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[54] **METHOD OF FABRICATING AN ELECTROACOUSTIC TRANSDUCER**

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[73] Assignee: **Star Micronics Co., Ltd.**, Shizuoka, Japan

[*] Notice: This patent is subject to a terminal disclaimer.

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[22] Filed: **Dec. 14, 1998**

Related U.S. Patent Documents

Reissue of:

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Appl. No.: **08/450,350**
Filed: **May 25, 1995**

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[52] **U.S. Cl.** **381/396**; 381/398; 381/400; 381/412; 340/391.1; 340/388.4; 367/175; 29/594

[58] **Field of Search** 381/396, 398, 381/400, 412; 340/391.1, 388.4; 367/175; 29/594

[56] **References Cited**

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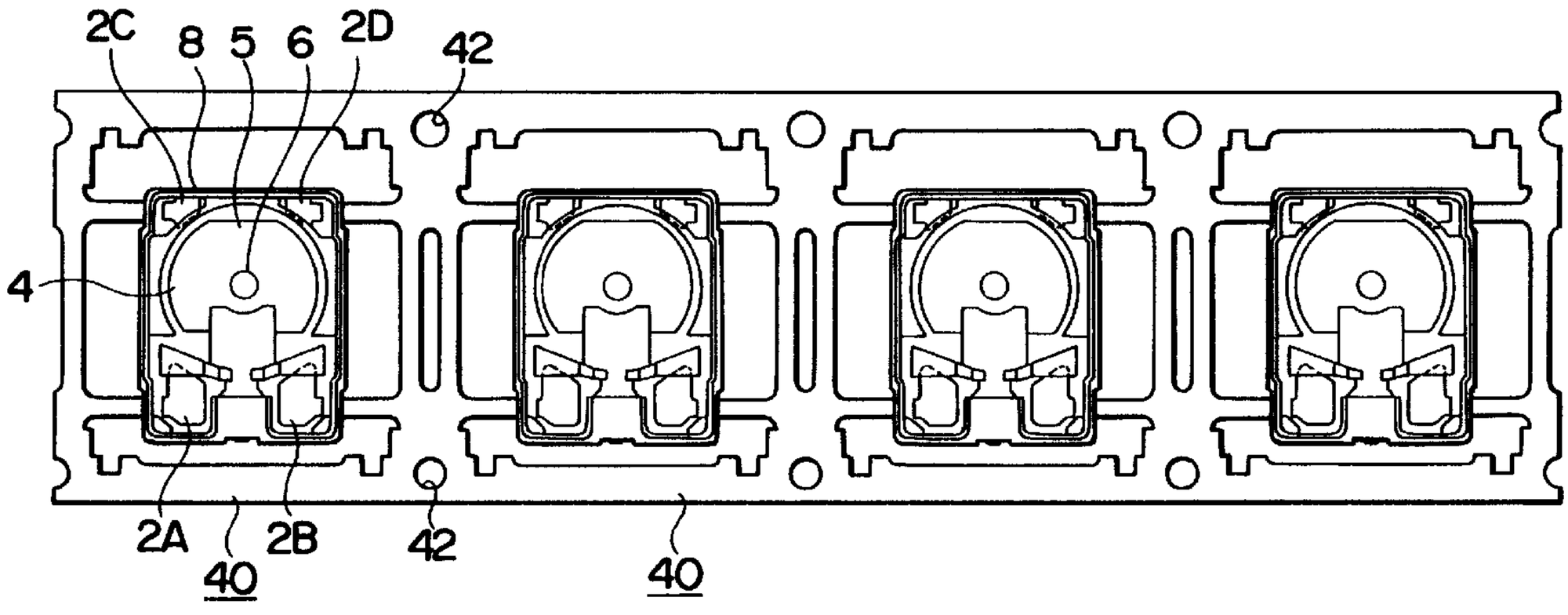
Primary Examiner—Sinh Tran
Attorney, Agent, or Firm—Pollock, Vande Sande & Amernick

[57] **ABSTRACT**

The present invention provides a fabrication method of an electroacoustic transducer capable of simplifying an assembling process on a lead frame and realizing an automatic assembly. The method comprises steps of forming pole piece portions, forming a lead frame having a plurality of base forming areas thereon, each of the areas having lead terminals formed therein, forming bases of a synthetic resin on the lead frame by molding so that the pole piece portions are embedded in the bases, mounting a coil on the pole piece portions embedded in the bases, disposing a support ring and a magnet so as to surround the coil, and placing a diaphragm on the support ring to be held thereby, connecting opposite ends of the coil to the lead terminals, cutting off the lead terminals from the lead frame, putting cases on and fixedly joining the same to the bases, and subjecting the cut lead terminals to a forming process.

13 Claims, 15 Drawing Sheets



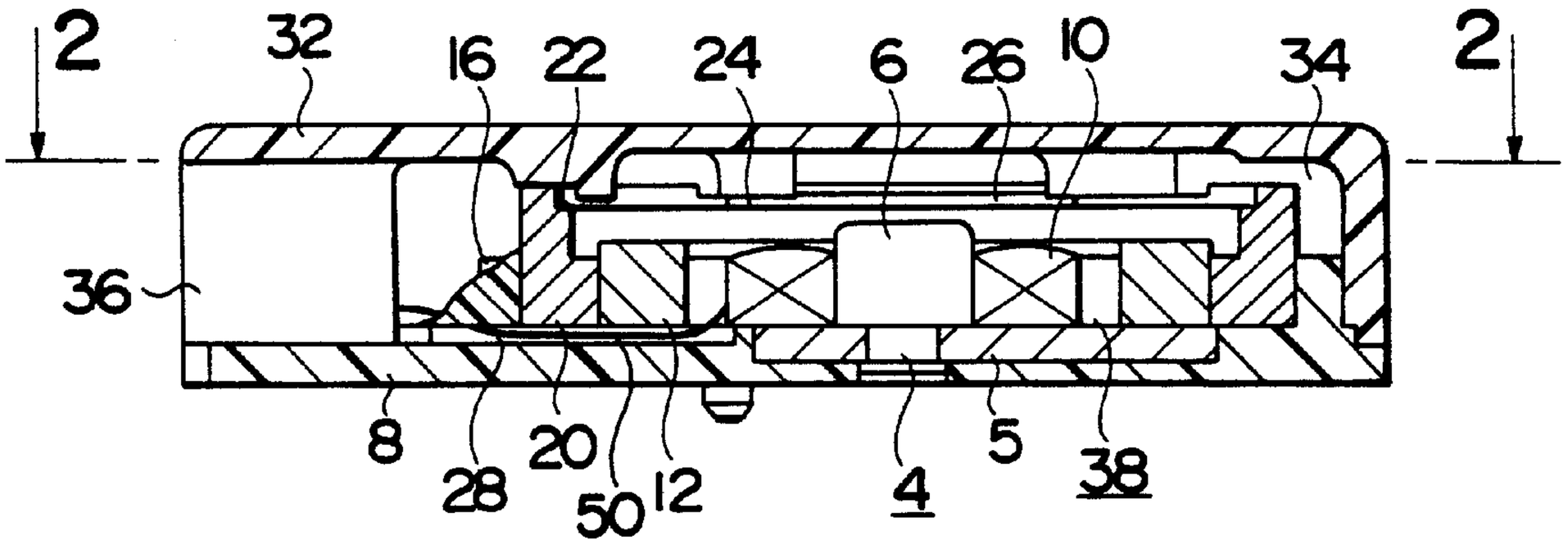

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FIG. 1

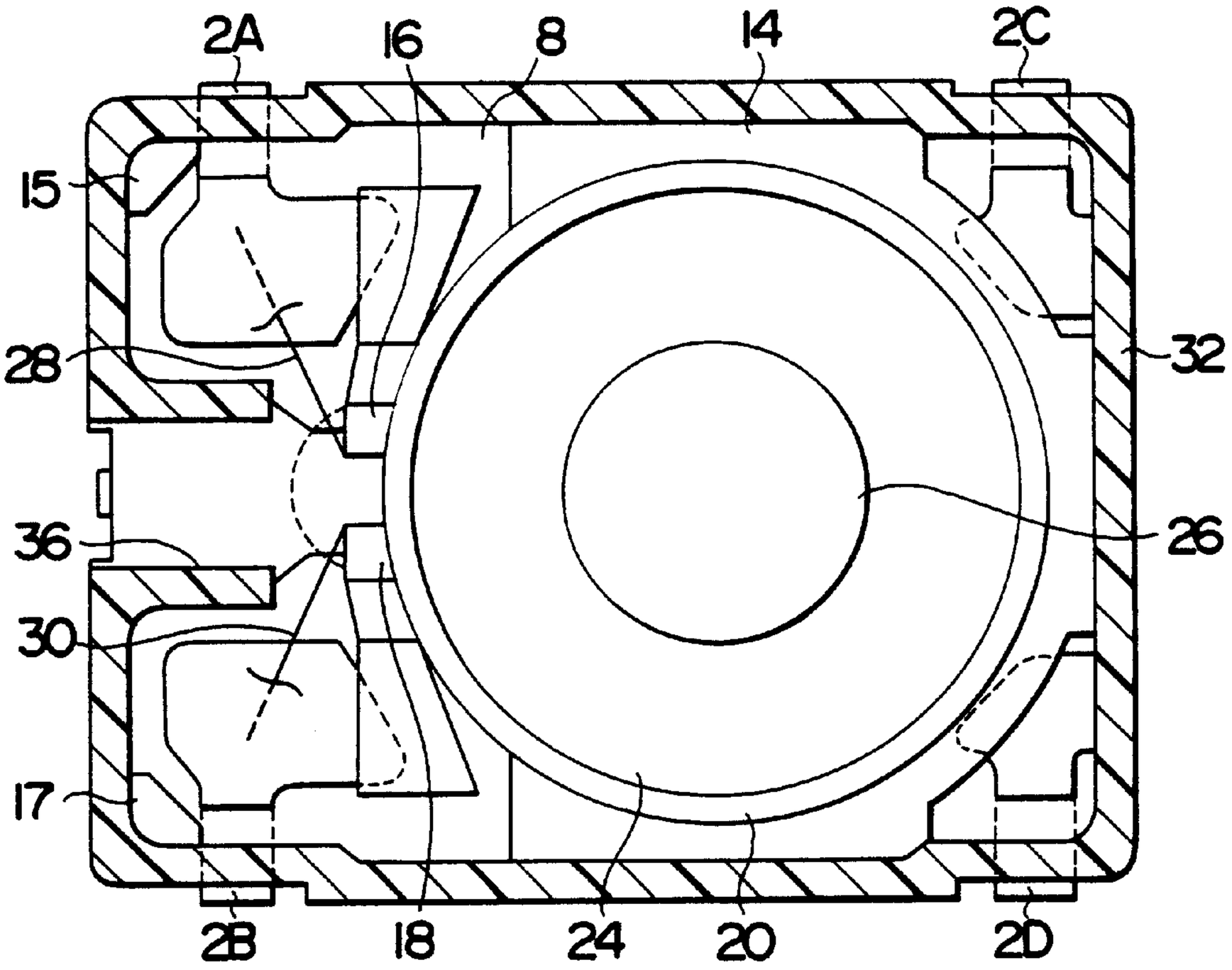
2A
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FIG. 2

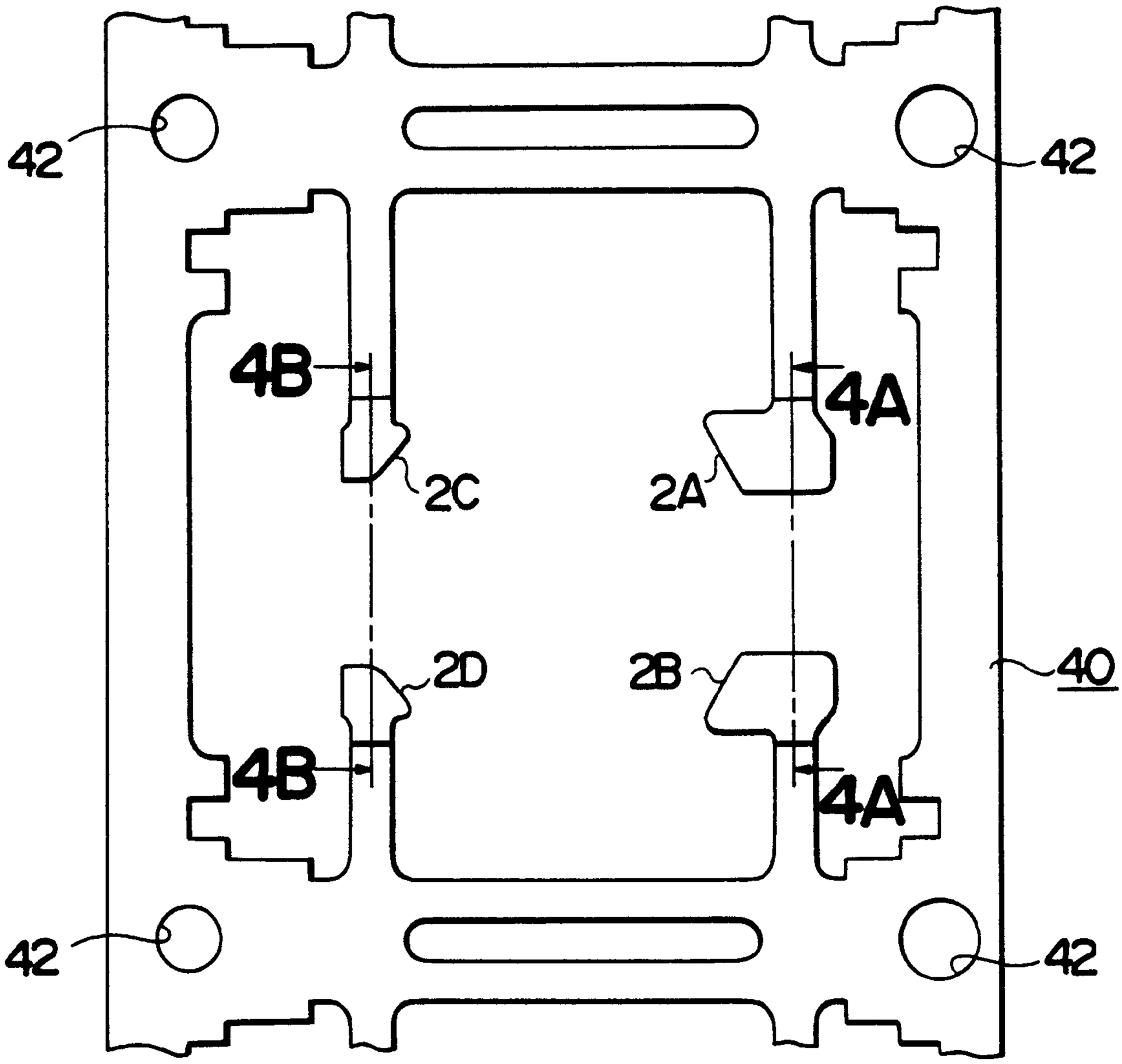
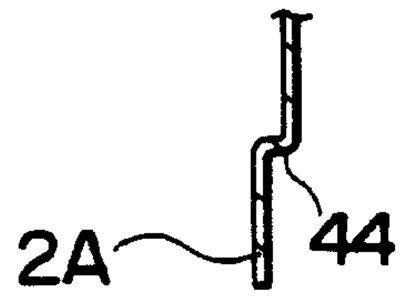


FIG. 3



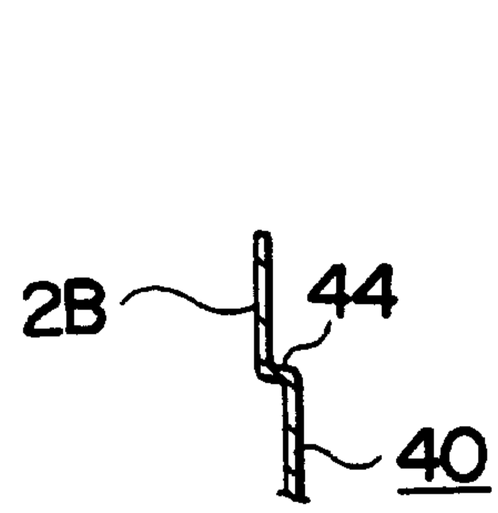


FIG. 4A

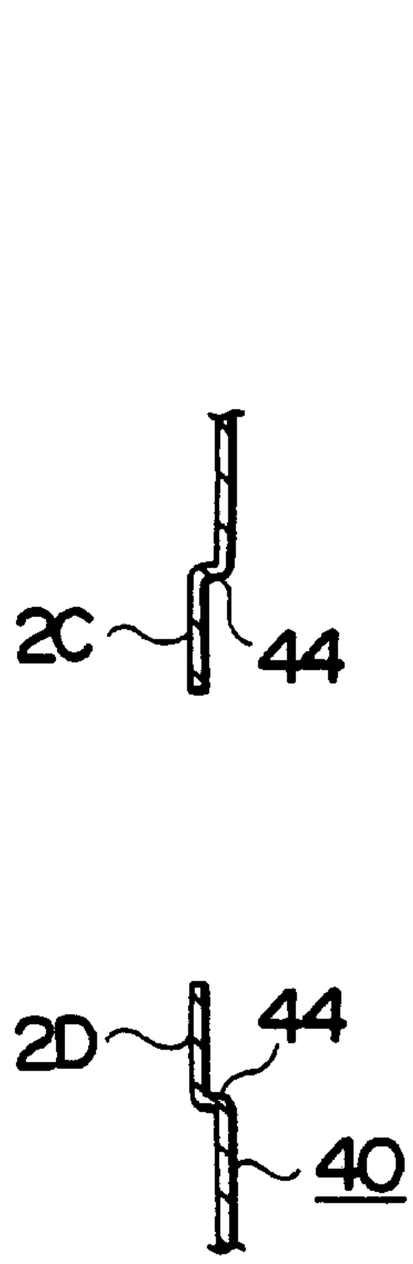


FIG. 4B

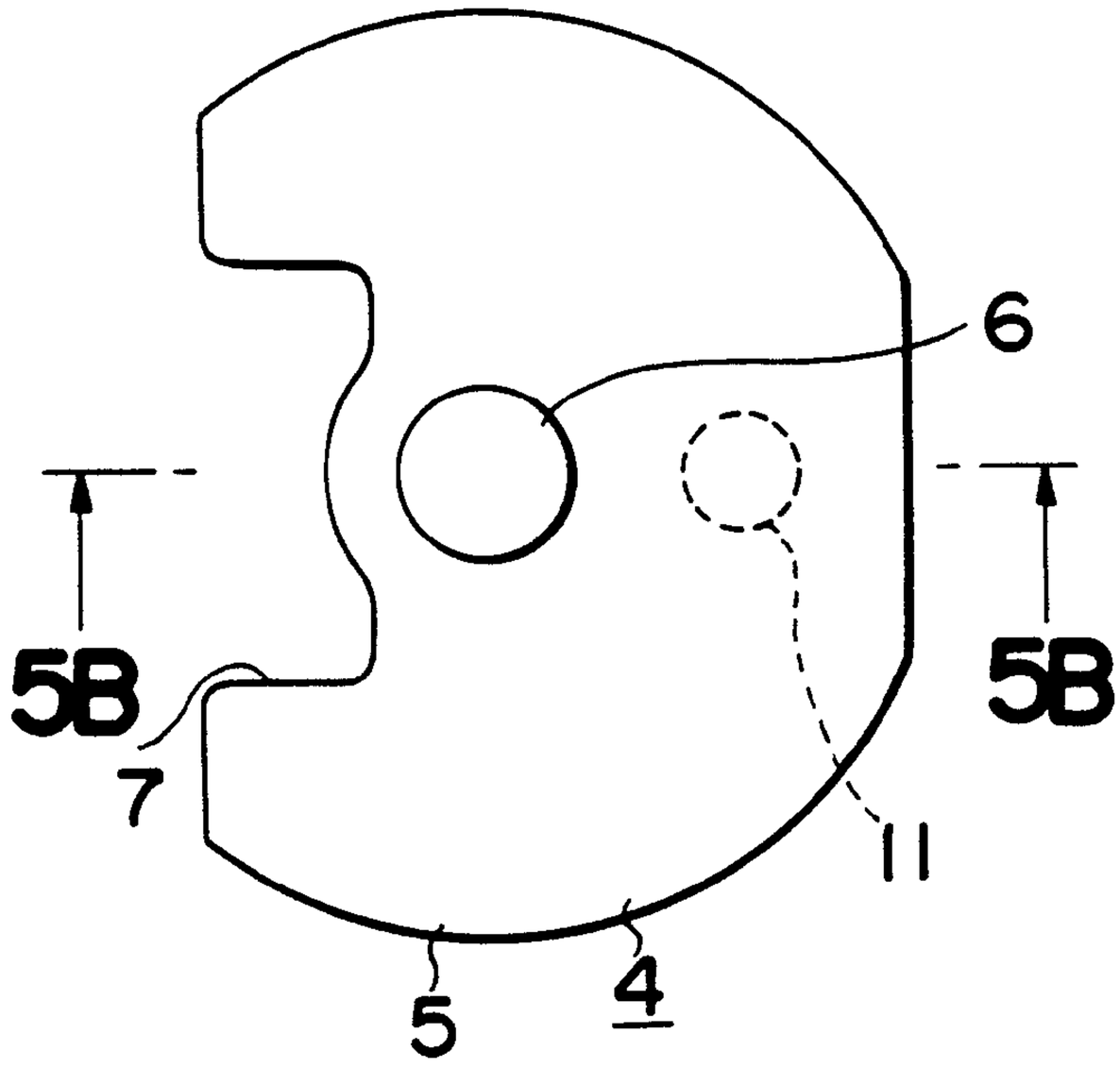


FIG 5A

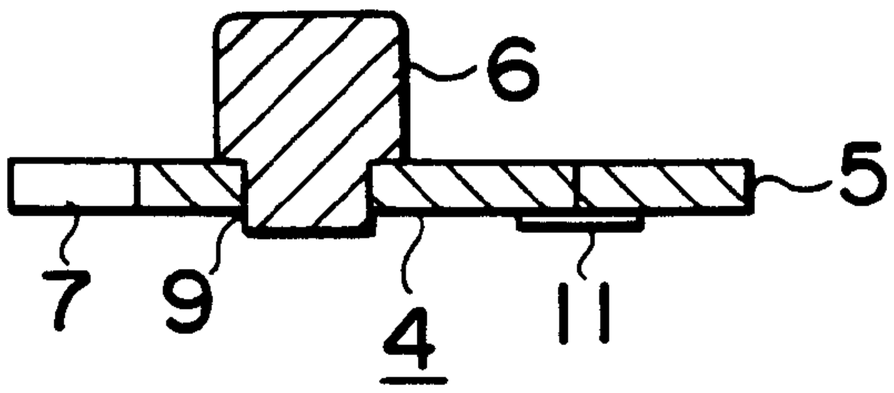


FIG. 5B

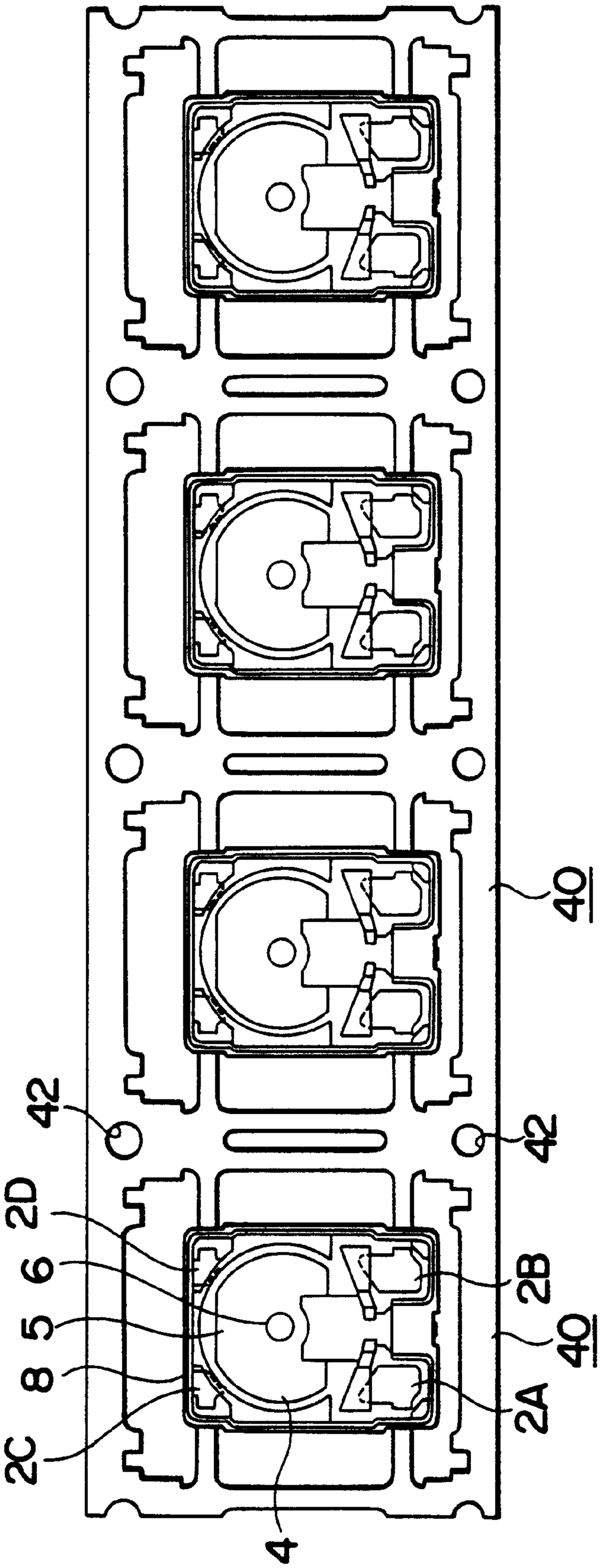


FIG. 6

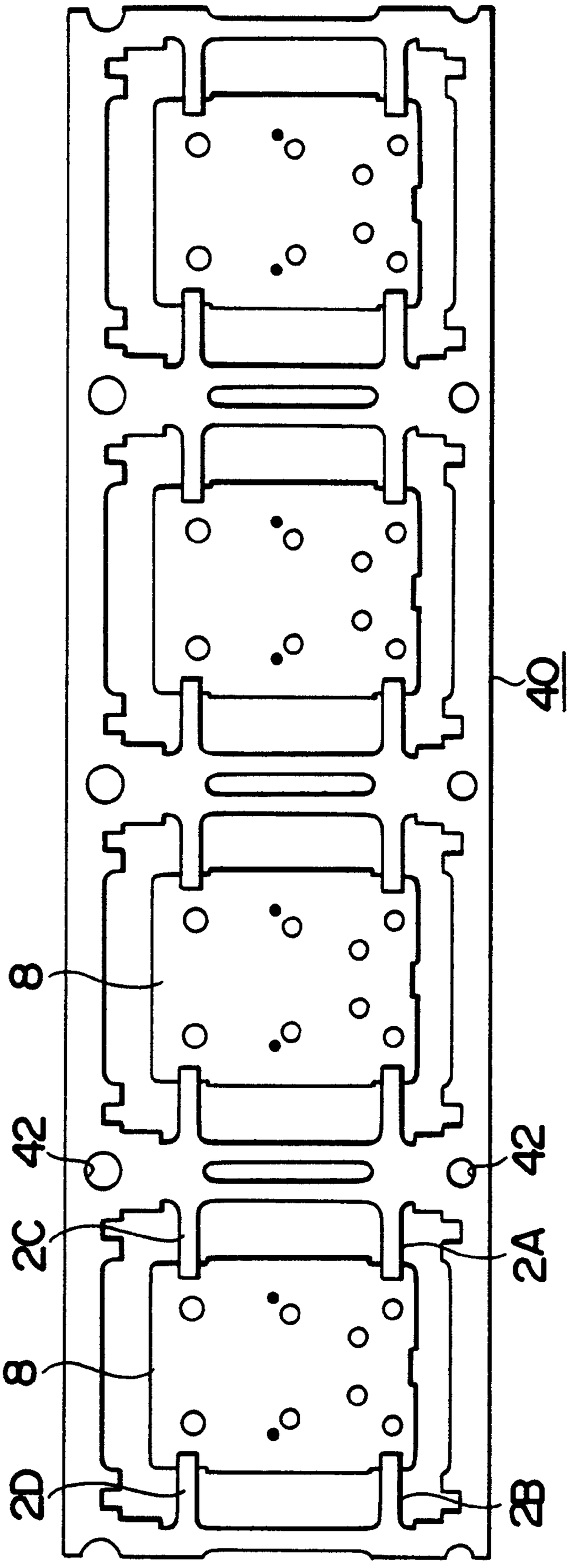


FIG. 7

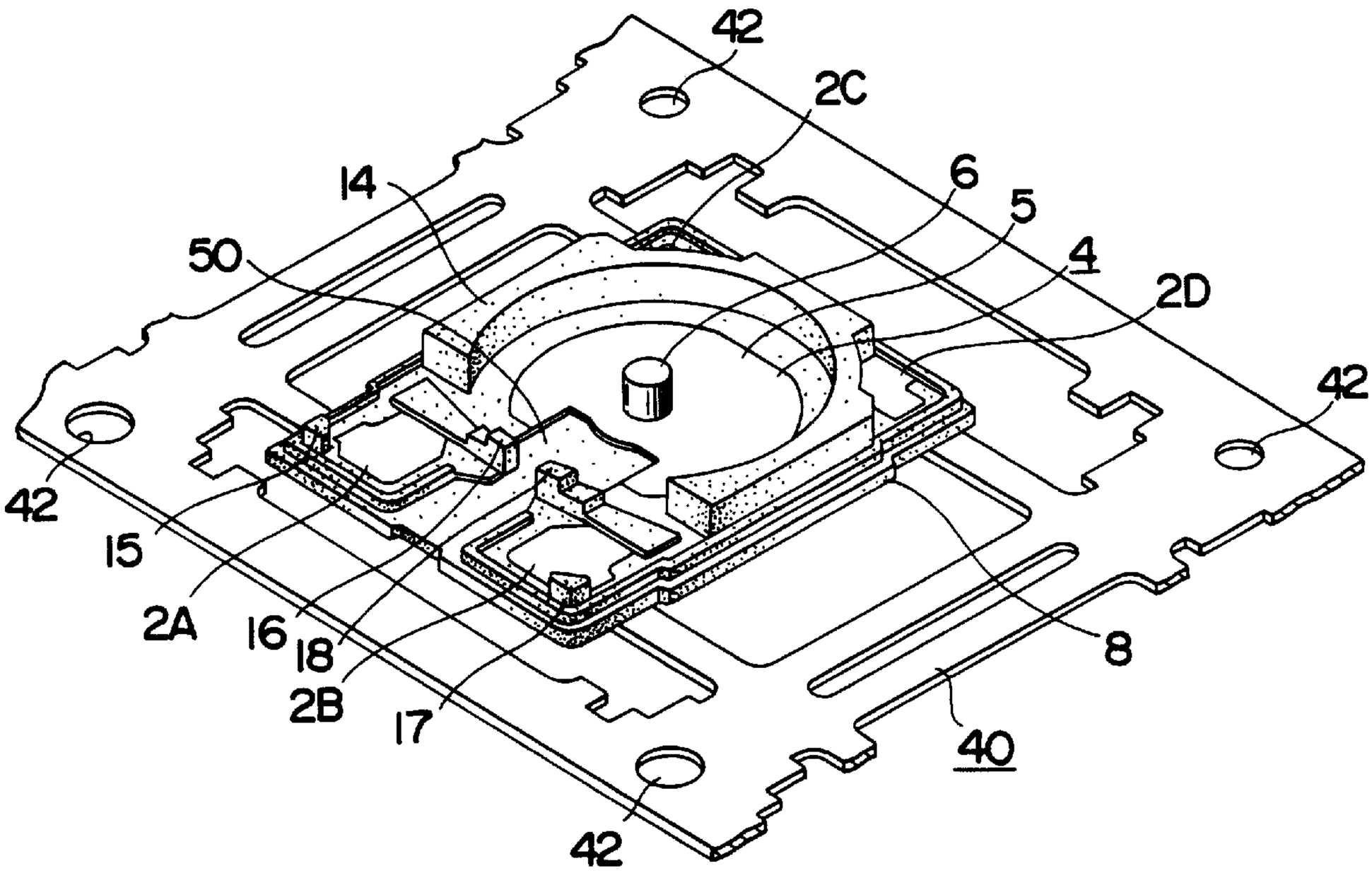


FIG. 8

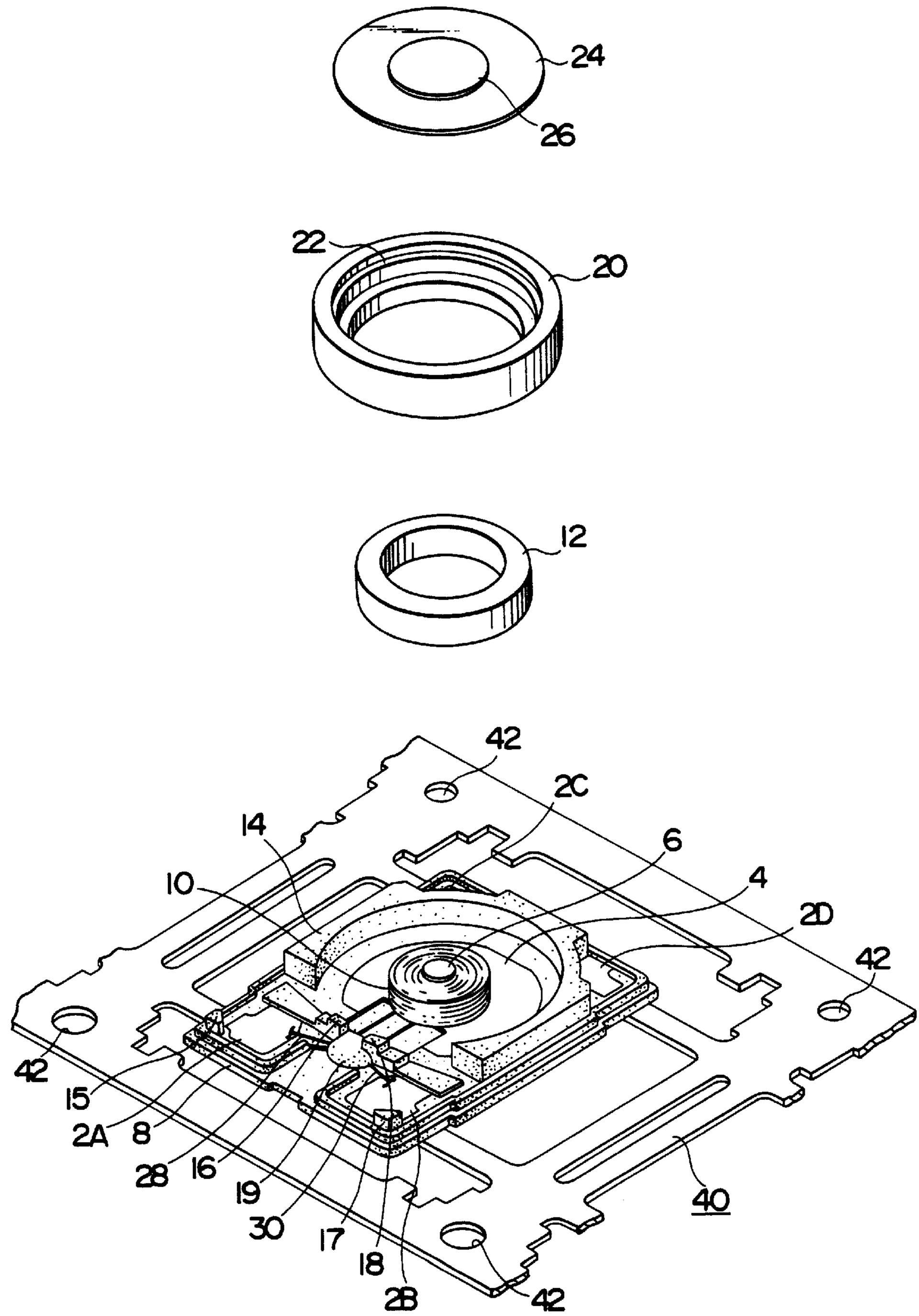


FIG. 9

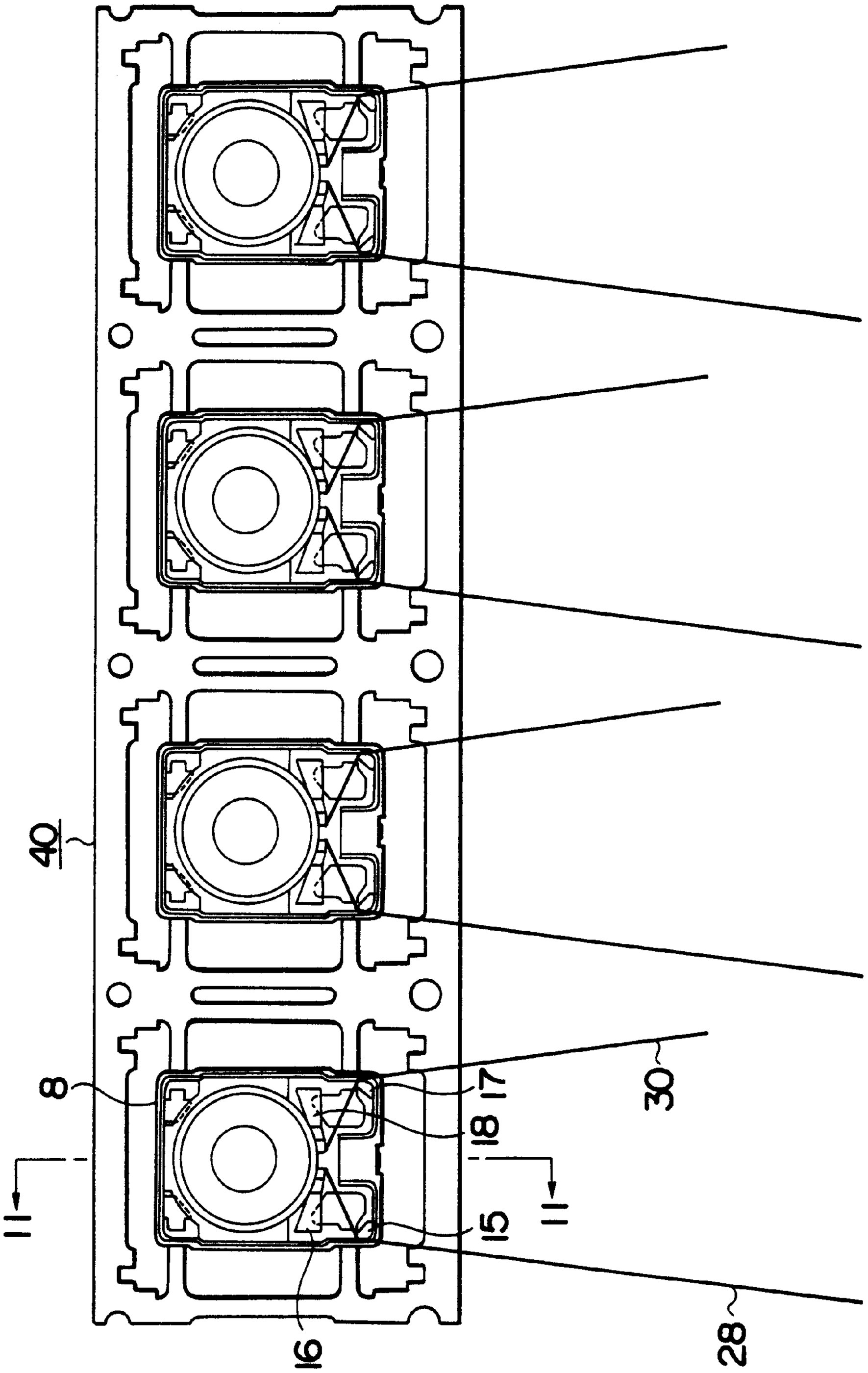


FIG. 10

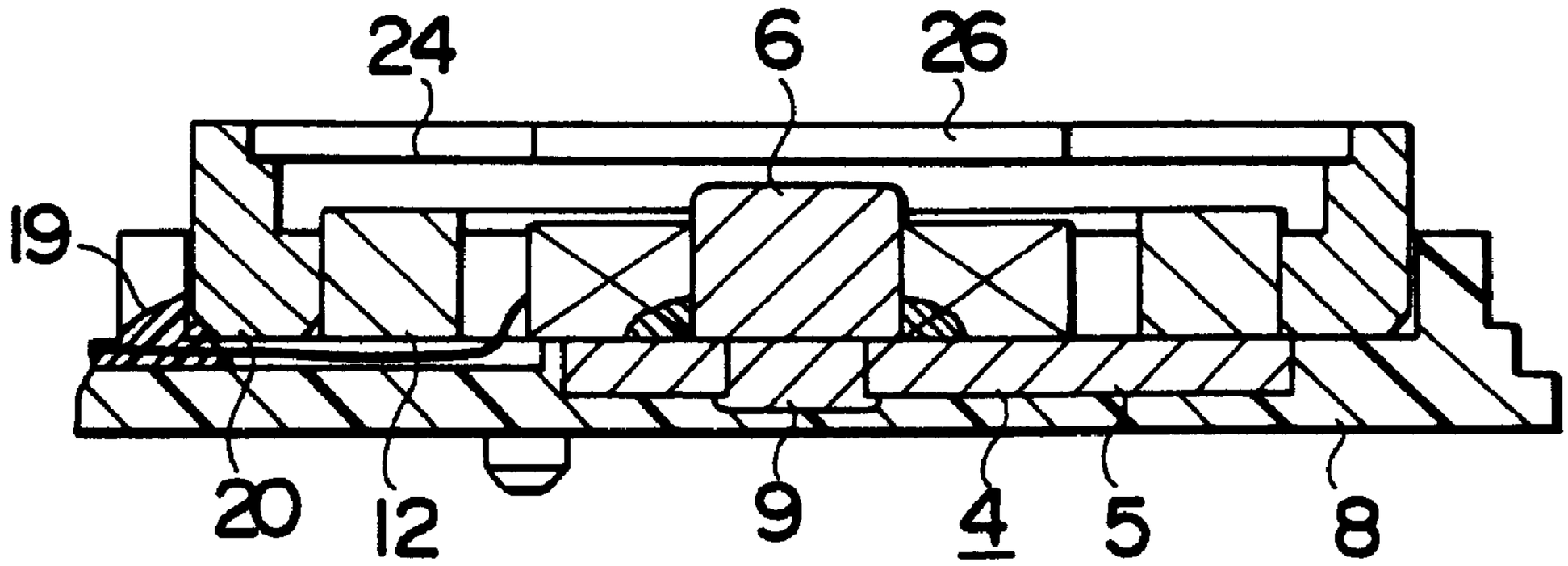
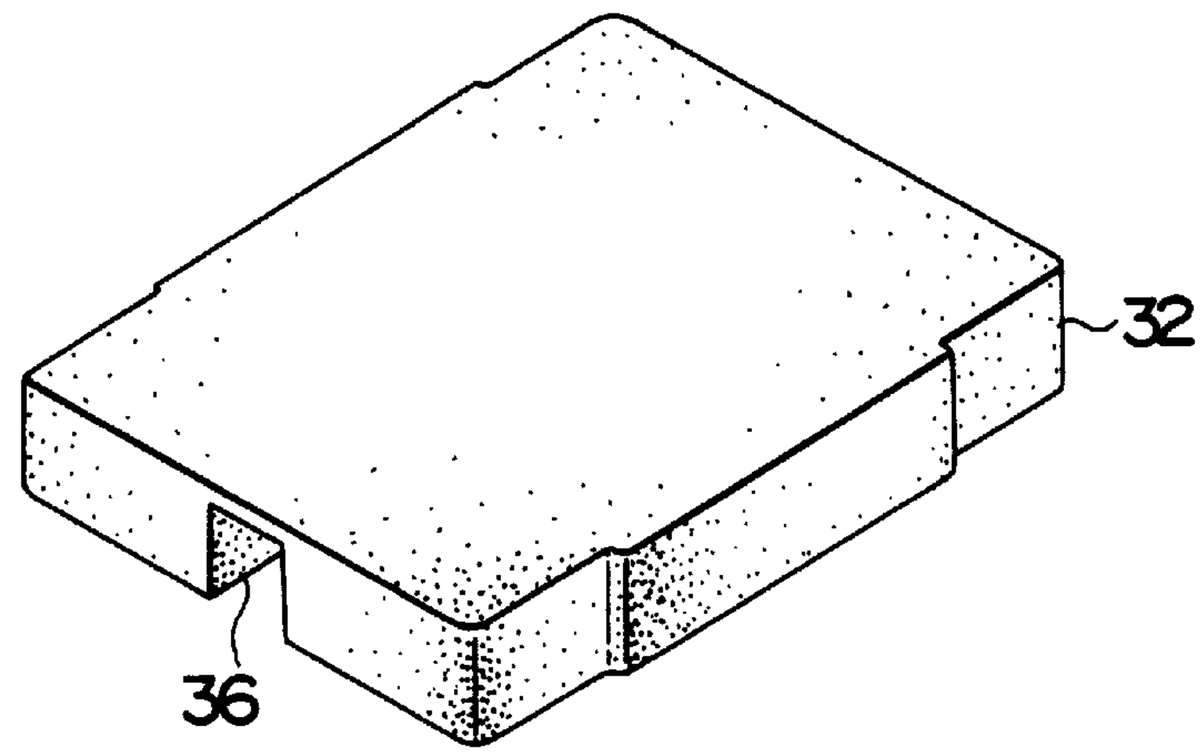


FIG. 11



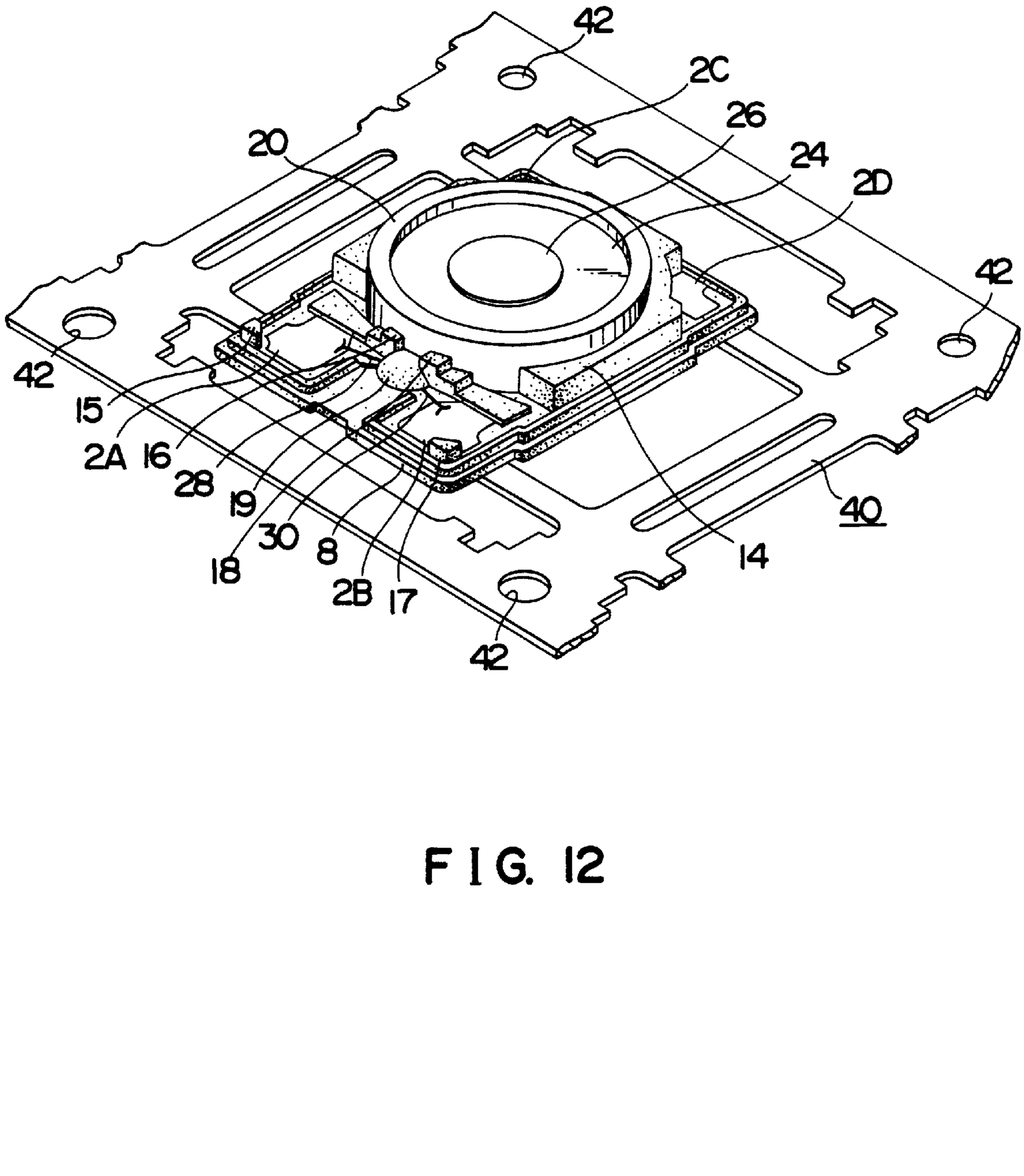


FIG. 12

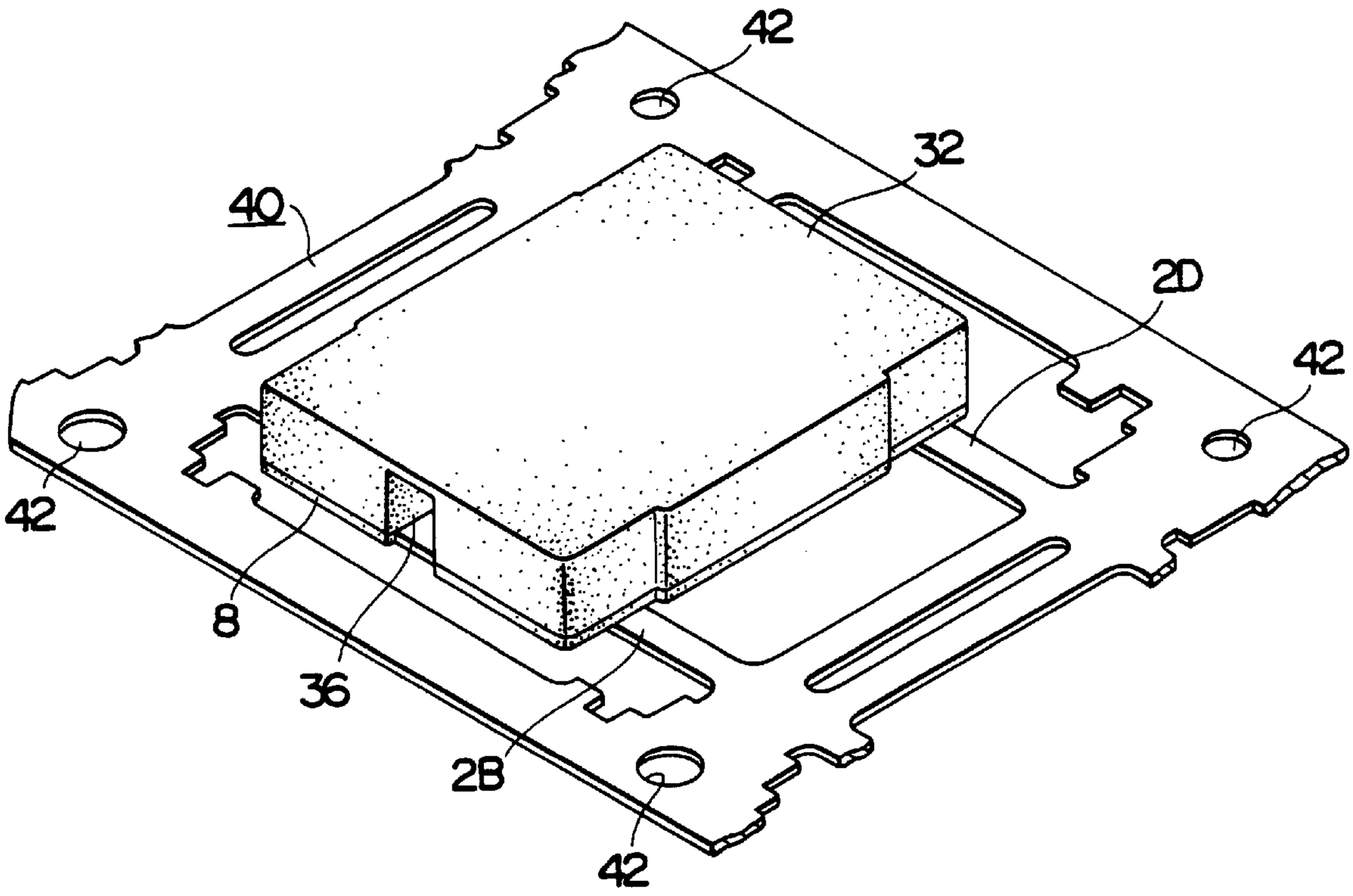


FIG. 13

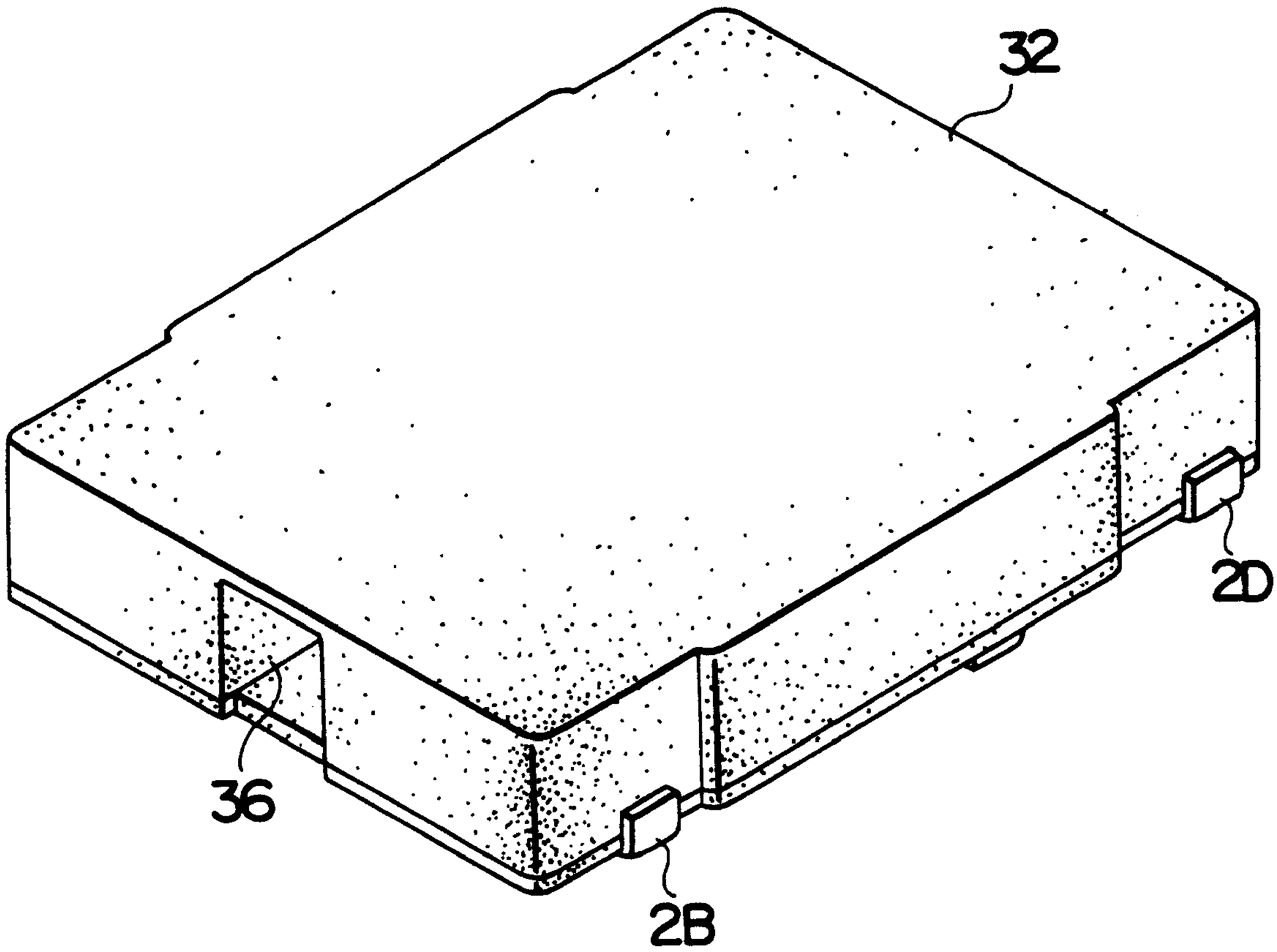


FIG. 14

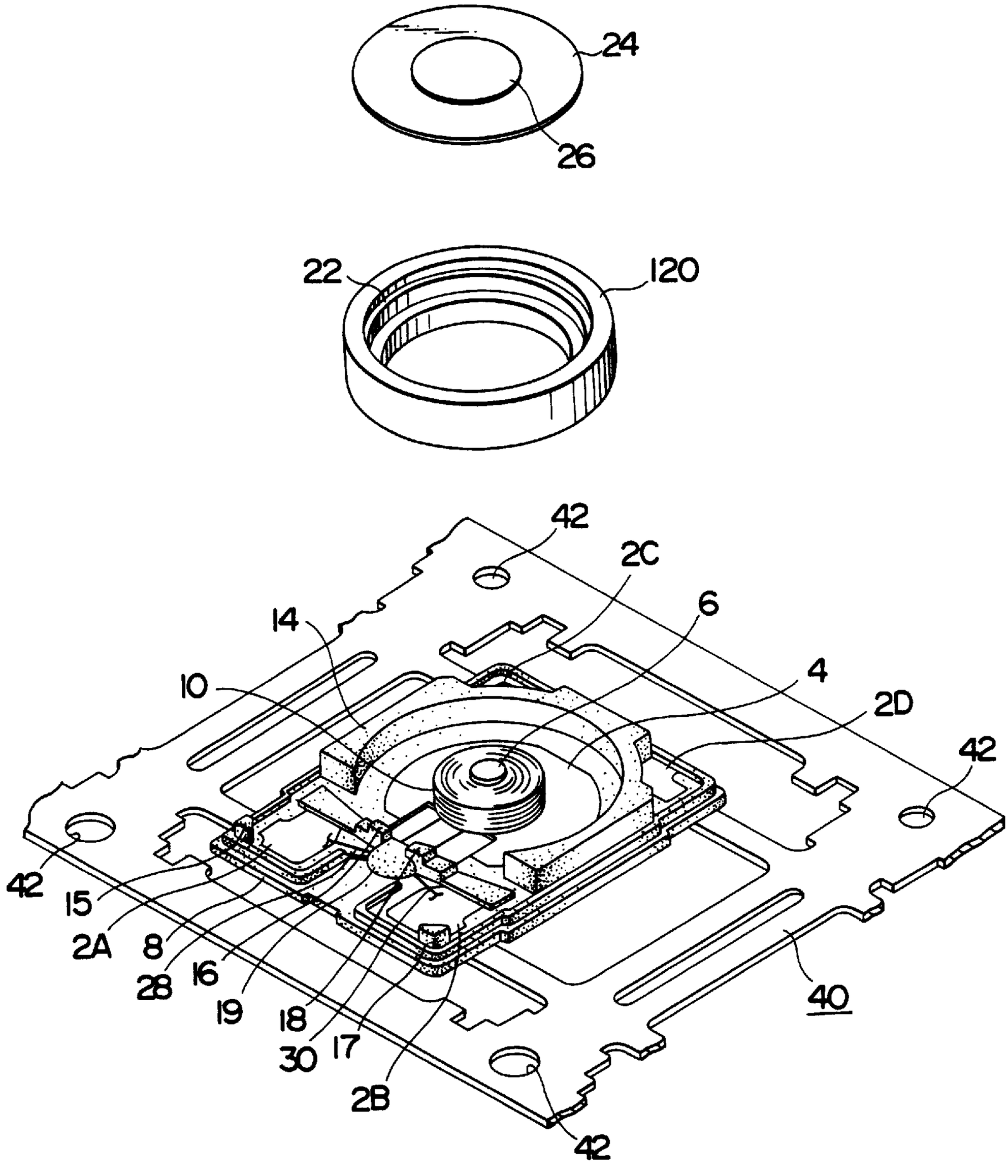


FIG. 15

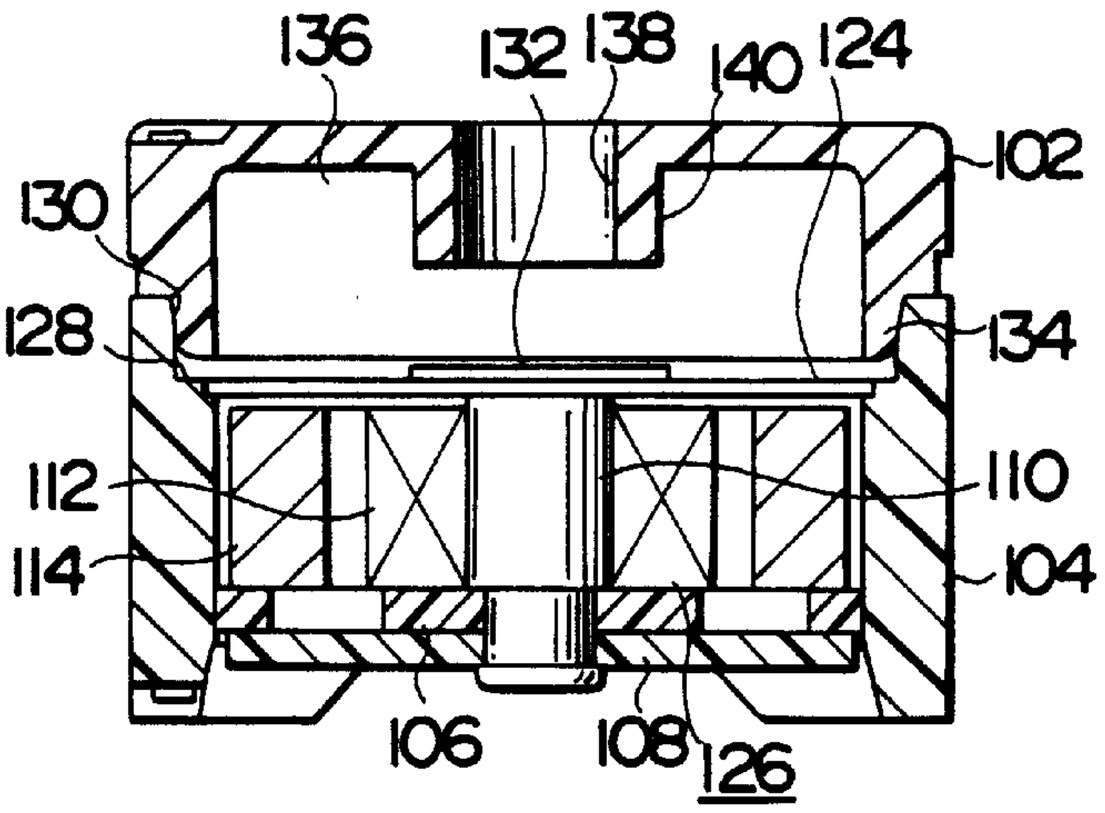


FIG. 16
PRIOR ART

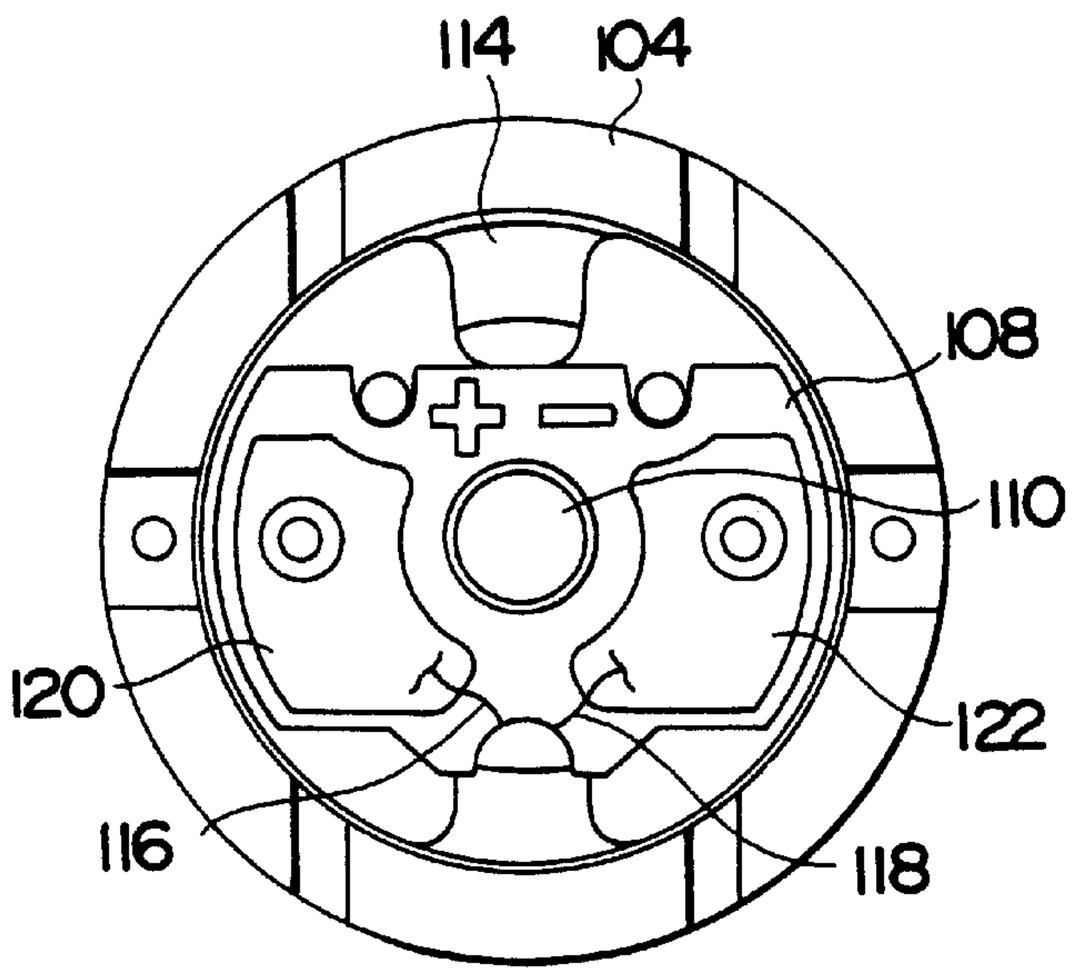


FIG. 17
PRIOR ART

METHOD OF FABRICATING AN ELECTROACOUSTIC TRANSDUCER

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a method of fabricating an electroacoustic transducer for converting electric input signals into sound.

2. Description of the Prior Art

Electroacoustic transducers are employed in various miniature electronic devices, such as card-shaped portable pagers. Miniaturization of electroacoustic transducers to be incorporated into such miniature electronic devices has been requested and efforts have been made for the further miniaturization of the component parts of electroacoustic transducers.

FIGS. **16** and **17** show an example of a conventional electroacoustic transducer. The construction of and a method of fabricating this conventional electroacoustic transducer will be described. A cylindrical upper case **102** and a cylindrical lower case **104** are formed individually of a synthetic resin by molding. A yoke **106** is attached to the lower side of the lower case **104** and a base plate **108** is attached to the lower surface of the yoke **106**. A core **110** has a lower end fixedly inserted in a hole formed coaxially through the yoke **106** and the base plate **108** so that the former is caulked by and integrated with the later. A coil **112** which is wound previously around a bobbin, etc. is mounted on the core **110**, and an annular magnet **114** is disposed so as to surround the coil **112**. Leads **116** and **118** of the coin **112** extend outside from the back side of the base plate **108** and are soldered to electrodes **120** and **122** formed on the base plate **108**, respectively. The yoke **106**, the core **110** and the magnet **114** form an electromagnetic transducing portion **126** for driving a diaphragm **124**.

The lower case **104** has a supporting stepped portion **128** near the upper open end thereof on the inner surface thereof, and a large diameter portion **130** formed at the upper open end of the lower case **104** to form the supporting stepped portion **128**. The diaphragm **124** is seated on the supporting stepped portion **128**. A circular magnetic piece **132** is attached to the central portion of the diaphragm **124** to increase the vibrating mass of the diaphragm **124**.

An engaging portion **134** of the upper case **102** is fitted in the large diameter portion **130** of the lower case **104**, and the upper case **102** and the lower case **104** are joined together in an integral unit by joining means, such as ultrasonic welding. Thus, a resonance space **136** that resonates with the vibration of the diaphragm **124** is formed in the upper case **102** to produce an appropriate sound pressure. A sound emitting cylinder **140** coaxially having a through hole **138** projects into the resonance space **136** from the inner surface of the top wall of the upper case **102**.

This electroacoustic transducer has a basic construction for converting electric input signals into sound and comprises a comparatively large number of independent component parts. Accordingly, the electroacoustic transducer must be assembled very carefully which obstructs an automatic assembly thereof because the characteristics of the electroacoustic transducer including a sound output characteristic are greatly dependent on the accuracy of alignment of the component parts, particularly that of alignment of the diaphragm **124** and the magnet **114**.

In assembly of component parts of such an electroacoustic transducer, when the component parts are mounted on the lower case **104**, such mounting is carried out in a state where the lower case **104** is positioned as illustrated in FIG. **16**, namely, the open end thereof is directed upward, and also such mounting is carried out in a state where the lower case **104** is reversed, namely, the open end thereof is directed downward. That is, the lower case **104** need be reversed in each step in such a way that firstly the yoke **106** and the base plate **108** are attached to the lower case **104**, secondly the magnet **114** is attached to the lower case **104** while the lower case **104** is reversed. Thirdly the adhesive is applied to the attached portions of the yoke **106**, the base plate **108** and the magnet **114** while the lower case **104** is again reversed, fourthly the diaphragm **124** is seated on the lower case **104** and the upper case **102** is fitted in the lower case **104** while the lower case **104** is further reversed, and finally the upper case **102** and the lower case **104** are joined together by the ultrasonic welding. Such a mechanical reversal of the lower case enhances accuracy of assembly and accomplishes uniform quality. However, this makes the makes process jigs and process steps complex.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a method of fabricating an electroacoustic transducer capable of simplifying an assembling step on a lead frame and realizing an automatic assembling work. The method comprises steps of forming pole piece portions **(4)**, forming a lead frame **(40)** having a plurality of base forming areas thereon, each of the areas having lead terminals **(2**A, **2**B, **2**C, **2**D) formed therein, forming bases **(8)** of a synthetic resin on the lead frame **(40)** by molding so that the pole piece portions **(4)** are embedded in the bases **(8)**, mounting a coil **(10)** on the pole piece portions **(4)** embedded in the bases **(8)**, disposing a support ring **(20)** and a magnet **(12)** so as to surround the coil **(10)**, and placing a diaphragm **(24)** on the support ring **(20)** to be held thereby, connecting opposite ends **(28, 30)** of the coil **(10)** to the lead terminals **(2**A, **2**B, **2**C, **2**D), cutting off the lead terminals **(2**A, **2**B, **2**C, **2**D) from the lead frame **(40)**, putting cases **(32)** on and fixedly joining the same to the bases **(8)**, and subjecting the cut lead terminals **(2**A, **2**B, **2**C, **2**D) to a forming process.

In the method of fabricating the electroacoustic transducer, the lead terminals may be cut off from the lead frame to be subjected to a forming process after the cases are put on and fixedly joined to the bases on the lead frame.

Further, in the method of fabricating the electroacoustic transducer, the coil may be formed as an individual air-core coil in an additional step or directly winding a wire around a pole portion or core of the pole piece portion embedded in the base on the lead frame.

A magnet **(120)** may be integrated with the support ring **(20)** so that the support ring **(20)** and the magnet **(12)** constitute a single component.

Still further, in the method of fabricating the electroacoustic transducer, the pole piece portion is provided with a yoke and a core wherein the yoke and the core are integrally formed as a single component or they are formed separately and then integrated with each other.

A plurality of areas for forming electroacoustic transducer bases thereon are provided on the lead frame, and lead terminals required by the electroacoustic transducers are

formed with respect to each area. Bases are formed of a synthetic resin on the lead frame by molding and each pole piece portion is embedded in each base in the molding process. After each coil is mounted on each pole piece portion, the support ring and the magnet is disposed so as to surround the coil and a diaphragm is placed on each support ring to be held thereby. The support rings hold the diaphragms by a magnetic force of the magnets. Opposite ends of each coil are connected to each pair of lead terminals. The lead terminals are cut off from the lead frame and the cases are put on and fixedly joined to the bases. The cut lead terminals are subjected to the forming process to complete the electroacoustic transducers.

In the method of fabricating the electroacoustic transducer, joining of the cases to the bases may be carried out on the lead frame. In this case, the cases are put on and fixedly joined to the bases on the lead frame before the lead terminals are cut off from the lead frame. Thereafter, the lead terminals are cut off from the lead frame to be subjected to the forming process to complete the electroacoustic transducer. That is, in such a fabricating method, a continuous operation of assembling process can be performed on the lead frame.

Further, in case the method of fabricating the electroacoustic transducer employs a coil formed by winding a wire as an individual air-core coil in advance, such a coil may be merely mounted on a pole portion or core of the pole piece portion on the lead frame, which reduces an assembling time. Still further, when the coil is wound around the pole portion or core of the pole piece portion on the lead frame, the coil can be formed on the lead frame so that the continuous operation of the assembling process including the winding process of the coil can be realized.

Still more further, as shown in FIG. **15**, if the magnet is formed in the shape of the support ring, the support ring can be made of the magnet. That is, the support ring and the magnet can integrally constitute a single component, which reduces the number of components and dimensional error caused by two components.

The above and other objects, features and advantages of the present invention will become more apparent from the following description taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a longitudinal sectional view of an electroacoustic transducer fabricated by a method of fabrication in accordance with a first embodiment according to the present invention;

FIG. **2** is a sectional plan view taken on line **2**—**2** in FIG. **1**;

FIG. **3** is a fragmentary plan view of a lead frame employed in fabricating the electroacoustic transducer of FIG. **1**;

FIG. **4**A is a sectional view taken on line **4**A—**4**A in FIG. **3**;

FIG. **4**B is a sectional view taken on line **4**B—**4**B in FIG. **3**;

FIG. **5**A is a plan view of a pole piece portion;

FIG. **5**B is a sectional view taken on line **5**B—**5**B in FIG. **5**A;

FIG. **6** is a plan view of the partially fabricated electroacoustic transducers of FIG. **1** in a step of forming bases on the lead frame of FIG. **3**;

FIG. **7** is a rear view of the partially fabricated electroacoustic transducers of FIG. **1** in a step of forming bases on die lead fame of FIG. **3**;

FIG. **8** is a perspective view of the partially fabricated electroacoustic transducer of FIG. **1** upon completion of a step of forming the base on the lead frame of FIG. **3**;

FIG. **9** is an exploded perspective view of the partially fabricated electroacoustic transducer of FIG. **1** in a step of mounting a magnet, a support ring and a diaphragm on the base formed on the lead frame of FIG. **3**;

FIG. **10** is a plan view of the partially fabricated electroacoustic transducers of FIG. **1** after a step of mounting a magnet, a support ring and a diaphragm on the bases formed on the lead frame of FIG. **3**;

FIG. **11** is a cross-sectional view of the partially fabricated electroacoustic transducer of FIG. **10** taken on lines **11**—**11** in FIG. **10** during a step of assembling the magnet, the support ring and the diaphragm on the base;

FIG. **12** is a perspective view of the partially fabricated electroacoustic transducer of FIG. **1** in a step of mounting a case on the base formed on the lead frame of FIG. **3**;

FIG. **13** is a perspective view of the electroacoustic transducer of FIG. **1** formed on the lead frame of FIG. **3**;

FIG. **14** is a perspective view of the electroacoustic transducer of FIG. **1** cut off from the lead frame of FIG. **3**;

FIG. **15** is an exploded perspective view of an electroacoustic transducer fabricated by a method in accordance with a second embodiment according to the present invention;

FIG. **16** is a longitudinal sectional view of a conventional electroacoustic transducer; and

FIG. **17** is a bottom view of the electroacoustic transducer of FIG. **16**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will be described in detail now with reference to the attached drawings.

FIGS. **1** and **2** show an electroacoustic transducer fabricated in accordance with a first embodiment of the present invention. Lead terminals **2**A, **2**B, **2**C and **2**D are integrally formed of a lead frame **40**. A pole piece portion **4** consists of a plate-shaped yoke **5** and a core **6** attached to the yoke **5**. The lead terminals **2**A, **2**B, **2**C and **2**D and the pole piece portion **4** are embedded in a base **8** formed of a synthetic resin in the shape of a rectangular flat plate.

A coil **10** is wound around the core **6**, and an annular magnet **12** is disposed so as to surround the coil **10**. The magnet **12** and the pole piece portion **4** are magnetically coupled to form a magnetic path. The coil **10** formed of an air-core one is mounted on the core **6** or directly wound around the core **6**.

The base **8** is provided on its upper surface with positioning protrusions **14**, **15**, **16**, **17** and **18**. A support ring **20** is positioned inside the positioning protrusions **14**, **16** and **18** on the base **8**. The support ring **20** has a stepped portion **22** on its inner surface at a position near the upper end thereof, and a diaphragm **24** is seated on the stepped portion **22** of the support ring **20**. A magnetic piece **26** is attached to the central portion of the diaphragm **24** to increase the vibrating mass of the diaphragm **24**.

Opposite ends **28** and **30** of the coil **10** are pulled outside along the lower surface of the magnet **12** and via a space between the positioning protrusions **16** and **18**, and soldered to the lead terminals **2**A and **2**B, respectively.

A case **32** is positioned in place on the base **8** by the positioning protrusions **14**, **15** and **17**, and the case **32** is fixed to the base **8** by a fixing means, such as ultrasonic welding. The case **32** formed of synthetic resin defines a resonance space **34** extending over the surface of the diaphragm **24** and around the support ring **20**. The case **32** is provided on one side wall thereof with a sound emitting cylinder **36** by means of which the resonance space **34** communicates with the atmosphere.

In such an electroacoustic transducer, the pole piece portion **4** having the core **6** and combined with the base **8** by insert molding, the coil **10** and the magnet **12** constitute an electromagnetic transducing portion **38**. When an ac signal is applied across the lead terminals **2**A and **2**B, the coil **10** is excited and creates an alternating magnetic field between the core **6** and the diaphragm **24** provided with the magnetic piece **26**. Consequently, the diaphragm **24** vibrates to generate sound, the resonant space **34** resonates and the sound is radiated outside the case **32** through the sound emitting cylinder **36**. The resonation of the resonant space **34** causes the base **8** and the case **32** to vibrate and generate sounds.

Since the lead terminals **2**A and **2**B are famed of the lead frame, the electracoustic transducer comprises a comparatively small number of component parts, can be efficiently assembled by a reduced number of assembling steps, and can be formed in a flat compact construction. The support ring **20** is formed of a metal, such as brass, separately from the base **8**, which enhances the accuracy of the support ring **20**, moderates demand for the molding accuracy of the base **8**, and improves the yield of the electroacoustic transducer fabricating process.

The method of fabricating the electroacoustic transducer will be described in sequential fabricating steps with reference to FIGS. **3** to **14**.

a. L Lead Frame Forming Step

Referring to FIG. **3** showing an example of the lead frame **40**, the lead frame **40** is formed like a strip and is coated with solder. The lead frame **40** has opposite side bars provided with locating holes **42**. As shown in FIGS. **4**A and **4**B, the lead terminals **2**A, **2**B, **2**C and **2**D are formed so as to slightly protrude by a step **44** from a plane including the side bars. The lead frame **40** as shown in FIG. **3** need not be formed by a single forming cycle but may be formed by a plurality of forming cycles in which the lead frame **40** is located by means of the locating holes **42**.

b. Pole Piece Portion Forming Step

Referring to FIG. **5** showing an example of the pole piece portion **4**, the pole piece portion **4** consists of the yoke **5** having a notched portion **7** on a circular material and the core **6** attached to the yoke **5** by caulking the core **6** by the yoke **5**. The core **6** is columnar and is small in diameter at its press fit portion **9**. A circular protrusion **11** is formed on the lower surface of the yoke **5**.

c. Base Forming Step

Referring to FIGS. **6**, **7** and **8** showing a molding process of the bases **8** on the lead frame **40**, a plurality of bases **8** are feed of synthetic resin on the lead frame **40** by molding. FIGS. **6** and **8** show the top side of the lead frame, and FIG. **7** shows the rear side. In the molding, the lead frame **40** and the pole piece portions **4** are held in a mold, and a molten synthetic resin is poured into the mold to form the bases **8** over the pole piece portion **4** and the lead terminals **2**A, **2**B, **2**C and **2**D so that the upper surface of the pole piece portion **4**, and the upper portions of the lead terminals **2**A, **2**B, **2**C and **2**D to be subjected to soldering are exposed on the bases **8**.

d. Support Ring, Magnet and Diaphragm Mounting Step

Referring to FIG. **9**, after the coil **10** is mounted on the core **6** of the pole piece portion **4** embedded in the bases **8** on the lead frame **40** while the support ring **20**, the magnet **12** and the diaphragm **24** are formed in advance, the support ring **20** is fitted in a space of the base **8** and is attached adhesively to the base **8**. The magnet **12** is fitted in the support ring **20**, and then the diaphragm **24** is placed on the support ring **20**.

e. Coil Ends Processing Step

As shown in FIG. **10**, opposite ends **28** and **30** of each coil **10** mounted on the core **6** of the pole piece portion **4** are pulled outside via the space between the positioning protrusions **16** and **18**, and then caught by protrusions **15** and **17** so that they are extended in the direction perpendicular to the lead frame **40** and held under an appropriate tension, and finally they are soldered to the terminals **2**A and **2**B, respectively. When an adhesive means, e.g. silicon adhesive is applied to a gap defined between the protrusions **16** and **18**, the opposite ends **28** and **30** of the coil **10** are protected and a groove **50** (FIGS. **1** and **8**) is sealed. FIG. **11** is a cross-sectional view taken on lines **11**—**11** in FIG. **10**, showing a state of completion of processing of the opposite ends **28** and **30** of the coil **10**.

f. Case Joining Step

The case **32** is formed of a synthetic resin by molding and it is disposed on the base **8** formed on the lead frame **40** as shown in FIG. **12**. As shown in FIG. **13**, the base **8** and the case **32** are jointed to each other by ultrasonic welding. The case **32** may be attached adhesively to the base **8** with an adhesive. With such a joining step, a plurality of such electroacoustic transducers are assembled on the lead frame **40**.

g. Lead Frame Cutting Step

After the lead terminals **2**A, **2**B, **2**C and **2**D are cut off from the lead frame **40**, the lead terminals **2**A, **2**B, **2**C and **2**D are subjected to a forming process as shown in FIG. **14** to complete the electroacoustic transducer.

Since the lead terminals **2**A to **2**D are integrally molded on the lead fame **40** and the base **8** is also molded to embed the pole piece portion **4** therein, the number of component parts that need to be assembled can be reduced. Further, since all the processes can be carried out on the lead frame **40**, it is not necessary to reverse the lower case every assembling step which has been made in the conventional method of fabricating the electroacoustic transducer, and hence the electroacoustic transducer can be easily assembled by simple assembling work.

Although the core **6** is mounted on the coil **10** in the first embodiment, the coil **10** can be directly wound around the core **6**.

Although the support ring **20** and the magnet **12** are formed separately in the first embodiment, a magnet **120** constituting a support ring may be formed of a plastic magnet or a metal magnet or the like as shown in FIG. **15**. The magnet **120** has the stepped portion **22** like the support

ring **20** so as to place the diaphragm **24** thereon. If the magnet **120** serving as the support ring **20** is used, it is possible to constitute the magnet **12** and support ring **20** as mentioned in the first embodiment by a single component, which reduces dimensional error caused by two components and enhances accuracy of the product.

The present invention has the following effects as mentioned above.

a. Since the bases are formed on the lead frame by molding and the pole piece portions can be integrated with the bases by the same molding, it is possible to perform continuous operation starting from mounting to assembling of the component parts on the lead frame. Further, since the lead frame need not be reversed, the fabricating steps can be simplified and accuracy of assembly of the product can be enhanced.

b. Since the lead frame may be formed of a strip of material and intervals between products can be assured on the continuous lead frame, and the plural products can be subjected to an automatic assembling process when the lead frame is carried, fabricating time can be shortened, the number of carriage of the products by a pallet can be reduced, and working areas involved in assembling and molding processes can be reduced so as to enhance productivity of the electroacoustic transducer.

c. If the support ring is made of the magnet, the number of component parts can be reduced, the number of components and dimensional error caused by two components can be reduced, and further the accuracy of product can be enhanced.

Although the invention has been described in its preferred form with a certain degree of particularity, obviously many changes and variations are possible therein. It is therefore to be understood that the present invention may be practiced otherwise than as specifically described herein without departing from the scope and spirit thereof.

What is claimed is:

1. A method of fabricating an electroacoustic transducer for converting electric input signals into sound, said method comprising steps of:

forming pole piece portions;

forming a lead frame having a plurality of base forming areas thereon, each of said areas having lead terminals formed therein;

forming bases of a synthetic resin on said lead frame by molding so that said pole piece portions are embedded in said bases;

mounting a coil on each of said pole piece portions embedded in said bases, surrounding said coil with support ring and magnet sections, and placing a diaphragm on said support ring section to be held thereby;

connecting opposite ends of said coil to said lead terminals;

cutting off said lead terminals from said lead frame;

putting cases on and fixedly joining the same to said bases; and

subjecting said cut lead terminals to a forming process.

2. A method of fabricating an electroacoustic transducer for converting electric input signals into sound, said method comprising steps of:

forming pole piece portions;

forming a lead frame having a plurality of base forming areas thereon, each of said areas having lead terminals formed therein;

forming bases of a synthetic resin on said lead frame by molding so that said pole piece portions are embedded in said bases;

mounting a coil on each of said pole piece portions embedded in said bases, surrounding said coil with support ring and magnet sections, and placing a diaphragm on said support ring section to be held thereby;

connecting opposite ends of said coil to said lead terminals;

putting cases on and fixedly joining the same to said bases, said putting being carried out on said lead frame;

cutting off said lead terminals from said lead frame; and

subjecting said cut lead terminals to a forming process.

3. A method of fabricating an electroacoustic transducer according to claim **1** or **2**, wherein said coil is formed by winding a wire as an individual air-core coil or by directly winding a wire around a core of one of said pole piece portions embedded in said bases on said lead frame.

4. A method of fabricating an electroacoustic transducer according to claim **1** or **2**, wherein said support ring and magnet sections are integrally formed from a single magnetic member.

5. A method of fabricating an electroacoustic transducer according to claim **1** or **2**, wherein said support ring and magnet sections are separate units.

6. A method of fabricating an electroacoustic transducer comprising the steps of:

forming pole piece portions;

forming a lead frame having a plurality of base forming areas thereon, each of said areas having lead terminals formed therein;

forming bases of a synthetic resin on said lead frame so that said lead terminals and pole piece portions are embedded in said bases;

mounting a coil on each of said pole piece portions embedded in said bases;

disposing a diaphragm with a given interval between itself and said pole piece portions;

connecting opposite ends of said coil to said lead terminals; and

cutting off said lead terminals from said lead frame.

7. A method of fabricating an electroacoustic transducer comprising the steps of:

forming pole piece portions;

forming a lead frame having a plurality of base forming areas thereon, each of said areas having lead terminals formed therein;

forming bases of a synthetic resin on said lead frame so that said lead terminals and pole piece portions are embedded in said bases;

mounting a coil on each of said pole piece portions embedded in said bases;

disposing a diaphragm with a given interval between itself and said pole piece portions;

connecting opposite ends of said coil to said lead terminals;

putting cases on said bases formed on said lead frame; and

cutting off said lead terminals from said lead frame.

8. A method of fabricating an electroacoustic transducer according to claim 6, wherein said mounting of a coil is performed by mounting a wound coil or directly winding a wire around each of said pole piece portions on said lead frame.

9. A method of fabricating an electroacoustic transducer according to claim 7, wherein said mounting of a coil is performed by mounting a wound coil or directly winding a wire around each of said pole piece portions on said lead frame.

10. A method of fabricating an electroacoustic transducer according to claim 6, wherein a magnet is disposed around the periphery of the coil and the magnet supports the diaphragm.

11. A method of fabricating an electroacoustic transducer according to claim 7, wherein a magnet is disposed around the periphery of the coil and the magnet supports the diaphragm.

12. A method of fabricating an electroacoustic transducer according to claim 6, wherein a support ring is disposed around the periphery of the coil and the support ring supports the diaphragm.

13. A method of fabricating an electroacoustic transducer according to claim 7, wherein a support ring is disposed around the periphery of the coil and the support ring supports the diaphragm.

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