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DISK DRIVE SUSPENSION STRUCTURE AND DISK DRIVE

Abstract

According to one embodiment, a disk drive suspension structure includes a base member including a base portion and an attachment portion connected to the base portion, the base portion including a boss portion attached to the arm, the attachment portion including a first attachment surface facing in a direction opposite to a projection direction of the boss portion and a second attachment surface facing in the projection direction of the boss portion, a first load beam attached to the first attachment surface, and a second load beam attached to the second attachment surface and facing the first load beam.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS
[0001] This application is based upon and claims the benefit of priority from prior Japanese Patent Application No. 2024-018584, filed Feb. 9, 2024, the entire contents of which are incorporated herein by reference.
BACKGROUND OF THE INVENTION
1. Field of the Invention
[0002] The present invention relates to a disk drive suspension structure and a disk drive.
2. Description of the Related Art
[0003] Hard disk drives (HDDs) are used in information processing apparatuses such as computers. A hard disk drive includes a magnetic disk which rotates around a spindle, a carriage which turns on a pivot, and the like. The carriage comprises an arm and is turned on the pivot in a track-width direction of the disk by a positioning motor such as a voice coil motor.
[0004] A disk drive suspension (hereinafter, simply referred to as a suspension) is attached to the arm. The suspension includes a baseplate connected to the arm, a load beam, a flexure disposed along the load beam, and the like. A slider constituting a magnetic head is provided at a gimbal portion formed in the vicinity of the distal end of the flexure.
[0005] The slider is provided with elements (transducers) for accessing data, that is, for reading or writing data. The load beam, the flexure, the slider, and the like, constitute a head gimbal assembly.
[0006] In order to deal with an increase in the recording density of a disk, the head gimbal assembly needs to be more smaller and be positioned on the recording surface of the disk more precisely.
[0007] There has been a strong demand to improve the recording capacity of hard disk drives to deal with an improvement in the recording density. Thus, increasing the number of magnetic disks in the hard disk drives (that is, configuring them for multiple disks) has been underway. To increase the number of magnetic disks, it is necessary to reduce the distance between the magnetic disks, as well as making the magnetic disks and the like thinner.
[0008] For example, reducing the thickness of an arm to reduce the distance between the magnetic disks has been known. As means for reducing the thickness of an arm, various proposals have been made (for example, JP 2736174 B, US 2021/0264941 A, and JP H07-111771 B).
[0009] However, even in light of the inventions disclosed in the above patent literatures, there is still room for various improvements in making disk drives thinner.
BRIEF SUMMARY OF THE INVENTION
[0010] One of the objects of the present invention is to provide a disk drive suspension structure and a disk drive which can be made thinner.
[0011] According to one embodiment, a disk drive suspension structure attached to an arm of a disk drive. The disk drive suspension structure comprises a base member comprising a base portion and an attachment portion connected to the base portion, the base portion comprising a boss portion attached to the arm, the attachment portion comprising a first attachment surface facing in a direction opposite to a projection direction of the boss portion and a second attachment surface facing in the projection direction of the boss portion, a first load beam attached to the first attachment surface, and a second load beam attached to the second attachment surface and facing the first load beam.
[0012] The first load beam may comprise first bent portions formed at both side portions of the first load beam, respectively, and extending in a longitudinal direction of the first load beam. The second load beam may comprise second bent portions formed at both side portions of the second load beam, respectively, extending in the longitudinal direction, and facing the first bent portions.

[0013] The base portion comprises a first surface on which the boss portion is formed and which faces the arm. The second attachment surface may be shifted further in the projection direction than the first surface.
[0014] The base portion further may comprise a second surface on an opposite side of the first surface, and the first attachment surface may be shifted further in the projection direction than the second surface.
[0015] The base member further may comprise a step portion formed between the base portion and the attachment portion. The step portion may comprise a first inclined surface connecting the first surface and the second attachment surface, and a second inclined surface connecting the second surface and the first attachment surface.
[0016] The base member may comprise a first member comprising the first attachment surface, and a second member comprising the boss portion and the second attachment surface and overlapping the first member. The second member may comprise a third surface not overlapping the first member, and a fourth surface connected to the third surface and facing the first member. The third surface and the fourth surface may be located on an opposite side of the second attachment surface.
[0017] The base member may comprise a third member comprising the boss portion and the first attachment surface, and a fourth member comprising the second attachment surface and overlapping the third member. The fourth member and the boss portion may be arranged in the longitudinal direction of the first load beam.
[0018] The first load beam may comprise a first spring portion attached to the first attachment surface, and a first load bent portion formed in a width direction of the first load beam between the first spring portion and the first bent portions and having a first angle. The second load beam may comprise a second spring portion attached to the second attachment surface, and a second load bent portion formed in the width direction between the second spring portion and the second bent portions and having a second angle different from the first angle.
[0019] The second angle may be smaller than the first angle. The second attachment surface may be inclined with respect to the first attachment surface to increase a distance between the first attachment surface and the second attachment surface in a longitudinal direction of the first load beam.
[0020] The first load beam may comprise first bent portions formed at both side portions of the first load beam, respectively, and extending in a longitudinal direction of the first load beam. The second load beam may comprise second bent portions formed at both side portions of the second load beam, respectively, and extending in the longitudinal direction, a gap being formed between the first bent portions and the second bent portions in a width direction of the first load beam. The first bent portions may overlap the second bent portions, when viewed in the width direction.
[0021] The base member further may comprise an actuator mounting portion formed between the first attachment surface and the second attachment surface. The actuator mounting portion may be an aperture penetrating the first attachment surface and the second attachment surface.
[0022] According to one embodiment, a disk drive comprises the disk drive suspension structure, and the arm comprising a base fixing portion to which the base member is attached.
[0023] The above-described structures can provide a disk drive suspension structure and a disk drive which can be made thinner.
[0024] Additional objects and advantages of the invention will be set forth in the description which follows, and in part will be obvious from the description, or may be learned by practice of the invention. The objects and advantages of the invention may be realized and obtained by means of the instrumentalities and combinations particularly pointed out hereinafter.

Description

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

[0025] The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate embodiments of the invention, and together with the general description given above and the detailed description of the embodiments given below, serve to explain the principles of the invention.

[0026] FIG. **1** is a schematic perspective view illustrating an example of a disk drive according to a first embodiment.

[0027] FIG. **2** is a schematic cross-sectional view illustrating part of the disk drive according to the first embodiment.

[0028] FIG. **3** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of an arm illustrated in FIG. **2**.

[0029] FIG. **4** is a schematic cross-sectional view of a suspension structure along line IV-IV of FIG. **3**.

[0030] FIG. **5** is a schematic plan view illustrating an example of the suspension structure according to the first embodiment.

[0031] FIG. **6** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of an arm of a disk drive according to a comparative example.

[0032] FIG. **7** is a diagram illustrating the arrangement state of a head stack assembly and disks in the disk drive according to the comparative example.

[0033] FIG. **8** is a diagram illustrating the arrangement state of a head stack assembly and disks in the disk drive according to the first embodiment.

[0034] FIG. **9** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of the arm in the disk drive according to a second embodiment.

[0035] FIG. **10** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of the arm in the disk drive according to a third embodiment.

[0036] FIG. **11** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of the arm in the disk drive according to a fourth embodiment.

[0037] FIG. **12** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of the arm in the disk drive according to a fifth embodiment.

[0038] FIG. **13** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of the arm in the disk drive according to a sixth embodiment.

[0039] FIG. **14** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of the arm in the disk drive according to a seventh embodiment.

[0040] FIG. **15** is a diagram illustrating an example of the arrangement state of load beams of the suspension structure in the seventh embodiment.

[0041] FIG. **16** is a diagram illustrating another example of the arrangement state of the load beams of the suspension structure in the seventh embodiment.

[0042] FIG. **17** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of the arm in the disk drive according to an eighth embodiment.

[0043] FIG. **18** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of the arm in the disk drive according to a ninth embodiment.

[0044] FIG. **19** is a schematic plan view illustrating an example of the suspension structure according to a tenth embodiment.

[0045] FIG. **20** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of the arm in the disk drive according to the tenth embodiment.

DETAILED DESCRIPTION OF THE INVENTION

[0046] Each embodiment of the present invention will be described hereinafter with reference to the drawings. To make the description clearer, the drawings may schematically illustrate the size, the shape, and the like, of each portion, with changes from those in actual embodiments.

[0047] The drawings illustrate an X-axis, a Y-axis, and a Z-axis orthogonal to each other to facilitate understanding as necessary. A direction along the X-axis is referred to as a first direction X, a direction along the Y-axis is referred to as a second direction Y, and a direction along the Z-axis is referred to as a third direction Z. The third direction Z may be referred to "high" or "upward", and the direction opposite to the third direction Z may be referred to as "low" or "downward".

FIRST EMBODIMENT

[0048] FIG. **1** is a schematic perspective view illustrating an example of a disk drive **1** (HDD) according to the present embodiment. In the example illustrated in FIG. **1**, the disk drive **1** comprises a case **2**, magnetic disks **4** (hereinafter, simply referred to as disks **4**) which rotate around a spindle **3**, a carriage **6** which can turn on a pivot **5**, and a positioning motor (voice coil motor) **7** for actuating the carriage **6**. The case **2** is sealed by a lid not illustrated in the figure.

[0049] FIG. **2** is a schematic cross-sectional view illustrating part of the disk drive **1** according to the present embodiment. The carriage **6** comprises arms **8** (for example, three arms **8**). A disk drive suspension structure **10** (hereinafter, simply referred to as a suspension structure **10**) is attached to the distal end portion of the arm **8** provided in the central portion of the arms **8**.

[0050] In the following description, the arm **8** to which the suspension structure **10** is attached, of the arms **8**, is referred to as an arm **8**A. In addition, disk drive suspensions **100** (hereinafter, simply referred to as suspensions **100**) are attached to the distal end portions of the other arms **8**, respectively.

[0051] Sliders **11** constituting a magnetic head are mounted on the distal end portions of the suspension structure **10** and the suspensions **100**, respectively. Two sliders **10** are mounted on the one suspension structure **10**. In contrast, one slider **11** is mounted on each of the suspensions **100**.

[0052] As illustrated in FIG. **2**, the disks **4** (for example, two disks **4**) face each other at a predetermined distance. The suspension structure **10** is located between two disks **4**. The carriage **6**, the suspension structure **10**, the suspensions **100**, and the like constitute a head stack assembly HSA.

[0053] When the disks **4** rotate at high speed, an influx of air into the space between the disks **4** and the sliders **11** forms an air bearing. When the carriage **6** is turned by the positioning motor **7**, the arms **8** move in the radial direction of the disks **4**, and the sliders **11** thereby move to desired tracks on the disks **4**.

[0054] FIG. **3** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of the arm **8**A illustrated in FIG. **2**. FIG. **4** is a schematic cross-sectional view of the suspension structure **10** along line IV-IV of FIG. **3**. FIG. **5** is a schematic plan view illustrating an example of the suspension structure **10** according to the present embodiment.

[0055] In FIG. **3**, some portions are illustrated in cross-sectional view. In FIG. **4**, only load beams **30**A and **30**B are illustrated. In FIG. **5**, the suspension structure **10** is viewed in the direction opposite to the third direction Z.

[0056] As illustrated in FIG. **3**, the suspension structure **10** is attached to the arm **8**A. The arm **8**A comprises a base fixing portion **81** at its distal end portion. In the example illustrated in FIG. **3**, the base fixing portion **81** has a thickness smaller than that of the other portion.

[0057] In the base fixing portion **81**, a through-hole **81***a* for passing a boss portion, which will be described later, is formed. The carriage **6** (illustrated in FIG. **2**) including the arm **8**A is formed of, for example, a metallic material such as an aluminum alloy.

[0058] The suspension structure **10** extends in the first direction X. In the present embodiment, the first direction X corresponds to the longitudinal direction of the suspension structure **10**. In the first direction X, the side on which the sliders **11** are mounted with respect to the arms **8** is referred to as the "distal end side".

[0059] The second direction Y corresponds to the width direction of the suspension structure **10**, and the third direction Z corresponds to the thickness direction of the suspension structure **10**. In

the following description, a distance along the third direction Z may be referred as a “thickness”.
[0060] The suspension structure **10** comprises a base member **20** and suspension elements SA**1** and SA**2**. The base member **20** is attachable to the base fixing portion **81** of the arm **8**A. The base member **20** has the shape of a plate.
[0061] The base member **20** comprises a base portion **21** and an attachment portion **23** connected to the base portion **21**. The base portion **21** corresponds to, for example, a portion overlapping the arm **8**A.
[0062] The base member **20** comprises a surface **25** and a surface **27** on the opposite side of the surface **25**. In the present embodiment, the surface **25** corresponds to a first attachment surface, and the surface **27** corresponds to a second attachment surface. Each of the surfaces **25** and **27** is formed over the base portion **21** and the attachment portion **23**. The surface **25** faces in the third direction Z, and the surface **27** faces in the direction opposite to the third direction Z.
[0063] The surfaces **25** and **27** are parallel to an X-Y plane defined by the first direction X and the second direction Y. When the focus is on the arm **8**A, the surface **27** includes a region facing the arm **8**A.
[0064] The base portion **21** comprises a boss portion **29**. The base member **20** is attached to the arm **8**A via the boss portion **29**. In the example illustrated in FIG. **3**, the boss portion **29** is formed on the surface **27** in the base portion **21**.
[0065] The boss portion **29** projects from the surface **27** in the direction opposite to the third direction Z. In the present embodiment, the third direction Z corresponds to the direction opposite to the projection direction of the boss portion **29**, and the direction opposite to the third direction Z corresponds to the projection direction of the boss portion **29**.
[0066] The boss portion **29** has, for example, a circular shape when viewed in the third direction Z. In the boss portion **29**, a through-hole **29***a* for passing a ball for swaging is formed.
[0067] The thickness of the base member **20** is, for example, 300 μm or less. For example, the thickness of the base member **20** is 100 to 300 μm. However, the thickness of the base member **20** is not limited to the above example. The thickness of the base member **20** corresponds to the distance between the surface **25** and the surface **27**. The thickness of the base member **20** is, for example, smaller than the thickness of the arms **8**. Here, the thickness of the arms **8** is the thickness of the portions other than the base fixing portion **81**.
[0068] The base member **20** is formed of, for example, a metallic material such as stainless steel. In the present embodiment, the base member **20** is formed of a single member.
[0069] The suspension elements SA**1** and SA**2** are each attached to the base member **20**. The suspension element SA**1** faces the suspension element SA**2** with the base member **20** interposed therebetween.
[0070] The suspension element SA**2** has the same structure as that of the suspension element SA**1**. The description here mainly explains the structure of the suspension element SA**1**.
[0071] The suspension element SA**1** comprises the load beam **30**A (first load beam) and a flexure **40**A. The load beam **30**A is attached to the surface **25** of the base member **20**. As illustrated in FIG. **5**, the load beam **30**A has a shape tapering toward the distal end side.
[0072] The load beam **30**A comprises a spring portion **31**A (first spring portion). The load beam **30**A is elastically supported on the surface **25** by the spring portion **31**A. The load beam **30**A is, for example, fixed to the surface **25** by spot welding using a laser.
[0073] The load beam **30**A further comprises a load bent portion **33**A (first load bent portion) and bent portions **35**A and **37**A (first bent portions). As illustrated in FIG. **3**, the load beam **30**A is inclined by the load bent portion **33**A in a direction crossing the first direction X, when viewed in the second direction Y.
[0074] The load bent portion **33**A is located between the spring portion **31**A and the bent portions **35**A and **37**A in the first direction X. The load bent portion **33**A is formed along the second direction Y. The load bent portion **33**A has a first angle θ1.

[0075] The first angle θ1 of the load bent portion **33**A is, for example, a clockwise angle with respect to the spring portion **31**A, when viewed in the second direction Y. In FIG. **3**, the load beam **30**A is inclined upward in the first direction X.
[0076] The bent portions **35**A and **37**A are provided closer to the distal end side than the load bent portion **33**A. As illustrated in FIG. **4**, the bent portions **35**A and **37**A are formed at both side portions **350** and **370** of the load beam **30**A. Both side portions **350** and **370** of the load beam **30**A are portions located at both sides in the second direction Y of the load beam **30**A. The bent portions **35**A and **37**A extend in the first direction X. In the load beam **30**A, the stiffness of the region where the bent portions **35**A and **37**A are formed is greater than that of the other regions.
[0077] The thickness of the load beam **30**A is smaller than the thickness of the base member **20**. The thickness of the load beam **30**A is, for example, **20** to **80** um, but is not limited to this example. The load beam **30**A is formed of a metallic material such as stainless steel.
[0078] As illustrated in FIG. **5**, the flexure **40**A is disposed along the base member **20** and the load beam **30**A. Part of the flexure **40**A overlaps the load beam **30**A. The flexure **40**A is, for example, fixed to the base member **20** and the load beam **30**A by spot welding using a laser.
[0079] The flexure **40**A includes a distal end side portion **41**A overlapping the load beam **30**A and a flexure tail **43**A extending from the distal end side portion **41**A toward the back of the base member **20**.
[0080] The flexure **40**A comprises a metal base **45** formed of, for example, a thin plate of stainless steel, and a wiring portion **47** overlapping the metal base **45**. The thickness of the metal base **45** is smaller than the thickness of the load beam **30**A. The thickness of the metal base **45** is, for example, 15 to 20 μm.
[0081] In the distal end side portion **41**A, the flexure **40**A further comprises a tongue **51** and a pair of outriggers **53** and **55**. On the tongue **51**, the slider **11** is mounted.
[0082] The distal end portion of the slider **11** is provided with elements which can convert a magnetic signal and an electrical signal, for example, MR elements. In the distal end side portion **41**A, the wiring portion **47** is electrically connected to the elements of the slider **11** via a terminal **57**. The elements access the disk **4**, that is, writes data to or read data from the disk **4**.
[0083] The pair of outriggers **53** and **55** is disposed at both sides of the tongue **51** in the second direction Y, respectively. The pair of outriggers **53** and **55** has a shape protruding to both outer sides of the tongue **51** in the second direction Y. All of the tongue **51** and the pair of outriggers **53** and **55** are part of the metal base **45**, and their respective contours are formed by, for example, etching.
[0084] The tongue **51**, the pair of outriggers **53** and **55**, and the like constitute a gimbal portion. The gimbal portion is formed at the distal end side portion **41**A of the flexure **40**A. On the gimbal portion, actuator elements **61** and **63** are mounted. The actuator elements **61** and **63** have the function of pivoting the tongue **51** in a sway direction S (illustrated in FIG. **5**).
[0085] The actuator elements **61** and **63** are disposed at both sides of the slider **11** in the second direction Y. The actuator elements **61** and **63** are, for example, piezoelectric elements, and are formed of lead zirconate titanate (PZT) or the like. The actuator elements **61** and **63** are each fixed to the tongue **51** by conductive adhesive or the like.
[0086] As illustrated in FIG. **3**, the suspension element SA**2** comprises the load beam **30**B (second load beam) and a flexure **40**B. The load beam **30**B and the flexure **40**B have the same structures as those of the load beam **30**A and the flexure **40**A.
[0087] The load beam **30**B is attached to the surface **27** of the base member **20**. The load beam **30**B faces the load beam **30**A. The load beam **30**B comprises a spring portion **31**B (second spring portion), a load bent portion **33**B (second load bent portion), and bent portions **35**B and **37**B (second bent portions).
[0088] The load beam **30**B is elastically supported on the surface **27** by the spring portion **31**B. The load beam **30**B is inclined by the load bent portion **33**B in a direction different from the direction in

which the load beam **30**A is inclined. The load bent portion **33**B has a second angle θ2.
[0089] The second angle θ2 of the load bent portion **33**B is, for example, a counterclockwise angle with respect to the spring portion **31**B, when viewed in the second direction Y. In the present embodiment, the second angle θ2 is equal to the first angle θ1. As illustrated in FIG. **3**, the load beam **30**B is inclined downward in the first direction X. From another point of view, as illustrated in FIG. **3**, the load beams **30**A and **30**B are inclined by the load bent portions **33**A and **33**B to become apart from each other in the first direction X.
[0090] Thus, the slider **11** mounted on the suspension element SA**1** can read data from and write data to the disk **4** different from that of the slider **11** mounted on the suspension element SA**2**.
[0091] The bent portions **35**B and **37**B are formed at both side portions **350** and **370** of the load beam **30**B, and extends in the first direction X. When the focus is on the suspension element SA**1**, the bent portions **35**B and **37**B face the bent portions **35**A and **37**A of the load beam **30**A as illustrated in FIG. **4**.
[0092] In the example illustrated in FIG. **4**, the distance W**1** in the second direction Y between the bent portions **35**A and **37**A is equal to the distance in the second direction Y between the bent portions **35**B and **37**B. The distance W**1** gradually becomes smaller in the first direction X.
[0093] The bent portions **35**A and **37**A are arranged at a distance from the bent portions **35**B and **37**B in the third direction Z. In other words, a gap G**1** is formed between the bent portions **35**A and **37**A and the bent portions **35**B and **37**B. As illustrated in FIG. **3**, the size of the gap G**1** gradually becomes larger in the first direction X.
[0094] FIG. **6** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of an arm **8** of a disk drive **1**E according to a comparative example. FIG. **7** is a diagram illustrating the arrangement state of a head stack assembly HSAE and disks **4** in the disk drive **1**E according to the comparative example. FIG. **8** is a diagram illustrating the arrangement state of the head stack assembly HSA and the disks **4** in the disk drive **1** according to the present embodiment.
[0095] In the disk drive **1**E according to the comparative example, two suspensions **100** are attached to the arm **8**. More specifically, the suspensions **100** are attached to the arm **8** from the third direction Z and the direction opposite to the third direction Z, respectively.
[0096] As illustrated in FIG. **7**, sliders **11** are mounted on the distal end sides of the suspensions **100**, respectively. The suspensions **100** each comprise a base plate **200**, a load beam **30** and a flexure **40**. As described above, the suspensions **100** (illustrated in FIG. **2**) are attached to the arms **8** in the present embodiment as well.
[0097] The base plates **200** each comprise a boss portion and a surface **250**. For example, the thickness of the base plates **200** is equal to the thickness of the base member **20**. The load beams **30** have the same structure of that of the above-described load beams **30**A and **30**B. The flexures **40** have the same structure as that of the above-described flexures **40**A and **40**B. The load beams **30** are attached to the surfaces **250** of the base plates **200**.
[0098] As illustrated in FIG. **6**, the two base plates **200** are attached to the arm **8**. Thus, a base fixing portion **810** of the arm **8** in the comparative example has a thickness greater than that of the base fixing portion **81** in the present embodiment.
[0099] Here, the distance between the surface **25** and the surface **27** of the base member **20** in the present embodiment is defined as a distance D**1** (illustrated in FIG. **3**), and the distance between the surfaces **250** of the base plates **200** in the comparative example is defined as a distance D**2** (illustrated in FIG. **7**). The distances D**1** and D**2** correspond to the distance between the spring portions of the load beams. The distance D**1** is shorter than the distance D**2** (D**1**<D**2**).
[0100] When the focus is on the head stack assembly HSA, the thickness DH (illustrated in FIG. **2**) of the head stack assembly HSA can be reduced by reducing the distance D**1**. In particular, if the number of arms **8**A increases, the thickness can be reduced more.
[0101] It is here assumed that the angles of the respective load bent portions of the load beams **30**, **30**A, and **30**B are equal. In this case, the distance between the sliders **11** can be reduced by

reducing the distance D**1**.
[0102] The distance between the sliders **11** in the comparative example is defined as a distance D**3** (illustrated in FIG. **7**), and the distance between the sliders **11** in the present embodiment is defined as a distance D**4** (illustrated in FIG. **8**). As described above, the distance D**4** is shorter than the distance D**3** (D**4**<D**3**).
[0103] The distance between the disks **4** can be reduced by reducing the distance D**4**. That is, the distance between the disks **4** in the present embodiment is shorter than the distance between the disks **4** in the comparative example.
[0104] Accordingly, if the same number of disks **4** are disposed, the present embodiment can reduce the thickness of the disk drive **1**. In other words, in the structure of the present embodiment, a larger number of disks **4** can be disposed in the case **2** having the same thickness than in the disk drive **1**E according to the comparative example.
[0105] In addition, reducing the distance D**1** can form, for example, a sufficient gap between the disks **4** and the suspension structure **10**, when the head stack assembly HSA is located between the disks **4**. This makes it hard for the head stack assembly HSA to make contact with the disks **4**.
[0106] In the present embodiment, the suspension elements SA**1** and SA**2** are each attached to the base member **20**. Thus, the number of members for attaching the load beams can be reduced, compared to the head stack assembly HSAE of the comparative example. This can suppress the cost of the members.
[0107] Moreover, reducing the number of members for attaching the load beams also allows the thickness of the base member **20** to be increased. This can improve the stiffness of the base member **20**. As a result, the resonance characteristics and load stability as the suspension elements SA**1** and SA**2** can be improved.
[0108] Furthermore, reducing the number of members for attaching the load beams also allows the height of the boss portion **29** to be increased. The base member **20** thereby can be stably attached to the arm **8**A. As a result, the resonance characteristics and load stability as the suspension elements SA**1** and SA**2** can be improved.
[0109] In the present embodiment, the load directions can be unified, when the base member **20** is attached to the arm **8**A in the manufacturing process. More specifically, in swaging, the direction in which the ball passes through the through-hole **29***a* can be set to a single direction (for example, the direction opposite to the third direction Z).
[0110] In this case, too, the base member **20** can be stably attached to the arm **8**A. As a result, the resonance characteristics and load stability as the suspension elements SA**1** and SA**2** can be improved.
[0111] As described above, the structure of the present embodiment can provide the disk drive suspension structure **10** which can be made thinner. In particular, the present embodiment can make the head stack assembly HSA thinner. The disk drive **1** comprising the above-described disk drive suspension structure **10** can be made thinner. In addition to the above-described effects, the present embodiment can achieve various favorable effects.
[0112] While the example of the suspension structure **10** being attached to the one arm **8**A of the arms **8** of the carriage **6** has been disclosed in the present embodiment, the suspension structure **10** may be attached to each of the arms **8** of the carriage **6**.
[0113] Other embodiments will be described next. In the other embodiments described below, the same structural elements as those of the above-described first embodiment are assigned the same reference symbols as those of the first embodiment, and their detailed description may be omitted or simplified.
SECOND EMBODIMENT
[0114] FIG. **9** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of the arm **8**A in the disk drive **1** according to the present embodiment. In the present embodiment, the shape of the base member **20** is different from that of the first embodiment.

[0115] The base member **20** comprises the base portion **21** and the attachment portion **23**. The thickness of the attachment portion **23** is different from the thickness of the base portion **21**. In the example illustrated in FIG. **9**, the thickness of the attachment portion **23** is greater than the thickness of the base portion **21**.
[0116] In comparison with the first embodiment, the thickness of the base portion **21** is smaller than the thickness of the base member **20** in the first embodiment, and the thickness of the attachment portion **23** is equal to the thickness of the base member **20** in the first embodiment.
[0117] The base member **20** comprises the surface **25** and surfaces **271** and **273** located on the opposite side. The surface **271** is located on the base portion **21**, and the surface **273** is located on the attachment portion **23**. In the present embodiment, the surface **25** corresponds to a first attachment surface, the surface **271** corresponds to a first surface, and the surface **273** corresponds to a second attachment surface.
[0118] The surface **271** and the surface **273** are parallel to the X-Y plane. The surface **271** faces the arm **8**A, and the boss portion **29** is formed on the surface **271**. As illustrated in FIG. **9**, the surface **273** is located lower than the surface **271**.
[0119] In other words, the surface **273** is shifted further in the direction opposite to the third direction Z than the surface **271**. The load beam **30**A is attached to the surface **25** of the base member **20**, and the load beam **30**B is attached to the surface **273** of the base member **20**.
[0120] When the focus is on the relationship with the arm **8**A, the surface **273** is located higher than a lower surface **83** of the arm **8**A, and the surface **25** is located lower than an upper surface **85** of the arm **8**A. In addition, the spring portion **31**A of the load beam **30**A is located lower than the upper surface **85**.
[0121] The structure of the present embodiment also can achieve the same effects as those of the first embodiment. Moreover, in the present embodiment, the positions of the spring portions **31**A and **31**B are shifted in the direction opposite to the third direction Z, compared to the first embodiment, by changing the thickness of the attachment portion **23** and the thickness of the base portion **21** as described above.
[0122] Accordingly, the distance D**5** (illustrated in FIG. **9**) from the lower surface **83** to the load beam **30**A can be made shorter than in the first embodiment. As a result, it becomes hard for the suspension structure **10** to make contact with the disks **4**, when the arm **8**A is located between the disks **4**.
[0123] Furthermore, in the present embodiment, the positions of the sliders **11** (illustrated in FIG. **8**) can be shifted in the third direction Z or the direction opposite to the third direction Z, compared to the first embodiment. For example, in the example illustrated in FIG. **9**, the positions of the positions of the sliders **11** can be shifted in the direction opposite to the third direction Z, compared to the first embodiment.
THIRD EMBODIMENT
[0124] FIG. **10** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of the arm **8**A in the disk drive **1** according to the present embodiment. The present embodiment differs from the first embodiment in that the base member **20** is composed of a plurality of members.
[0125] The base member **20** comprises a member **201** and a member **202** overlapping the member **201**. In the present embodiment, the member **201** corresponds to a first member, and the member **202** corresponds to a second member. The member **201** is, for example, fixed to the member **202** by spot welding using a laser.
[0126] The member **201** and the member **202** each have the shape of a plate. The size of the member **201** is approximately equal to that of the member **202** when viewed in the third direction Z. The base portion **21** and the attachment portion **23** of the base member **20** are composed of the member **201** and the member **202**.
[0127] The member **201** comprises a surface **2011** and a surface **2013** on the opposite side of the

surface **2011**. The member **202** comprises a surface **2021**, a surface **2023** on the opposite side of the surface **2021**, and the boss portion **29**.

[0128] In the present embodiment, the surface **2011** corresponds to a first attachment surface, and the surface **2023** corresponds to a second attachment surface. The surface **2013** faces the surface **2021**. On the surface **2023**, the boss portion **29** is formed. The load beam **30**A is attached to the surface **2011** of the member **201**, and the load beam **30**B is attached to the surface **2023** of the member **202**.

[0129] The structure of the present embodiment also can achieve the same effects as those of the first embodiment. In addition, in the present embodiment, the base member **20** comprises the member **201** and the member **202**.

[0130] In the manufacturing process, the load beam **30**A is attached to the surface **2011** of the member **201**, and the load beam **30**B is attached to the surface **2023** of the member **202**. After that, the load bent portions **33**A and **33**B of the load beams **30**A and **30**B are each formed.

[0131] Then, after the process of joining the member **201** and the member **202** together, the suspension structure **10** is attached to the arm **8**A. As described above, since the load beams **30**A and **30**B are attached to separate members, the load bent portions **33**A and **33**B are easily processed. As a result, the present embodiment can improve the productivity of the manufacture of the suspension structure **10**.

FOURTH EMBODIMENT

[0132] FIG. **11** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of the arm **8**A in the disk drive **1** according to the present embodiment. In the present embodiment, the shape of the member **201** is different from that of the third embodiment.

[0133] In the present embodiment, the base portion **21** of the base member **20** is composed of the member **202**, and the attachment portion **23** is composed of the member **201** and the member **202**. In other words, the member **201** does not overlap, for example, the boss portion **29** of the member **202**. As illustrated in FIG. **11**, the length in the first direction X of the member **201** is shorter than the length in the first direction X of the member **202**.

[0134] The surface **2021** of the member **202** comprises a surface **2021***a* not overlapping the member **201** and a surface **2021***b* facing the member **201**. The surface **2021***b* is connected to the surface **2021***a*. In the present embodiment, the surface **2021***a* corresponds to a third surface, and the surface **2021***b* corresponds to a fourth surface.

[0135] The structure of the present embodiment also can achieve the same effects as those of the third embodiment. In addition, in the present embodiment, the length of the member **201** in the first direction X is shorter than that of the third embodiment. Thus, the mass of the base member **20** can be made smaller than that of the base member **20** in the third embodiment.

[0136] That is, the mass of the head stack assembly HSA can be made smaller than the mass of the head stack assembly HSA in the third embodiment. As a result, the responsiveness of the head stack assembly HSA can be improved.

FIFTH EMBODIMENT

[0137] FIG. **12** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of the arm **8**A in the disk drive **1** according to the present embodiment. The present embodiment differs from the second embodiment in that the attachment portion **23** of the base member **20** is composed of a plurality of members.

[0138] The base member **20** comprises the member **202** and a member **203** overlapping the member **202**. In the present embodiment, the member **202** corresponds to a third member, and the member **203** corresponds to a fourth member. The member **203** is, for example, fixed to the member **202** by spot welding using a laser.

[0139] In the present embodiment, the base portion **21** of the base member **20** is composed of the member **202**, and the attachment portion **23** is composed of the member **202** and the member **203**. The member **203** does not overlap, for example, the boss portion **29** of the member **202**. In other words, the member **203** and the boss portion **29** are arranged in the first direction X.

[0140] The member **203** has the shape of a plate. As illustrated in FIG. **12**, the length in the first direction X of the member **203** is shorter than the length in the first direction X of the member **202**.

[0141] The member **203** comprises a surface **2031** facing the surface **2023**, and a surface **2033** on the opposite side of the surface **2031**. In the present embodiment, the surface **2021** corresponds to a first attachment surface, and the surface **2033** corresponds to a second attachment surface. The load beam **30**A is attached to the surface **2021** of the member **202**, and the load beam **30**B is attached to the surface **2033** of the member **203**.

[0142] As illustrated in FIG. **12**, the surface **2033** is located lower than the surface **2021**. In other words, the surface **2033** is shifted further in the direction opposite to the third direction Z than the surface **2021**.

[0143] The structure of the present embodiment also can achieve the same effects as those of the second embodiment. In addition, in the present embodiment, since the load beams **30**A and **30**B are attached to separate members, the load bent portions **33**A and **33**B are easily processed.

SIXTH EMBODIMENT

[0144] FIG. **13** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of the arm **8**A in the disk drive **1** according to the present embodiment. In the present embodiment, the shape of the base member **20** is different from that of the first embodiment.

[0145] The base member **20** further comprises a step portion **22** formed between the base portion **21** and the attachment portion **23**. The base portion **21**, the attachment portion **23**, and the step portion **22** are, for example, uniform in thickness. The surface **25** of the base member **20** comprises a surface **25***a* located on the base portion **21**, a surface **25***b* located on the attachment portion **23**, and a surface **25***c* located on the step portion **22**.

[0146] The surface **27** of the base member **20** comprises a surface **27***a* located on the base portion **21**, a surface **27***b* located on the attachment portion **23**, and a surface **27***c* located on the step portion **22**. The surface **27***a* faces the arm **8**A, and the boss portion **29** is formed on the surface **27***a*.

[0147] In the present embodiment, the surface **25***a* corresponds to a second surface, the surface **25***b* corresponds to a first attachment surface, the surface **27***a* corresponds to a first surface, and the surface **27***b* corresponds to a second attachment surface. The surfaces **25***a*, **25***b*, **27***a*, and **27***b* are parallel to the X-Y plane. The load beam **30**A is attached to the surface **25***b* of the base member **20**, and the load beam **30**B is attached to the surface **27***b* of the base member **20**.

[0148] The surfaces **25***c* and **27***c* are, for example, inclined surfaces inclined with respect to the first direction X. In the present embodiment, the surface **25***c* corresponds to a second inclined surface, and the surface **27***c* corresponds to a first inclined surface. More specifically, as illustrated in FIG. **13**, the surfaces **25***c* and **27***c* are inclined downward in the first direction X.

[0149] Thus, the surface **25***b* is located lower than the surface **25***a*, and the surface **27***b* is located lower than the surface **27***a*. In other words, the surface **25***b* is shifted further in the direction opposite to the third direction Z than the surface **25***a*, and the surface **27***b* is shifted further in the direction opposite to the third direction Z than the surface **27***a*.

[0150] When the focus is on the relationship with the arm **8**A, the surface **27***b* is located higher than the lower surface **83** of the arm **8**A, and the surface **25***b* is located lower than the upper surface **85** of the arm **8**A. In addition, the spring portion **31**A of the load beam **30**A is located lower than the upper surface **85**.

[0151] The structure of the present embodiment also can achieve the same effects as those of the first and second embodiments. Note that the shape of the step portion **22** is not limited to the example illustrated in FIG. **13**.

SEVENTH EMBODIMENT

[0152] FIG. **14** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of the arm **8**A in the disk drive **1** according to the present embodiment. In the present embodiment, the thickness of the base member **20** is different from that of the first embodiment.

[0153] More specifically, the thickness of the base member **20** is smaller than that of the base member **20** in the first embodiment. Thus, at least part of the load beam **30**A overlaps the load beam **30**B when viewed in the second direction Y. That is, the base member **20** has a thickness that causes at least part of the load beam **30**A to overlap the load beam **30**B.
[0154] More specifically, the bent portions **35**A and **37**A overlap the bent portions **35**B and **37**B, when viewed in the second direction Y. In FIG. **14**, the region where the bent portions **35**A and **37**A overlap the bent portions **35**B and **37**B when viewed in the second direction Y is patterned with dots. The region where the bent portions **35**A and **37**A overlap the bent portions **35**B and **37**B gradually becomes smaller in the first direction X.
[0155] FIG. **15** and FIG. **16** are diagrams illustrating examples of the arrangement state of the load beams **30**A and **30**B of the suspension structure **10** in the present embodiment.
[0156] In the example illustrated in FIG. **15**, the distance W**1** in the second direction Y between the bent portions **35**A and **37**A is different from the distance W**2** in the second direction Y between the bent portions **35**B and **37**B. More specifically, the distance W**1** in the second direction Y between the bent portions **35**A and **37**A is longer than the distance W**2** in the second direction Y between the bent portions **35**B and **37**B.
[0157] The load beam **30**B is located between the bent portions **35**A and **37**A of the load beam **30**A in the second direction Y. The distance W**1** in the second direction Y between the bent portions **35**A and **37**A may be shorter than the distance W**2** in the second direction Y between the bent portions **35**B and **37**B.
[0158] In the example illustrated in FIG. **16**, the distance W**1** in the second direction Y between the bent portions **35**A and **37**A is equal to the distance in the second direction Y between the bent portions **35**B and **37**B. The center in the second direction Y of the load beam **30**A is shifted from the center in the second direction Y of the load beam **30**B.
[0159] More specifically, the load beam **30**B is shifted toward the left side in the figure (in the second direction Y) with respect to the center of the load beam **30**A. The load beam **30**B may be shifted toward the right side in the figure (in the direction opposite to the second direction Y) with respect to the center of the load beam **30**A. In the example illustrated in FIG. **16**, too, the distance W**1** in the second direction Y between the bent portions **35**A and **37**A may be different from the distance in the second direction Y between the bent portions **35**B and **37**B as in the example illustrated in FIG. **15**.
[0160] In the examples illustrated in FIG. **15** and FIG. **16**, a gap G**2** is formed between the bent portions **35**A and **37**A and the bent portions **35**B and **37**B in the second direction Y. With the arrangement state in the examples illustrated in FIG. **15** and FIG. **16**, it is hard for the load beams **30**A and **30**B to interfere with each other, even if the thickness of the base member **20** is reduced.
[0161] The structure of the present embodiment also can achieve the same effects as those of the first embodiment. Moreover, the present embodiment can further reduce the thickness of the base member **20**. The structure of the present embodiment can be applied to each of the above-described embodiments as well.
EIGHTH EMBODIMENT
[0162] FIG. **17** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of the arm **8**A in the disk drive **1** according to the present embodiment. The present embodiment differs from the first embodiment in that the first angle θ1 of the load bent portion **33**A of the load beam **30**A is different from the second angle θ2 of the load bent portion **33**B of the load beam **30**B.
[0163] In the example illustrated in FIG. **17**, the second angle θ2 of the load bent portion **33**B is smaller than the first angle θ1 of the load bent portion **33**A. The first angle θ1 of the load bent portion **33**A is large, compared to that of the first embodiment. In contrast, the second angle θ2 of the load bent portion **33**B is small, compared to that of the first embodiment.
[0164] The structure of the present embodiment also can achieve the same effects as those of the first embodiment. In addition, in the present embodiment, the positions of the sliders **11** (illustrated

in FIG. **8**) can be shifted in the third direction Z or the direction opposite to the third direction Z, compared to the first embodiment, by adjusting the first angle θ1 and the second angle θ2. For example, in the example illustrated in FIG. **17**, the positions of the sliders **11** can be shifted in the direction opposite to the third direction Z, compared to the first embodiment.

[0165] In addition, the distance between the disks **4** can be adjusted in accordance with the first angle θ1 of the load bent portion **33**A and the second angle θ2 of the load bent portion **33**B. The structure of the present embodiment can be applied to each of the above- described embodiments as well.

NINTH EMBODIMENT

[0166] FIG. **18** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of the arm **8**A in the disk drive **1** according to the present embodiment. In the present embodiment, the shape of the base member **20** is different from that of the first embodiment.

[0167] The surface **27** comprises a surface **27***d* located on the attachment portion **23**. In the present embodiment, the surface **25** corresponds to a first attachment surface, and the surface **27***d* corresponds to a second attachment surface. The load beam **30**A is attached to the surface **25** of the base member **20**, and the load beam **30**B is attached to the surface **27***d* of the base member **20**.

[0168] The surface **27***d* is an inclined surface inclined with respect to the surface **25**. More specifically, the surface **27***d* is inclined with respect to the surface **25** such that its distance from the surface **25** in the third direction Z increases in the first direction X. An angle θ3 of the surface **27***d* with respect to the first direction X can be changed as appropriate in accordance with the distance between the disks **4**. In addition, the first angle θ1 of the load bent portion **33**A (illustrated in FIG. **3**) may be equal to or may be different from the second angle θ2 of the load bent portion **33**B (illustrated in FIG. **3**).

[0169] The structure of the present embodiment also can achieve the same effects as those of the first embodiment. Moreover, in the present embodiment, the positions of the sliders **11** (illustrated in FIG. **8**) can be shifted further in the third direction Z or the direction opposite to the third direction Z, compared to the first embodiment, by adjusting the angle θ3 of the surface **27***d* with respect to the first direction X.

[0170] For example, in the example illustrated in FIG. **18**, the positions of the sliders **11** can be shifted in the direction opposite to the third direction Z, compared to the first embodiment. In addition, the distance between the disks **4** can be adjusted in accordance with the angle θ3 of the surface **27***d* with respect to the first direction X.

[0171] While the case where the surface **27** comprises an inclined surface has been described in the present embodiment, the surface to which the load beam **30**A is attached of the surface **25** may be inclined, or the surfaces to which the load beams **30**A and **30**B are attached may be each inclined. The structure of the present embodiment can be applied to each of the above-described embodiments as well.

TENTH EMBODIMENT

[0172] FIG. **19** is a schematic plan view illustrating an example of the suspension structure **10** according to the present embodiment. FIG. **20** is a schematic partial enlarged view illustrating the vicinity of the distal end portion of the arm **8**A in the disk drive **1** according to the present embodiment. The present embodiment differs from the first embodiment in that actuator elements **65** and **67** are mounted on the base member **20**.

[0173] In the example illustrated in FIG. **19**, the suspension structure **10** comprises the actuator elements **61** and **63** mounted on the distal end side, and the actuator elements **65** and **67** mounted on the base member **20**.

[0174] In the base member **20**, apertures **71** and **73** (illustrated in FIG. **19**) for mounting the actuator elements **65** and **67** are formed in the attachment portion **23**. In the present embodiment, the apertures **71** and **73** correspond to actuator mounting portions.

[0175] The apertures **71** and **73** are formed between the surface **25** and the surface **27**. More

specifically, the apertures **71** and **73** penetrate the surface **25** and the surface **27**. When the focus is on the suspension elements SA**1** and SA**2**, the actuator elements **65** and **67** are located between the load beams **30**A and **30**B as illustrated in FIG. **19**.
[0176] The structure of the present embodiment also can achieve the same effects as those of the first embodiment. Moreover, in the present embodiment, the actuator elements **65** and **67** are mounted on the base member **20**. The actuator elements **65** and **67** thereby act on the suspension elements SA**1** and SA**2**, respectively.
[0177] As described above, since it is unnecessary to mount actuator elements on the suspension elements SA**1** and SA**2**, respectively, the number of actuator elements to be mounted can be reduced. This can suppress the cost of the members.
[0178] In carrying out each of the above-described embodiments, various changes can be made to the specific form of each element constituting the disk drive, as well as to specific forms such as the shapes of the arms, the base member, the load beams, the flexures, and the like.
[0179] Various embodiments can be formed by combining structural elements disclosed in each of the above-described embodiments as appropriate. For example, several structural elements may be deleted from all structural elements disclosed in each of the embodiments. Furthermore, structural elements in different embodiments may be combined as appropriate.
[0180] Additional advantages and modifications will readily occur to those skilled in the art. Therefore, the invention in its broader aspects is not limited to the specific details and representative embodiments shown and described herein. Accordingly, various modifications may be made without departing from the spirit or scope of the general inventive concept as defined by the appended claims and their equivalents.

Claims

1. A disk drive suspension structure attached to an arm of a disk drive, the disk drive suspension structure comprising: a base member comprising a base portion and an attachment portion connected to the base portion, the base portion comprising a boss portion attached to the arm, the attachment portion comprising a first attachment surface facing in a direction opposite to a projection direction of the boss portion and a second attachment surface facing in the projection direction of the boss portion; a first load beam attached to the first attachment surface; and a second load beam attached to the second attachment surface and facing the first load beam.
2. The disk drive suspension structure of claim 1, wherein the first load beam comprises first bent portions formed at both side portions of the first load beam, respectively, and extending in a longitudinal direction of the first load beam, and the second load beam comprises second bent portions formed at both side portions of the second load beam, respectively, extending in the longitudinal direction, and facing the first bent portions.
3. The disk drive suspension structure of claim 1, wherein the base portion comprises a first surface on which the boss portion is formed and which faces the arm, and the second attachment surface is shifted further in the projection direction than the first surface.
4. The disk drive suspension structure of claim 3, wherein the base portion further comprises a second surface on an opposite side of the first surface, and the first attachment surface is shifted further in the projection direction than the second surface.
5. The disk drive suspension structure of claim 4, wherein the base member further comprises a step portion formed between the base portion and the attachment portion, wherein the step portion comprises: a first inclined surface connecting the first surface and the second attachment surface; and a second inclined surface connecting the second surface and the first attachment surface.
6. The disk drive suspension structure of claim 1, wherein the base member comprises: a first member comprising the first attachment surface; and a second member comprising the boss portion and the second attachment surface and overlapping the first member.

7. The disk drive suspension structure of claim 6, wherein the second member comprises: a third surface not overlapping the first member; and a fourth surface connected to the third surface and facing the first member, and the third surface and the fourth surface are located on an opposite side of the second attachment surface.
8. The disk drive suspension structure of claim 1, wherein the base member comprises: a third member comprising the boss portion and the first attachment surface; and a fourth member comprising the second attachment surface and overlapping the third member.
9. The disk drive suspension structure of claim 8, wherein the fourth member and the boss portion are arranged in the longitudinal direction of the first load beam.
10. The disk drive suspension structure of claim 2, wherein the first load beam comprises a first spring portion attached to the first attachment surface, and a first load bent portion formed in a width direction of the first load beam between the first spring portion and the first bent portions and having a first angle, and the second load beam comprises a second spring portion attached to the second attachment surface, and a second load bent portion formed in the width direction between the second spring portion and the second bent portions and having a second angle different from the first angle.
11. The disk drive suspension structure of claim 10, wherein the second angle is smaller than the first angle.
12. The disk drive suspension structure of claim 1, wherein the second attachment surface is inclined with respect to the first attachment surface to increase a distance between the first attachment surface and the second attachment surface in a longitudinal direction of the first load beam.
13. The disk drive suspension structure of claim 1, wherein the first load beam comprises first bent portions formed at both side portions of the first load beam, respectively, and extending in a longitudinal direction of the first load beam, the second load beam comprises second bent portions formed at both side portions of the second load beam, respectively, and extending in the longitudinal direction, a gap being formed between the first bent portions and the second bent portions in a width direction of the first load beam, and the first bent portions overlap the second bent portions, when viewed in the width direction.
14. The disk drive suspension structure of claim 1, wherein the base member further comprises an actuator mounting portion formed between the first attachment surface and the second attachment surface.
15. The disk drive suspension structure of claim 14, wherein the actuator mounting portion is an aperture penetrating the first attachment surface and the second attachment surface.
16. A disk drive comprising: the disk drive suspension structure of claim 1; and the arm comprising a base fixing portion to which the base member is attached.