

## Description

### Technical field

The invention relates to an electric noise absorber according to the first part of claim 1 for absorbing electric noise which is generated within an electronic device or which enters from the outside into the device through a cord.

### Background art

As a method for absorbing such noise, it is well-known that magnetic ferrite can be attached to a cord. Thereby two pieces of half ring-shaped ferrite are attached by adhesive tape around the cord or according to JP-A-6016404 by grooves and protrusions formed in the contact surfaces of the two pieces. However the pieces are apt to easily come off from the cord because the protrusion may slip out from the groove. Furthermore the conductive ferrite may make a short circuit or may generate a contact electricity in the electronic device.

A further noise absorber according to JP-B 62-14770 shows the features of the first part of claim 1. However, the stripelike case members for holding the ferrites are not able to hold the ferrites safely or to fix the noise absorber at the cord avoiding any displacement along the cord.

A coil retaining case disclosed in US-A-3 846 725 is provided with wall-like end portions having substantially semicircular apertures for receiving a coil form and holding centrally in the case. However, these end portions with a conical shape are inclined in order to permit coil forms of different diameters and are not able to grip a cord.

### Disclosure of the invention

It is therefore an object of the invention to provide an electric noise absorber which can be fixed surely to a cord thereby preventing any short circuit or contact electricity with other conductive parts.

The problems are solved by the electric noise absorber according to the invention with the features of claim 1. Accordingly, the magnetic substance contained in the electric noise absorber can be held securely to the cord for a long time and the absorber can be easily attached to and detached from the cord whenever required. Furthermore, the absorber can effectively absorb electric noise and prevent the generation and inflow of noise.

### BRIEF DESCRIPTION OF DRAWINGS

This invention is illustrated diagrammatically in the following drawings wherein:

Fig. 1 is a perspective view illustrating a holding case

1 of the first embodiment;

Fig. 2 is a plan view of the holding case 1 shown in Fig. 1;

Fig. 3 is a left side view of the holding case 1 shown in Fig. 1;

Fig. 4 is a front view of the holding case 1 shown in Fig. 1;

Fig. 5 is a bottom view of the holding case 1 shown in Fig. 1;

Fig. 6 is a rear view of the holding case 1 shown in Fig. 1;

Fig. 7 is a sectional view taken along line VII-VII of Fig. 2;

Fig. 8 is a sectional view taken along line VIII-VIII of Fig. 2;

Fig. 9 is a sectional view taken along line IX-IX of Fig. 2;

Fig. 10 is a sectional view taken along line X-X of Fig. 2;

Fig. 11 is a perspective view illustrating a ferrite member 5;

Fig. 12 is a view when an electric noise absorber is attached to a cord 30;

Fig. 13 is a left side view illustrating the absorber attached to the cord 30; and

Fig. 14 is a perspective view illustrating a case member 22 of the second embodiment.

### BEST MODE FOR CARRYING OUT OF THE INVENTION

The first embodiment of this invention will be described with reference to Figs. 1 through 13.

Fig. 1 shows a perspective view of a holding case 1 of an electric noise absorber. The holding case 1 is composed of two case members 2 and 3 connected by means of two hinges 4. The case members 2 and 3 are box-shaped with one open surface and formed so as to securely contain a ferrite member 5 shaped as shown in Fig. 11. Four biasing members 6 and 7 project resiliently inward from the bottom of the case members 2 and 3 for biasing the ferrite member 5. Wide fixing members 8 and 9 are provided at the center of the front surface (the surface shown in Figs. 4 and 6) of the case members 2 and 3 for securing an upper side of the ferrite member 5. Two pairs of flexible supporting projections 10 and 11 are formed adjacent to the fixing members 8 and 9. Within the case member 2, a pair of supporting projections 15 projects inward from a surface opposite to the projections 10. Within the case member 3, a pair of supporting projections 16 projects inward from a surface opposite to the projections 11. The projections 10, 11, 15 and 16 project inward from the front surface so as to support side notches 5a of the ferrite member 5. Moreover, long engaging tabs 12 are provided adjacent to the projections 10 of the case member 2. Engaging projections 13 and protrusions 14 are provided adjacent to the projections 11 of the case member 3. The projections 13 are en-

gaged with the tabs 12 when the holding case 1 is closed. Substantially semi-holes 17 having teeth 17a are formed on both side walls of the case member 2 for inserting a cord. Likewise, semi-holes 18 having teeth 18a are formed on both side walls of the case member 3.

As shown in Fig. 11, a hemi-cylindrical groove 5b is formed longitudinally along the upper part of the ferrite member 5 for receiving the cord. The notches 5a are formed on both sides of the ferrite member 5.

The holding case 1 is integrally formed of a synthetic resin, and each member, projection and tab have appropriate resilience.

Two ferrite members 5 are contained in the case members 2 and 3 of the holding case 1. In the case member 2, the upper side of the ferrite member 5 is secured by the fixing member 8. Two pairs of supporting projections 10 and 15 engage with the notches 5a, therefore the ferrite member 5 is securely held in the member 2. Likewise, in the case member 3, the upper side of the ferrite member 5 is secured by the fixing member 9, and two pairs of the projections 11 and 16 engage with the notches 5a. Thus the ferrite member 5 is securely held within the case member 3.

In the state that the ferrite members 5 are contained in the case members 2 and 3, a cord 30 is inserted between the case members 2 and 3, and the case member 3 covers the case member 2 so that the case 1 is attached to the cord 30 of an electronic device. The engaging projections 13 of the case member 3 are engaged with the engaging tabs 12 of the case member 2, therefore the case 1 is securely fastened. When the case 1 is closed, the biasing members 6 and 7 projecting from the bottom of the case members 2 and 3 support the ferrite members 5 so as to join them together, thereby, the ferrite members 5 are securely held. As shown in Fig. 13, the teeth 17a and 18a, around the semi-holes 17 and 18 formed on both side walls of the case members 2 and 3, are clamped against the cord 30.

By applying an appropriate number of the holding cases 1 containing the magnetic ferrite members 5 to the cord 30, noise flowing in the cord 30 is absorbed by the magnetic ferrite and generation of noise is prevented. The noise absorbing efficiency of the case 1 is measured at various positions thereof along the cord by a noise measuring device, and the position for the case where noise is absorbed most efficiently is found. It is preferable that the most appropriate number of the cases to be used are experimentally determined by measuring the noise absorbing efficiency. The ferrite members 5 absorb noise that is generated outside or enters the electronic device through the cord.

To detach the case from the cord or to change its position thereon, the engaging tabs 12 of the case member 2 are pulled outwardly so that the tabs 12 detach easily from the engaging projections 13 and the case 1 can be opened. It is possible to secure the holding case 1 to a circuit board with a double-sided adhesive tape.

As shown by a double-dash interrupted line in Fig.

6, a mounting leg 31 having an engaging hook may be attached to the bottom of the case member 2 or 3 so as to secure the holding case to the circuit board.

Regarding the magnetic substance, either hard or soft ferrite can be used. Further, a plastic magnet or rubber magnet which is made by mixing magnetic powder of ferrite with plastic or rubber can also be used.

The second embodiment of this invention is shown in Fig. 14. In this embodiment, an engaging tab 112 and a projection 113 are formed on each of the sides of a single case member 22. Another projection 113 is also provided opposite to the engaging tab 112. In order to secure the cord 30, two same case members 22 are prepared, and one ferrite member 5 is contained in each case member. Then the cord 30 is held between a pair of case members 22 and the engaging tab 112 is engaged with the projection 113.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims in the invention may be practiced otherwise than as specifically described.

## 25 Claims

1. An electric noise absorber for surrounding a cord (30) of an electronic device comprising two members of magnetic substance (5), being mutually opposed in register and in contact when the absorber is in use, each having a hemi-cylindrical groove for receiving the cord (30), and two case members (2, 3; 22) for covering the cord (30) when interlocked, each case member (2, 3; 22) containing a respective one of the members of magnetic substance (5), characterized in that the case members (2, 3; 22) are box-shaped with one open surface, wherein a semi-hole (17, 18) is formed on each of narrow edges of the open surface for passing the cord (30), and teeth (17a, 18a) are formed on an edge of each of the semi-holes (17, 18) for securing the cord (30) when the case members (2, 3; 22) are closed, wherein for gripping the cord the teeth are positioned completely within the semi-holes and directed to the cord (30) to be gripped.
2. The electric noise absorber according to claim 1, wherein the two case members (2, 3) form halves of one body and are connected by a hinge (4) and each said case member (2, 3) has means (12, 13) for engaging with the other such that the case members (2, 3) clamp around the cord (30).
3. The electric noise absorber according to claim 2, wherein the hinge (4) is formed along a longitudinal edge of the open surface and the engaging means (12, 13) are formed on another longitudinal edge of the open surface.



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By applying an appropriate number of the holding cases 1 containing the magnetic ferrite members 5 to the cord 30, noise flowing in the cord 30 is absorbed by the magnetic ferrite and generation of noise is prevented. The noise absorbing efficiency of the case 1 is measured at various positions thereof along the cord by a noise measuring device, and the position for the case where noise is absorbed most efficiently is found. It is preferable that the most appropriate number of the cases to be used are experimentally determined by measuring the noise absorbing efficiency. The ferrite members 5 absorb noise that is generated outside or enters the electronic device through the cord.

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The second embodiment of this invention is shown in Fig. 14. In this embodiment, an engaging tab 112 and a projection 113 are formed on each of the sides of a single case member 22. Another projection 113 is also provided opposite to the engaging tab 112. In order to secure the cord 30, two same case members 22 are prepared, and one ferrite member 5 is contained in each case member. Then the cord 30 is held between a pair of case members 22 and the engaging tab 112 is engaged with the projection 113.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims in the invention may be practiced otherwise than as specifically described.

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1. An electric noise absorber for surrounding a cord (30) of an electronic device comprising two members of magnetic substance (5), being mutually opposed in register and in contact when the absorber is in use, each having a hemi-cylindrical groove for receiving the cord (30), and two case members (2, 3; 22) for covering the cord (30) when interlocked, each case member (2, 3; 22) containing a respective one of the members of magnetic substance (5), characterized in that the case members (2, 3; 22) are box-shaped with one open surface, wherein a semi-hole (17, 18) is formed on each of narrow edges of the open surface for passing the cord (30), and teeth (17a, 18a) are formed on an edge of each of the semi-holes (17, 18) for securing the cord (30) when the case members (2, 3; 22) are closed, wherein for gripping the cord the teeth are positioned completely within the semi-holes and directed to the cord (30) to be gripped.
2. The electric noise absorber according to claim 1, wherein the two case members (2, 3) form halves of one body and are connected by a hinge (4) and each said case member (2, 3) has means (12, 13) for engaging with the other such that the case members (2, 3) clamp around the cord (30).
3. The electric noise absorber according to claim 2, wherein the hinge (4) is formed along a longitudinal edge of the open surface and the engaging means (12, 13) are formed on another longitudinal edge of the open surface.



4. The electric noise absorber according to claim 1 wherein the two case members (22) are formed separately and identical to each other and said each case member (22) has means (112, 113) for engaging with each other such that the case members (22) clamp around the cord (30).
5. The electric noise absorber according to claim 4, wherein the engaging means (112, 113) are formed along a longitudinal edge of the open surface.
6. The electric noise absorber according to any one of the preceding claims characterized in that each member of magnetic substance (5) has notches (5a) and each case member (2, 3; 22) has flexible projections (10, 11, 15, 16) for securing the member of magnetic substance (5) in the case member (2, 3; 22) by engaging with the notches (5a).
7. The electric noise absorber according to any one of the preceding claims characterized in that each member (2, 3; 22) has biasing means (6, 7) on a surface opposite to the open surface for biasing the member of magnetic substance (5) to the cord (30) when the case members (2, 3; 22) are closed.
8. The electric noise absorber according to claim 7, wherein one of the case members (3) has a hook (31) projecting outside of the case member (3) on the surface opposite to the open surface for securing the case to a circuit board.
2. Elektrischer Rauschabsorber nach Anspruch 1, bei dem die beiden Gehäuseelemente (2, 3) Hälften eines Körpers bilden und über ein Gelenk (4) verbunden sind und bei dem jedes Gehäuseelement (2, 3) Mittel (12, 13) zum gegenseitigen Verriegeln aufweist, so daß die Gehäuseelemente (2, 3) um die Leitung (30) herum festklemmen.
3. Elektrischer Rauschabsorber nach Anspruch 2, bei dem das Gelenk (4) entlang einer Längskante der offenen Seite angeformt ist und bei dem die Mittel zum Verriegeln (12, 13) an einer anderen Längskante der offenen Seite angeformt sind.
4. Elektrischer Rauschabsorber nach Anspruch 1, bei dem die beiden Gehäuseelemente (22) separat und identisch zueinander ausgebildet sind und bei dem jedes Gehäuseelement (22) Mittel (112, 113) zum gegenseitigen Verriegeln aufweist, so daß die Gehäuseelemente (22) um die Leitung (30) herum festklemmen.
5. Elektrischer Rauschabsorber nach Anspruch 4, bei dem die Mittel zur Verriegelung (112, 113) entlang einer Längskante der offenen Seite angeformt sind.
6. Elektrischer Rauschabsorber nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß jedes Element (5) aus einer magnetischen Substanz Nuten (5a) und jedes Gehäuseelement (2, 3; 22) flexible Vorsprünge (10, 11, 15, 16) zum Festhalten des Elements (5) aus einer magnetischen Substanz im Gehäuseelement (2, 3; 22) durch Eingriff in die Nuten (5a) aufweist.

#### Patentansprüche

1. Elektrischer, um eine Leitung (30) eines elektrischen Gerätes legbarer Rauschabsorber, der zwei Elemente (5) aus einer magnetischen Substanz enthält, die beim Gebrauch des Absorbers genau zusammenpassend einander gegenüberliegen und miteinander in Kontakt stehen, wobei jedes eine halbzylindrische Nut zur Aufnahme der Leitung (30) und zwei Gehäuseelemente (2, 3; 22) zur Umhüllung der Leitung (30) im verriegelten Zustand aufweist, und wobei jedes Gehäuseelement (2, 3; 22) jeweils eines der Elemente (5) aus einer magnetischen Substanz enthält, dadurch gekennzeichnet, daß die Gehäuseelemente (2, 3; 22) kastenförmig mit einer offenen Seite ausgebildet sind, wobei ein Halbloch (17, 18) an jeder der schmalen Kanten der offenen Seite zum Durchführen der Leitung (30) eingeformt ist, und wobei Zähne (17a, 18a) an jeder Kante jedes Halbloches (17, 18) zum Festhalten der Leitung (30) bei geschlossenen Gehäuseelementen (2, 3; 22) eingeformt sind, und wobei die Zähne zum Festhalten der Leitung ganz innerhalb der Halblöcher angeordnet und zur festzuhaltenden Leitung (30) hin gerichtet sind.
7. Elektrischer Rauschabsorber nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß jedes Element (2, 3; 22) Vorspannmittel (6, 7) an einer der offenen Seite gegenüberliegenden Seite zum Vorspannen der Elemente (5) aus einer magnetischen Substanz an der Leitung (30) aufweist, wenn die Gehäuseelemente (2, 3; 22) geschlossen sind.
8. Elektrischer Rauschabsorber nach Anspruch 7, bei dem eines der Gehäuseelemente (3) einen außerhalb des Gehäuseelements (3) an der der offenen Seite gegenüberliegenden Seite vorspringenden Haken (31) aufweist, um das Gehäuse an einer Leiterplatte zu fixieren.
1. Amortisseur de bruit électrique prévu pour entourer un câble (30) d'un dispositif électronique, comprenant deux éléments en substance magnétique (5), mutuellement opposés, en correspondance et en

#### Revendications



- contact lorsque l'amortisseur est utilisé, ayant chacun une gorge demi-cylindrique pour recevoir le câble (30), et deux éléments de boîtier (2,3 ; 22) pour recouvrir le câble (30) lorsqu'ils sont verrouillés réciproquement, chaque élément de boîtier (2,3 ; 22) contenant l'un des éléments en substance magnétique (5), **caractérisé en ce que les éléments de boîtier (2,3 ; 22) ont la forme d'un boîtier avec une surface ouverte, dans lequel un demi-orifice (17,18) est formé sur chacun des bords étroits de la surface ouverte pour passer le câble (30) et dans lequel des dents (17a, 18a) sont formées sur un bord de chaque demi-orifice (17,18) afin de bloquer le câble (30) quand les éléments de boîtiers (2,3 ; 22) sont fermés, et en ce que, pour pincer le câble, les dents sont positionnées entièrement à l'intérieur des demi-orifices et dirigées vers le câble (30) à pincer.**
2. Amortisseur de bruit électrique selon la revendication 1, dans lequel les deux éléments de boîtier (2,3) constituent les moitiés d'un seul corps et sont liés par une chamière (4), et chaque élément de boîtier (2,3) possède des moyens (12,13) pour s'engager avec l'autre de telle sorte que les éléments de boîtier (2,3) pincent le câble (30).
  3. Amortisseur de bruit électrique selon la revendication 2, dans lequel la chamière (4) est formée le long d'un bord longitudinal de la surface ouverte et les moyens d'engagement (12,13) sont formés sur un autre bord longitudinal de la surface ouverte.
  4. Amortisseur de bruit électrique selon la revendication 1, dans lequel les deux éléments de boîtier (22) sont formés séparément et identiques l'un à l'autre et chacun desdits éléments de boîtier (22) possède des moyens (112,113) pour s'engager avec l'autre de telle sorte que les éléments de boîtier (22) se serrent sur le câble (30).
  5. Amortisseur de bruit électrique selon la revendication 4, dans lequel les moyens d'engagement (112,113) sont formés le long d'un bord longitudinal de la surface ouverte.
  6. Amortisseur de bruit électrique selon l'une quelconque des revendications précédentes, caractérisé en ce que chaque élément en substance magnétique (5) présente des crans (5a) et en ce que chaque élément de boîtier (2,3 ; 22) présente des saillies flexibles (10,11,15,16) pour fixer l'élément en substance magnétique (5) sur l'élément de boîtier (2,3 ; 22) par engagement avec les crans (5a).
  7. Amortisseur de bruit électrique selon l'une quelconque des revendications précédentes, caractérisé en ce que chaque élément (2,3 ; 22) présente des

moyens de contrainte (6,7) sur la surface opposée à la surface ouverte pour contraindre l'élément en substance magnétique (5) sur le câble (30) quand les éléments de boîtier (2,3 ; 22) sont fermés.

8. Amortisseur de bruit électrique selon la revendication 7, dans lequel l'un des éléments de boîtier (3) présente un crochet (31) faisant saillie à l'extérieur de l'élément de boîtier (3) sur la surface opposée à la surface ouverte pour fixer le boîtier sur une plaque de circuits imprimés.