens driving control unit 108 causing a predetermined lens of the lens group 109 to move on the basis of a control signal from the CPU 106.

[0175]

When image data recorded in the memory 1000 is reproduced, predetermined image data is read by the R/W 105 from the memory 1000 according to an operation performed on the input unit 107, decompression encoding processing is performed by the image processing unit 103 on the read image data, and then a reproduced image signal is output to the image display unit 104 and displayed as a reproduced image.

[0176]

Meanwhile, in the present technology, “imaging” refers to processing including only a part or all of a series of processing from photoelectric conversion processing of converting captured light into an electrical signal by the imaging element 110 to processing such as conversion of an output signal from the imaging element 110 into a digital signal, noise removal, image quality correction, and conversion into luminance and color difference signals performed by the camera signal processing unit 102, image signal compression encoding/decompression encoding processing based on a predetermined image data format and processing of converting data specifications such as resolution performed by the image processing unit 103, and processing of writing an image signal to the memory 1000 by the R/W 105.

[0177]

That is, “imaging” may refer to only photoelectric conversion processing of converting captured light into an electrical signal by the imaging element 110, refer to photoelectric conversion processing of converting captured light into an electrical signal by the imaging element 110 to processing such as conversion of

an output signal from the imaging element 110 into a digital signal, noise removal, image quality correction, and conversion into luminance and color difference signals performed by the camera signal processing unit 102, refer to photoelectric conversion processing of converting captured light into an electrical signal by the imaging element 110 to image signal compression encoding/decompression encoding processing based on a predetermined image data format and processing of converting data specifications such as resolution performed by the image processing unit 103 via processing such as conversion of an output signal from the imaging element 110 into a digital signal, noise removal, image quality correction, and conversion into luminance and color difference signals performed by the camera signal processing unit 102, refer to photoelectric conversion processing of converting captured light into an electrical signal by the imaging element 110 to processing such as conversion of an output signal from the imaging element 110 into a digital signal, noise removal, image quality correction, and conversion into luminance and color difference signals performed by the camera signal processing unit 102 and image signal compression encoding/decompression encoding processing based on a predetermined image data format and processing of converting data specifications such as resolution performed by the image processing unit 103, or refer to processing of writing an image signal to the memory 1000 performed by the R/W 105. In the aforementioned processing, processing order may be appropriately changed.

[0178]

In addition, in the present technology, the imaging apparatus 100 may be configured to include only a part or all of the imaging element 110, the camera signal processing unit 102, the image processing unit 103, and the R/W 105 which perform the aforementioned processing.

[0179]

<Present technology>

The present technology can be configured as follows.

[0180]

(1)

An image blurring correction device including:

a fixed body fixed inside a casing;

a movable body that includes an imaging element and moves with respect to the fixed body in a direction orthogonal to an optical axis direction; and

a bendable heat transfer sheet that has parts mounted on the fixed body and the movable body and transfers heat generated in the movable body to the fixed body, wherein a thickness direction of the heat transfer sheet is orthogonal to the optical axis direction.

[0181]

(2)

The image blurring correction device according to (1), wherein a fixed side mounting part mounted on the fixed body, a movable side mounting part mounted on the movable body, and a deformation part positioned between the fixed side mounting part and the movable side mounting part are provided in the heat transfer sheet, wherein the deformation part is formed in a bent shape.

[0182]

(3)

The image blurring correction device according to (2), wherein the heat transfer sheet is formed by superimposing a plurality of sheet members in the thickness direction.

[0183]

(4)

The image blurring correction device according to (3), wherein the fixed side mounting part and the movable side mounting part are positioned facing each other, and the deformation part has both ends respectively connected to one end of the fixed side mounting part and one end of the movable side mounting part and includes a first part connected to the fixed side mounting part and a second part connected to the movable side mounting part, wherein the first part is bent at an acute angle with respect to the fixed side mounting part, and the second part is bent at an acute angle with respect to the movable side mounting part.

[0184]

(5)

The image blurring correction device according to (4), wherein the heat transfer sheet is formed in a ring shape, the deformation part is provided as a pair, both ends of one of the deformation parts are respectively connected to one end of the fixed side mounting part and one end of the movable side mounting part, and both ends of the other deformation part are respectively connected to the other end of the fixed side mounting part and the other end of the movable side mounting part.

[0185]

(6)

The image blurring correction device according to (4) or (5), wherein at least two heat transfer sheets are provided, and at least one of the heat transfer sheets and at least one of the other heat transfer sheets are disposed in orthogonal directions orthogonal to the optical axis direction.

[0186]

(7)

The image blurring correction device according to any one of (4) to (6), wherein a flexible printed wiring board is connected to the movable body, the flexible printed wiring board is bent in the optical axis direction such that parts face each other, and the fixed side mounting part and the movable side mounting part are positioned facing each other in a direction orthogonal to the optical axis direction and a width direction of the flexible printed wiring board.

[0187]

(8)

The image blurring correction device according to any one of (1) to (7), wherein at least two heat transfer sheets are provided on a side of a rear surface of the imaging element, and the two heat transfer sheets are disposed on opposite sides of a center of the imaging element therebetween on a diagonal line of the imaging element.

[0188]

(9)

The image blurring correction device according to any one of (1) to (8), wherein a fixed side heat transfer plate is provided in the fixed body, a movable side heat transfer plate is provided in the movable body, and parts of the heat transfer sheet are provided on the fixed side heat transfer plate and the movable side heat transfer plate.

[0189]

(10)

The image blurring correction device according to any one of (1) to (9), wherein a graphite sheet is used as the heat transfer sheet.

[0190]

(11)

An imaging apparatus including an image blurring correction device that corrects image blurring in such a manner that a movable body including an imaging element moves with respect to a fixed body fixed inside a casing in a direction orthogonal to an optical axis direction, wherein the image blurring correction device includes a bendable heat transfer sheet that has parts mounted on the fixed body and the movable body and transfers heat generated in the movable body to the fixed body, wherein a thickness direction of the heat transfer sheet is orthogonal to the optical axis direction.

[Reference Signs List]

[0191]

- 1 Imaging apparatus
- 6 Image blurring correction device
- 7 Fixed body
- 8 Movable body

12	First fixed side heat transfer plate
13	Second fixed side heat transfer plate
19	First movable side heat transfer plate
20	Second movable side heat transfer plate
23	Imaging element
33	First flexible printed wiring board
37	Second flexible printed wiring board
38	Third flexible printed wiring board
39	First heat transfer sheet
40	Sheet member
43	Fixed side mounting part
44	Movable side mounting part
45	Deformation part
45a	First part
45b	Second part
46	Second heat transfer sheet
47	Sheet member
50	Fixed side mounting part
51	Movable side mounting part
52	Deformation part
52a	First part
52b	Second part
70	Heat transfer sheet
71	Fixed side mounting part
72	Movable side mounting part
73	Deformation part
80	First heat transfer plate
90	Second heat transfer plate
70A to 70G	Heat transfer sheet
71A to 71G	Fixed side mounting part
72A to 72G	Movable side mounting part
73A to 73G	Deformation part
80A to 80G	First heat transfer plate
90A to 90G	Second heat transfer plate
100	Imaging apparatus
110	Imaging element

[CLAIMS]

[Claim 1]

An image blurring correction device comprising:

a fixed body fixed inside a casing;

a movable body that includes an imaging element and moves with respect to the fixed body in a direction orthogonal to an optical axis direction; and

a bendable heat transfer sheet that has parts mounted on the fixed body and the movable body and transfers heat generated in the movable body to the fixed body, wherein a thickness direction of the heat transfer sheet is orthogonal to the optical axis direction.

[Claim 2]

The image blurring correction device according to claim 1, wherein a fixed side mounting part mounted on the fixed body, a movable side mounting part mounted on the movable body, and a deformation part positioned between the fixed side mounting part and the movable side mounting part are provided in the heat transfer sheet, wherein the deformation part is formed in a bent shape.

[Claim 3]

The image blurring correction device according to claim 2, wherein the heat transfer sheet is formed by superimposing a plurality of sheet members in the thickness direction.

[Claim 4]

The image blurring correction device according to claim 3, wherein the fixed side mounting part and the movable side mounting part are positioned facing each other, and the deformation part has both ends respectively connected to one end of the fixed side mounting part and one end of the movable side mounting part and includes a first part connected to the fixed side mounting part and a second part connected to the movable side mounting part, wherein the first part is bent at an acute angle with respect to the fixed side mounting part, and the second part is bent at an acute angle with respect to the movable side mounting part.

[Claim 5]

The image blurring correction device according to claim 4, wherein the heat transfer sheet is formed in a ring shape, the deformation part is provided as a pair, both ends of one of the deformation parts are respectively connected to one end of the fixed side mounting part and one end of the movable side mounting part, and both ends of the other deformation part are respectively connected to the other end of the fixed side mounting part and the other end of the movable side mounting part.

[Claim 6]

The image blurring correction device according to claim 4, wherein at least two heat transfer sheets are provided, and at least one of the heat transfer sheets and at least one of the other heat transfer sheets are disposed in orthogonal directions orthogonal to the optical axis direction.

[Claim 7]

The image blurring correction device according to claim 4, wherein a flexible printed wiring board is connected to the movable body, the flexible printed wiring board is bent in the optical axis direction such that parts face each other, and the fixed side mounting part and the movable side mounting part are positioned facing each other in a direction orthogonal to the optical axis direction and a width direction of the flexible printed wiring board.

[Claim 8]

The image blurring correction device according to claim 1, wherein at least two heat transfer sheets are provided on a side of a rear surface of the imaging element, and the two heat transfer sheets are disposed on opposite sides of a center of the imaging element therebetween on a diagonal line of the imaging element.

[Claim 9]

The image blurring correction device according to claim 1, wherein a fixed side heat transfer plate is provided in the fixed body, a movable side heat transfer plate is provided in the movable body, and parts of the heat transfer sheet are provided on the fixed side heat transfer plate and the movable side heat transfer plate.

[Claim 10]

The image blurring correction device according to claim 1, wherein a graphite sheet is used as the heat transfer sheet.

[Claim 11]

An imaging apparatus comprising an image blurring correction device that corrects image blurring in such a manner that a movable body including an imaging element moves with respect to a fixed body fixed inside a casing in a direction orthogonal to an optical axis direction, wherein the image blurring correction device includes a bendable heat transfer sheet that has parts mounted on the fixed body and the movable body and transfers heat generated in the movable body to the fixed body, wherein a thickness direction of the heat transfer sheet is orthogonal to the optical axis direction.