

DESCRIPTION

TITLE OF THE INVENTION: VIBRATION CONTROL STRUCTURE OF STATIONARY INDUCTION DEVICE

TECHNICAL FIELD

5 [0001] The present invention relates to a vibration control structure of a stationary induction device, such as transformer or reactor, which is applied to various electric power facilities, etc.

BACKGROUND ART

[0002] As a stationary induction device, such as transformer or reactor,
10 which is applied to electric power facilities, there is known one having a structure where an inside element of the stationary induction device (hereinafter suitably referred to as simply inside element), having an iron core and a coil installed on the iron core, together with a liquid-state, cooling insulation medium, such as insulation oil, is accommodated in a container of
15 the stationary induction device (hereinafter suitably referred to as simply container), and where the inside element is immersed in the cooling insulation medium in the container.

[0003] When such stationary induction device is operated, electric current flows through the coil, and electromagnetic force resulting from the current
20 conduction may cause the inside element's vibration (coil's vibration or iron core's exciting vibration), and this vibration may be transmitted to the container, etc. or may cause noise. Furthermore, vibration of the container may also be caused by magnetic flux passing through the container side by the current conduction. Then, there is also a risk that these vibrations
25 (vibration referred to as so-called magnetic vibration, etc.) related to the

stationary induction device radiate as noise (noise referred to as so-called current conduction noise, etc.) to the outside of the stationary induction device (ambient air side from the container, etc.).

[0004] There are various studies of suppressing such vibration or noise

5 related to the stationary induction device. For example, as shown in Patent Publication 1, there is known a method of using a damping material formed of elastic body, such as rubber or synthetic resin. In this Patent Publication 1, a damping material is bonded to an inner surface (side wall's inner surface, etc.) of the container surface by adhesive or the like, and then a magnetic
10 shield member is bonded to the surface of the damping material surface by adhesive or the like, thereby disclosing a structure (hereinafter suitably referred to as a restraint structure) in which the damping material is supported on the inner surface of the container in a restrained condition.

[0005] Furthermore, Patent Publication 2 discloses a structure (hereinafter
15 suitably referred to as a sandwich structure) in which a sandwich steel plate prepared by stacking a plurality of damping steel plates with an interpositional of a resin between the layers is attached to an outer surface (side wall's outer surface, etc.) of the container surface through an attachment seat, and furthermore a sound absorbing material is interposed between the outer
20 surface and the sandwich steel plate. Furthermore, this Patent Publication 2 discloses a structure (hereinafter suitably referred to as an alloy damping steel plate structure) in which, in place of using a sandwich steel plate or a sound absorbing material, an alloy damping steel plate for welded structure is applied as a side wall of the container.

25 PRIOR ART PUBLICATIONS

PATENT PUBLICATIONS

[0006] Patent Publication 1: JP Utility Model Application Publication
Showa 63-97220.

Patent Publication 2: JP Utility Model Application Publication Heisei
5 6-66018.

SUMMARY OF THE INVENTION

[0007] As mentioned above, there are various studies of suppressing vibration or noise. For example, in the case of Patent Publication 1, a damping material, a magnetic shield member, an adhesive, etc. are essential
10 only for making a restraint structure. Furthermore, it is necessary to have an operation of bonding in order the damping material and the magnetic shield member to an inner surface of the container, etc. Therefore, there is a risk to cause the increase of the production workload (the number of parts, the operation workload, etc.) and the production cost.

15 [0008] Furthermore, the sandwich structure of Patent Publication 2 may be able to suppress noise (e.g., sound radiation) from the container, but has a small effect on suppressing vibration of the container itself. Furthermore, in the alloy damping steel plate structure, the alloy damping steel plate has a high price as compared with general damping steel plates, etc. Therefore,
20 there is a risk to cause the increase of the product cost.

[0009] The present invention was made in view of such technical task, and its object is to provide a vibration control structure of a stationary induction device that is capable of contributing to suppression of production workload, etc. and suppression of vibration and noise related to the stationary
25 induction device.

[0010] A vibration control structure of a stationary induction device according to this invention is a creation capable of solving the above task. According to its one aspect, it is possible to cite one comprising a stationary induction device's inside element having an iron core and a coil wound
5 around the iron core, a stationary induction device's container that accommodates the inside element together with a liquid-state, cooling insulation medium, and a viscoelastic body that is supported on a surface of the container, wherein the viscoelastic body comprises a viscoelastic adhesive that covers the surface of the container.

10 [0011] A restraining plate may be adhered to the viscoelastic body through the viscoelastic adhesive that covers the surface of the container.

Furthermore, the restraining plate may be a magnetic shield plate, an electromagnetic shield plate, a damping steel plate, or a damping metal plate.

Furthermore, the restraining plate and the surface of the container may be
15 connected together by welding or a connecting means. Furthermore, it may be one wherein a gap is formed on an outer peripheral side of the viscoelastic body that is between an inner surface of the container surface and the restraining plate adhered to the viscoelastic body supported on the inner surface, and the cooling insulation medium penetrates into the gap to form a
20 squeeze film damper portion.

[0012] According to another aspect, it is possible to mention one comprising a stationary induction device's inside element having an iron core and a coil wound around the iron core, a stationary induction device's container that accommodates the inside element together with a liquid-state, cooling
25 insulation medium, and a stacked body of a plurality of restraining plates,

wherein the restraining plate on one end side in the stacked body is supported by adhesion to the container surface or supported by unification with the container surface, and wherein the two restraining plates of the stacked body are bonded together by the viscoelastic adhesive to form the viscoelastic body.

[0013] The stacked body may be a damping steel plate or a damping metal plate. Furthermore, the stacked body and the surface of the container may be connected together by welding or a connecting means.

[0014] Furthermore, it may be one wherein an additional device for the stationary induction device is connected to an outer peripheral side of the container through a connection apparatus comprising a steel plate, and the viscoelastic body comprising the viscoelastic adhesive is supported on a surface of the steel plate of the connection apparatus.

[0015] According to the present invention mentioned above, it becomes possible to contribute to suppression of the production workload, etc. and suppression of vibration and noise related to the stationary induction device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] Fig. 1 is a schematic longitudinal section for explaining a vibration control structure of a transformer 1A as one example of the present embodiment (a schematic section longitudinally sectioned along the axial direction of an iron core 21);

Fig. 2 is a schematic enlarged view of an enclosure X in Fig. 1;

Fig. 3 is a schematic enlarged view for explaining a modified example of the enclosure X in Fig. 1;

Fig. 4 is a schematic explanatory view showing one example of a

squeeze film damper portion 42 ((A) and (B) are views each facing an inner surface 10a of a container 1);

Fig. 5 is a schematic enlarged view for explaining a modified example of the enclosure X in Fig. 1 ((A) refers to the case in which an viscoelastic
5 body 4 is provided on the inner surface 10a, and (B) refers to the case in which it is provided on an outer surface 10b);

Fig. 6 is a schematic enlarged view for explaining a modified example of the enclosure X in Fig. 1 ((A) refers to the case in which a stacked body 6 is provided on the inner surface 10a, and (B) refers to the case in which it is
10 provided on the outer surface 10b);

Fig. 7 is a schematic view for explaining one example of connection apparatuses as a connection between additional devices of the transformer 1A and the container 1; and

Fig. 8 is a schematic view for explaining one example of a general
15 stationary induction device.

MODE FOR IMPLEMENTING THE INVENTION

[0017] A vibration control structure of a stationary induction device according to an embodiment of the present invention is distinct from a structure in which many constituent elements, such as a damping material,
20 a magnetic shield member and an adhesive, are essential and in which an operation of bonding a damping material and a magnetic shield member in order is necessary, as in conventional restraining structures. It is a structure in which a viscoelastic body resulting from a viscoelastic adhesive is supported on the container's surface (for example, the after-mentioned
25 inner surface 10a and outer surface 10b), etc.

[0018] In the case of a stationary induction device of Patent Publication 1, for example, as shown in Fig. 8, it is a structure in which an inside element 2 together with a cooling insulation medium 3 is accommodated in a container 8 and in which a damping material 81 is supported on an inner surface 80 of the container 8. It is, however, necessary to have an operation of bonding the damping material 81 to the inner surface 80 and to have an adhesive 82 (i.e., an adhesive for bonding the damping material 81 and a magnetic shield 83). Furthermore, in the case of a restraining structure, it is also necessary to have an operation of bonding the magnetic shield 83 by the adhesive 82. Therefore, there is a risk to cause the increase of the production workload (the number of parts and the operation workload, etc.) and the production cost. Furthermore, in the case of Patent Publication 2, a stationary induction device, to which a simple sandwich structure has been applied, has a small effect of suppressing vibration of the container itself. In a stationary induction device of an alloy damping steel plate structure, to which a relatively high-price alloy damping steel plate has been applied, there is a risk to cause the increase of the product cost.

[0019] On the other hand, a vibration control structure of a stationary induction device of the present embodiment was made by finding that a viscoelastic adhesive can effectively be used (its use is not for simply bonding members together, but for forming a viscoelastic body to be supported on the container surface) and is a structure capable of damping vibration related to the stationary induction device by a viscoelastic body that is resulting from a viscoelastic adhesive supported on the container surface, etc. That is, it is capable of contributing to suppression of vibration or noise related to the

stationary induction device and is capable of contributing to suppression of the production workload or the production cost, even if an operation of bonding the damping material, etc. as in Patent Publication 1 is not conducted or even if an alloy damping steel plate like that of Patent
5 Publication 2 or the adhesive 82 like that of Fig. 8 is not used.

[0020] Furthermore, viscoelastic adhesive itself is capable of bonding various members. Therefore, in case that a viscoelastic adhesive is interposed between two members (for example, the after-mentioned inner surface 10a and restraining plate 5) and then cured to bond the two members
10 each other, it is possible to construct a restraining structure (without using the adhesive 82 in Fig. 8) in which a viscoelastic body resulting from the viscoelastic adhesive is restrained. Therefore, there is a possibility that it becomes easy to contribute to suppression of vibration or noise by the viscoelastic body.

15 [0021] As long as the vibration control structure of the stationary induction device of the present embodiment is a structure in which a viscoelastic body is supported on the container surface, etc. as mentioned above, it is possible to conduct a modification by suitably applying a technical common sense in various fields. It is possible to cite one shown in the following as one
20 example thereof.

[0022] <<One example of the vibration control structure of the stationary induction device>>

Schematic explanatory views of Fig. 1 and Fig. 2 are those for explaining a vibration control structure of the transformer 1A according to
25 the present embodiment. Sign 1 in Fig. 1 and Fig. 2 represents a container

capable of accommodating an inside element 2 and a liquid-state, cooling insulation medium 3. This container 1 can be formed by using a metal material such as ordinary steel plate and has a structure that is equipped with a bottom wall 11 of a flat plate shape (e.g., a disk shape) and a tubular (e.g., cylindrical) side wall 12 provided to stand on a periphery of one end surface of the bottom wall 11. An opening portion 12a that makes it possible to take the inside element 2 and the cooling insulation medium 3 into and out of the container 1 is formed on one end side of the side wall 12. The opening portion 12a is provided with a lid 13 that is capable of opening and closing the opening portion 12a.

[0023] Sign 4 represents a viscoelastic body that results from a viscoelastic adhesive and is supported on the inner surface 10a of the surface 10 of the container 1. For example, as shown in Fig. 1 and Fig. 2, this viscoelastic body 4 can be formed by covering the inner surface 10a of the container 1 with the viscoelastic adhesive and then curing the same and turns into a structure in which it is supported on the inner surface 10a by adhesive force of the viscoelastic adhesive. Sign 5 represents a restraining plate that is bonded to the surface of the viscoelastic body 4 and restrains the viscoelastic body 4. This restraining plate 5 is one formed to conform to the shape of the inner surface 10a by using, for example, a metal material. It can be turned into a structure that is supported on the inner surface 10a through the viscoelastic body 4 by a close contact with the uncured viscoelastic adhesive covering the above-mentioned inner surface 10a and curing of the viscoelastic adhesive. With this, the viscoelastic body 4 is restrained by the inner surface 10a and the restraining plate 5, thereby constructing a

restraining structure in the container 1.

[0024] The inside element 2 is equipped with an iron core 21 formed by using, for example, an amorphous magnetic material and a coil 22 wound around the iron core 21. It is introduced into the container 1 through the opening portion 12a and then subjected to a fixing support on the bottom wall 11, etc. This fixing support can be conducted by applying various structures. For example, it is possible to cite a structure of a vibration-control support on the inner surface 10a through fastening metal parts, a vibration control member, etc. not shown in the drawings, but it is not limited to this. Then, the cooling insulation medium 3 is put into the container 1 through the opening portion 12a to have a condition where the inside element 2 accommodated in the container 1 is immersed in the cooling insulation medium 3. It is possible to achieve a connection between the inside element 2 and the outside (for example, the after-mentioned control panel 71) of the container through, for example, a leading terminal (not shown in the drawings) provided on the lid 13.

[0025] According to the transformer 1A shown in Fig. 1 and Fig. 2, even in the case of a condition where vibration of the inside element 2 by electromagnetic force by allowing electric current to flow through the coil 22 can be transmitted to the container 1, a condition where the container 1 itself can be vibrated by magnetic flux caused by the electric current flow, etc., when those vibrations are transmitted to the viscoelastic body 4, they are damped by shearing deformation of the viscoelastic body 4. That is, vibration or noise related to the transformer 1A is suppressed by the viscoelastic body 4.

[0026] <<One example of the viscoelastic body>>

In the viscoelastic adhesive to be applied to the viscoelastic body 4, as long as it turns into a viscoelastic body by covering the surface of the container 1 and then its cure to achieve vibration control, noise control, etc.

5 by vibration damping action, it is possible to apply various modes. For example, in case that a rubber-based or epoxy-based viscoelastic adhesive is applied to cover the inner surface 10a of the container 1, it is possible to cite one in which a viscoelastic adhesive having resistance (for example, oil resistance in case that the cooling insulation medium is insulation oil)
10 against the cooling insulation medium in the container 1, but it is not limited to this.

[0027] Furthermore, in the transformer 1A in Fig. 1 and Fig. 2, it is a mode in which, of the surfaces 10, all of the inner surfaces 10a of the bottom wall 11, the side wall 12 and the lid 13 are covered with the viscoelastic adhesive,
15 and then the viscoelastic adhesive is cured to form the viscoelastic body 4, but it is not limited to this. It is possible to conduct a suitable setting in accordance with the target transformer 1A characteristics (for example, transformer 1A rating and shape, each member's type, use environment, etc.).

20 [0028] For example, as shown in Fig. 3, it is optional to cover an outer surface 10b of the surfaces 10 with the viscoelastic adhesive and then cure the same to form the viscoelastic body 4 supported on the outer surface 10b. Furthermore, as shown in Fig. 3, it is possible to make a structure in which the restraining plate 5 is supported on the inner surface 10a through the
25 viscoelastic body 4 by previously bringing the restraining plate 5 into a close

contact with the uncured viscoelastic adhesive and then curing the viscoelastic adhesive. This structure shown in Fig. 3 also suppresses vibration or noise related to the transformer 1A, similar to Fig. 1 and Fig. 2. [0029] Therefore, it is optional to provide the viscoelastic body 4 and the
5 restraining plate 5 on the entirety or only a part of the inner surface 10a and/or the outer surface 10b of the container 1, and it is optional to provide a plurality of the viscoelastic bodies 4 and a plurality of the restraining plates 5 at separate positions.

[0030] In the restraining structure, in the case that the entire surface of a
10 surface (hereinafter the opposing surface) 10c of the surfaces 10, which surface is opposed to the restraining plate 5, is covered with the viscoelastic adhesive, and then a space between the opposing surface 10c and the restraining plate 5 is filled with the viscoelastic body 4 to make a condition (a condition of so-called boundary lubrication) where a gap (for example, the
15 after-mentioned clearance 41) does not exist, frictional coefficient between the opposing surface 10c and the restraining plate 5 increases, and it becomes easy to obtain a vibration damping action. It is, however, not limited to this. Therefore, it is optional to cover a part of the opposing surface 10c with the viscoelastic adhesive to form the viscoelastic body 4.
20 For example, it is optional to form the viscoelastic body 4 in a manner to intermittently extend as shown in Fig. 4(A) (an intermittent extension to form a rectangular shape in Fig. 4(A)) or to serpentinely extend as shown in Fig. 4(B). In the case of forming the viscoelastic body 4 as shown in Fig. 4, not only the viscoelastic body 4 is interposed between the opposing surface
25 10c and the restraining plate 5, but also the clearance (for example, a

clearance surrounded by the viscoelastic body 4) 41 is formed therebetween.

In the case of a condition (a condition of so-called fluid lubrication) where the cooling insulation medium 3 in the container 1 penetrates into the clearance 41 to impregnate the same, a squeeze film damper portion 42 is formed.

5 According to this squeeze film damper portion 42, it is possible to obtain a squeeze film damper effect to contribute to suppression of vibration or noise related to the transformer 1A, even if a vibration damping action by a so-called boundary lubrication does not become large.

[0031] Thickness of the viscoelastic body 4 is not particularly limited, either.

10 It can suitably be set, for example, by adjusting the covering thickness of the viscoelastic adhesive. As a specific example, in stationary induction devices applied to electric power facilities, etc., in the case of applying a rubber-based or epoxy-based viscoelastic adhesive, forming the viscoelastic body 4 having a thickness of around tens of micrometers to several millimeters can be cited,
15 but it is not limited to this.

[0032] In Fig. 1 to Fig. 4, there is shown a mode of the restraining structure in which the restraining plate 5 is adhered to the surface of the viscoelastic body 4. However, for example, as shown in Figs. 5(A) and 5(B), it may be a structure that does not use the restraining plate 5, that is, a non-restraining
20 type structure (hereinafter a non-restraining structure) in which the viscoelastic body 4 is exposed. In this structure shown in Fig. 5, even if it is not possible to obtain advantageous effects of the restraining structure, a sufficient vibration damping effect can be achieved by elastic deformation of the viscoelastic body 4, and it is possible to suppress the production workload,
25 etc. as the number of parts is reduced. In this case, it is possible to cite that

thickness of the viscoelastic body 4 is set to be about one to two times that of the container 1, but it is not limited to this.

[0033] <<One example of restraining plate, etc.>>

As long as the restraining plate 5 is one capable of restraining the viscoelastic body 4, it is possible to apply various modes. For example, it is possible to cite that a magnetic shield plate, such as silicon steel plate, or an electromagnetic shield plate made of a nonmagnetic conductor, such as copper or aluminum, is applied, but it is not limited to this.

[0034] Furthermore, not simply applying the restraining plate 5, as shown

in Figs. 6(A) and 6(B), it is optional to apply a stacked body 6 in which a plurality of restraining plates (e.g., sheet-shape metal plates) 61 are stacked and the restraining plates 61 are bonded together by the viscoelastic

adhesive. The viscoelastic body 4 resulting from the viscoelastic adhesive is interposed between the restraining plates 61. Then, the restraining plate

61 on one end side of the stacked body 6 is bonded to or unified with the surface 10 of the container 1. With this, it turns to a structure in which the viscoelastic body 4 between the restraining plates 61 is supported on the surface 10 through the restraining plate 61 on one end side, thereby

contributing to suppression of vibration or noise related to the transformer

1A.

[0035] As a specific example of the stacked body 6, it is possible to cite a damping steel plate, a damping metal plate, etc., but it is not limited to this.

It is optional to suitably set the number of the restraining plates to be stacked. It is optional to construct the stacked body 6 of a multilayer

structure (that is, a structure with a plurality of viscoelastic bodies 4).

Furthermore, bonding the restraining plate 61 on one end side of the stacked body 6 to the surface 10 of the container 1 can be achieved by various methods such as using adhesive. In the case of applying the viscoelastic adhesive, the viscoelastic body 4 (not shown in Fig. 6) is also formed between these.

[0036] Furthermore, both of the restraining plate 5 and the stacked body 6 (the restraining plate 61, etc.) may be not only bonded to the surface 10 through the above-mentioned viscoelastic adhesive, etc., but also directly connected to the surface 10 by welding or a fastening means (for example, a fastening bolts, etc. not shown in the drawings). Even in the case of such direct connection of these, as long as vibration damping effect by the viscoelastic body 4 is not blocked, it is possible to suppress vibration or noise related to the transformer 1A, and it also becomes possible to reinforce the supporting structure or conduct an electric connection (earth connection).

Furthermore, it is possible to cite applying those of various modes as specific examples of the fastening means, such as a fastening bolt that is used for fixing a heavy object installed between the inner surface 10a of the container 1 and the inside element 2, a fastening bolt that is used for fixing insulation members (such as pressboard for covering metal (bare electrode) of shield member), an earthing bolt used for electrical earth connection, a threaded fastening device (a sign of 62) as shown in Fig. 6 of Patent Publication 1, etc., but it is not limited to this.

[0037] <<One example of cooling insulation medium>>

Even if the cooling insulation medium 3 is a liquid one, it is possible to suitably apply various ones as long as they are known in the fields of

stationary induction devices, etc. For example, if it is a liquid one such as insulation oil, it turns into a condition where the insulation oil penetrates into the clearance 41 as shown in Fig. 4 to impregnate the same, thereby forming the squeeze film damper portion 42.

5 [0038] Furthermore, it is also possible to cite applying a cooling insulating medium 3 having a viscosity that is not too high, in terms of achieving a heat radiation suppression function by suppressing heat radiation of the iron core 21 to maintain the iron core 21 at high temperatures, in addition to insulation cooling function, and disaster prevention and environment. As
10 further specific examples, it is also possible to cite applying a liquid silicone having a flash point in a range of 180 °C to 320 °C and a kinematic viscosity coefficient in a range of 20 to 50 cSt or having a flash point of 250 °C or higher and a kinematic viscosity coefficient of 20 cSt, but it is not limited to these.

15 [0039] <<Connection apparatus for connecting stationary induction device and additional device>>

Outside the transformer 1A, there are provided various additional devices such as control panel 71, cooling device, etc. as shown in Fig. 7. The additional devices and the container 1 are connected through various
20 connection apparatuses 73. This connection apparatus 73 is applied in accordance with the type of the additional apparatus. There are applied those of various modes using steel plate, such as bushing pocket, duct, cooling apparatus, sound insulation wall (for example, a simple sound insulation wall, sound insulation panel, etc.), etc. Since this connection
25 apparatus 73 is connected to the container 1 (in Fig. 7, connected to the lid

13), vibration occurring with the operation of the transformer 1A can be transmitted therethrough. Alternatively, in addition to such solid transmission, in some cases, vibration is transmitted to the additional devices by sound transmission in the air or oil from the transformer 1A.

5 [0040] Thus, in case that a steel plate surface (for example, in the case of a tubular duct, the duct's outer peripheral surface, etc. not shown in the drawings) constituting the connection apparatus 73 is covered with the viscoelastic adhesive, followed by curing to form the viscoelastic body 4, the viscoelastic body 4 (not shown in Fig. 7) is supported on the steel plate
10 surface of the connection apparatus 73. With this, vibration transmitted to the steel plate is damped. As a result, it turns to contribute to suppression of vibration or noise related to the transformer 1A.

[0041] Furthermore, not covering the steel plate surface of the connection apparatus 73 simply with the viscoelastic adhesive to form the viscoelastic
15 body 4, it is also possible to make a restraining structure by bringing the restraining plate 5 (not shown in Fig. 7) into a close contact with the viscoelastic adhesive, prior to its cure, thereby bonding the restraining plate 5 to the viscoelastic body 4 as in Fig. 1, Fig. 2, etc. Furthermore, in place of forming the viscoelastic body 4 on the steel plate surface of the connection
20 apparatus 73, it is optional to make a structure in which the viscoelastic body 4 is supported on the steel plate surface by making the restraining plate 61 on one end side of the stacked body 6 bonded thereto or unified therewith as in Fig. 6.

[0042] As above, in the present invention, only the described specific
25 examples were explained in detail, but it is clear for a person skilled in the

art that various modifications, etc. are possible in a range of the technical concept of the present invention. It is natural that such modifications, etc. belong to the scope of the claims. For example, a specific example of the stationary induction device of the present embodiment was explained by
5 using the drawings, etc. showing the transformer 1A. The present invention is, however, not limited to transformer and is applicable to other stationary induction devices such as reactor, too. Achieving their respective similar effects is possible.

CLAIMS

1. A vibration control structure of a stationary induction device,
comprising:

5 an inside element of the stationary induction device, the inside
element having an iron core and a coil wound around the iron core;

a container of the stationary induction device, the container
accommodating the inside element together with a liquid-state, cooling
insulation medium; and

10 a viscoelastic body that is supported on a surface of the container,
wherein the viscoelastic body comprises a viscoelastic adhesive that
covers the surface of the container.

2. The vibration control structure of the stationary induction device as
15 claimed in claim 1, wherein a restraining plate is adhered to the viscoelastic
body through the viscoelastic adhesive that covers the surface of the
container.

3. The vibration control structure of the stationary induction device as
20 claimed in claim 2, wherein the restraining plate is a magnetic shield plate
or an electromagnetic shield plate.

4. The vibration control structure of the stationary induction device as
claimed in claim 2, wherein the restraining plate is a damping steel plate or
25 a damping metal plate.

5. The vibration control structure of the stationary induction device as claimed in any of claims 2 to 4, wherein the restraining plate and the surface of the container are connected together by welding or a connecting means.

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6. The vibration control structure of the stationary induction device as claimed in any of claims 2 to 4, wherein a gap is formed on an outer peripheral side of the viscoelastic body that is between an inner surface of the container surface and the restraining plate adhered to the viscoelastic
10 body supported on the inner surface,

wherein the cooling insulation medium penetrates into the gap to form a squeeze film damper portion.

7. A vibration control structure of a stationary induction device,
15 comprising:

an inside element of the stationary induction device, the inside element having an iron core and a coil wound around the iron core;

a container of the stationary induction device, the container accommodating the inside element together with a liquid-state, cooling
20 insulation medium; and

a stacked body of a plurality of restraining plates,

wherein the restraining plate on one end side in the stacked body is supported by adhesion to the container surface or supported by unification with the container surface,

25 wherein the two restraining plates of the stacked body are bonded

together by a viscoelastic adhesive to form a viscoelastic body.

8. The vibration control structure of the stationary induction device as claimed in claim 7, wherein the stacked body is a damping steel plate or a
5 damping metal plate.

9. The vibration control structure of the stationary induction device as claimed in claim 7 or 8, wherein the stacked body and the surface of the container are connected together by welding or a connecting means.

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10. The vibration control structure of the stationary induction device as claimed in any of claims 1 to 9, wherein an additional device for the stationary induction device is connected to an outer peripheral side of the container through a connection apparatus comprising a steel plate,

15 wherein a viscoelastic body comprising a viscoelastic adhesive is supported on a surface of the steel plate of the connection apparatus.