(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 249 758**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **87107218.7**

(51) Int. Cl.[4]: **H01H 50/02**

(22) Date of filing: **27.04.84**

A request for correction of page 7 of the originally filed description has been filed pursuant to Rule 88 EPC. A decision on the request will be taken during the proceedings before the Examining Division (Guidelines for Examination in the EPO, A-V, 2.2).

(30) Priority: **08.10.83 JP 188925/83**

(43) Date of publication of application:
23.12.87 Bulletin 87/52

(60) Publication number of the earlier application in accordance with Art.76 EPC: **0 124 109**

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI LU NL SE

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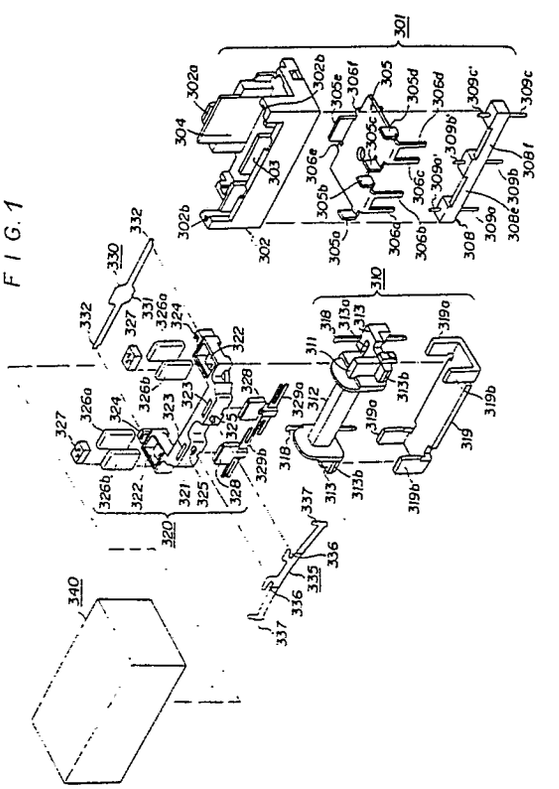
(54) Electromagnetic relay.

(57) An electromagnetic relay comprises a base (302) formed with an insertion socket and provided with an electroconductive coating, a terminal platform (308) having terminals (309a, 309b, 309c) mounted therein and fitted in said insertion socket; and a ground base board (305) fixed against said base (302) so as to pressingly hold said terminal platform (308) in said socket and so as to contact said electroconductive coating.

FIG. 1



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ELECTROMAGNETIC RELAY

The present invention relates to an electromagnetic relay.

Often shielding of the relay terminals is performed by providing a plated surface on the outside body of the relay from which the terminals protrude.

A problem that has arisen with such a plated surface on the relay is that it can occur that poor contact happens between the plated surface and the ground terminals which are providing grounding therefor. This is primarily because the joining area or cross section between such a thin film and a ground terminal protruding from the base is extremely limited in its extent.

Yet another important characteristic for such a relay is good sealability, which has in the prior art proved difficult to obtain as a result of inevitable inaccuracies of manufacture.

The present invention addresses these problems and is defined in claim 1.

According to such a construction, since the terminal platform is pressingly held into said insertion socket by the terminal platform, very good sealing characteristics are obtained. Further, since the ground base board contacts said electroconductive coating over a plane surface which typically has a large surface area, the grounding of said electroconductive coating is very good, and accordingly shielding of the relay is good and leakage of high frequency current is effectively prevented.

The present invention will now be shown and described with reference to a preferred embodiment thereof, and with reference to the illustrative drawings, which are all of them given purely for the purposes of explanation and exemplification only, and are not of them intended to be limitative of the scope of the present invention in any way.

Fig. 1 is an exploded perspective view showing the detailed construction of a preferred embodiment of the relay of the present invention;

Fig. 2 is an exploded perspective view of a base and a terminal platform of said preferred embodiment;

Fig. 3 is a sectional view of said base and said terminal platform;

Fig. 4 is a plan view of said preferred embodiment, and

Fig. 5 is a sectional view through said preferred embodiment, taken in a plane shown by the arrows XXVII - XXVII in Fig. 4.

and the stop/shield projections 107 were only made via the Cu-Ni plating on the surface of the base 103, in this fifth preferred embodiment these ground terminals 106 are constituted as downwards bent projections from a connecting body 113 which is made of a metal press formed plate and is fixed on the bottom of the base 103 and is located by projections 114 provided on the bottom surface of said base 103. With this connecting body 113 integrally connecting together the ground terminals 106 and also positively being pressed against and contacting the Cu-Ni plating on the bottom of the base 103 which is contacted with the stop/shield projections 107, the electrical connection between the ground terminals 106 and the stop/shield projections 107 is much more positively assured, and accordingly electrical integrity is improved.

Now, in Figs. 1 to 5, a sixth preferred embodiment of the relay of the present invention is shown. Referring to the exploded view of Fig. 1, this relay is substantially made up of a base assembly 301, an electromagnet assembly 310, an armature assembly 320, a pair of restoring springs 330 and 335, and an outer case 340.

The electromagnet assembly 310 comprises a spool 312 through the middle of which there is fitted an iron core 311 and on which there is wound a coil 317. The spool 312 is connected to a yoke member 319, which has two upward projecting pole pieces 319a and 319b at each of its ends which are positioned on the two sides of the corresponding projecting end of the iron core 311. In detail, the connection between the spool 312 and the yoke member 319 is accomplished by platform members 313 being fitted on either end of the spool 312 and by the upward projecting pole piecees 319a being fitted through slots 313a in the platform members 313 while the inside surfaces of the pole pieces 319b are contacted to the outer surfaces of side portions 313b of the platform members 313. And coil terminals 318, 318, are fixedly mounted in the platform members 313 and project downwards therefrom through appropriate holes in the base 312, not particularly shown.

The armature assembly 320 comprises a body portion 321 which is integrally molded from synthetic resin, and at each end of this body portion 321 there are mounted in frame portions 322 two plate pieces 326a and 326b and a permanent magnet 327 bridging between them so as to define a C-shape, and with the orientations of the permanent magnets 327, 327 opposite to one another as in said first embodiment. Further, insulated contact carrying members 328, 328 fitted into holes 323 formed in said body portion 321, and each of these contact carrying members 328 carries a pair of springy contact pieces 329a and 329b extending on both its sides. The armature assembly 320 is so disposed that, at each of its ends, the plate pieces

326a and 326b are inserted into the aforementioned gaps defined between the end of the iron core 3Il and the pole pieces 3I9a and 3I9b, with some movement remaining therebetween. And the armature assembly 320 is held in this position by two sheet springs 330 and 335 in such a fashion as to be movable transversely to and fro, against a restoring force provided by these sheet springs, through a certain distance in the directions A and A' (see Fig. 4).

The sheet spring 330 is fixed to the base 302 by its central portion 33I being fitted into a slot 305a formed in said base 302, and its end portions 332 are fitted into slots 324 formed in the body portion 32I of the armature assembly 320. On the other hand, the sheet spring 335 is fixed to the armature assembly 320 by hooked or notched shape portions 336 at its center portion (whose notch shape extends along the longitudinal direction of said sheet spring 335) being loosely fitted over corresponding projections 325 formed on the body portion 32I of said armature assembly 320, and its end portions 337, 337 are fitted into slots 305b formed in the base 302.

The particular part of this relay embodiment is the base assembly 30I, which will now be described.

This base assembly 30I comprises a base 302 integrally molded from synthetic resin and a terminal platform 308. The base 302 has a slot 303 formed therein, and the terminal platform 308 is fixedly secured in this slot 303 and has fixed terminals 309a, 309b, and 309c mounted in it. Upper contacts 309a', 309b', and 309c' of the terminals 309a, 309b, and 309c lie in the slot 303, and in this slot 303 there are provided ground contacts 302a' through 302f' on the walls of the slot 303 adjacent to each of the terminals 309a, 309b and 309c on either side thereof (see Fig. 4). And a grounding base board 305 is press formed out of copper plate, and has six integrally formed ground terminals 306a through 306f extending in the one direction therefrom (the direction out from the body of the relay) and five also integrally formed mounting lugs 305a through 305e extending in the other direction therefrom (into the body of the relay). The mountings lugs 305a through 305e are formed with notches 307a through 307e for positive engagement. On the lower surface of the base 302 there is deposited a thin electroconductive film of Cu-Ni or the like - of course, this electroconductive film does not touch the fixed terminals 309a, 309b, and 309c - and the grounding base board 305 is fixed to the lower side of the base 302 by being pressed against with the mounting lugs 305a through 305d slipping into and engaging positively (thanks to the notches 307a through 307e) with guide grooves 303a' through 303e' formed in the base 302. Thus the grounding base board 305 is in very good overall contact with the conducting coating film formed thereon for very good grounding. And the slot 303 in the base 302 is made up of slotlets 303e and 303f which communicate between larger sockets 303a, 303b, and 303c; these shapes are for receiving fatter portions of the terminal platform 308 which accomodate the terminals 309a through 309c and for receiving the thinner portions 308e and 308f of the terminal platform 308 joining these fatter portions.

The assembly process of this base assembly 30I will now be described. After the grounding base board 305 has been fitted to the base 302 as explained above by the mounting lugs 305a through 305e engaging with the guide grooves 303a' through 303e', then the terminal platform 308 is pushed into the slot 303, with the fatter terminal receiving portions thereof fitted into the socket shapes 303a, 303b, and 303c and with the thinner portions 308e and 308f fitted into the slotlets 303e and 303f, and with the side faces 308a through 308d defined on the terminal platform 308 (see Fig. 2) pushing strongly against the side inner surfaces of the socket shapes 303a, 303b, and 303c. Thereby a very good sealing structure is obtained. At this time, since the grounding base board 305 is very strongly and positively contacted against the conducting coating film formed on the outer surface of the base, 302, a very good ground is obtained, and there is no problem as there was with the prior art of poor and restricted contact between the ground terminals and the conducting coating for shielding.

In this preferred embodiment since the ground terminals 306a through 306d and the mounting lugs 305a through 305d are arranged on the opposite sides of the terminals 309a, 309b, and 309c, leakage of high frequency signals is well guarded against. And because the grounding base plate 305 is pressed hard against the base 302 and positively holds the terminal platform 308 in the slot 303 thereof, a very good sealing effect is obtained.

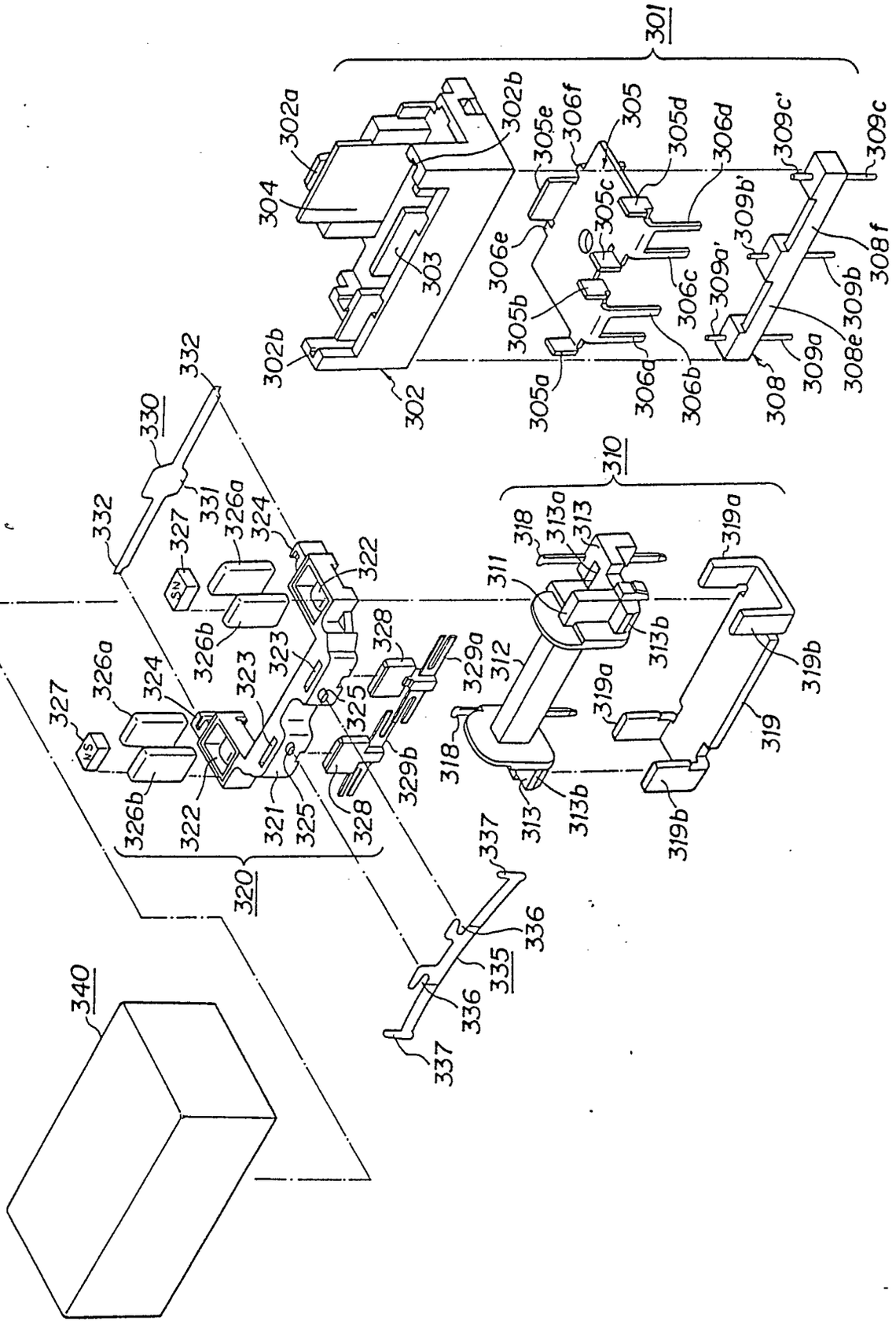
Claims

1. An electromagnetic relay, comprising a base (302) formed with an insertion socket and provided with an electroconductive coating, a terminal platform (308) having terminals (309a, 309b, 309c) mounted therein and fitted in said insertion socket, and a ground base board (305) fixed against said base (302) so as to pressingly hold said terminal platform (308) in said socket and so as to contact said electroconductive coating.

2. An electromagnetic relay according to claim 1, wherein said ground base board (305) is fixed against said base by mounting lugs (305a - 305d).

3. An electromagnetic relay according to claim 1 or 2, wherein said ground base board (305) is provided with at least one integrally grounding terminal (306a - 306f).

FIG. 1


301
302
302a
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308
308e
308f
309a
309b
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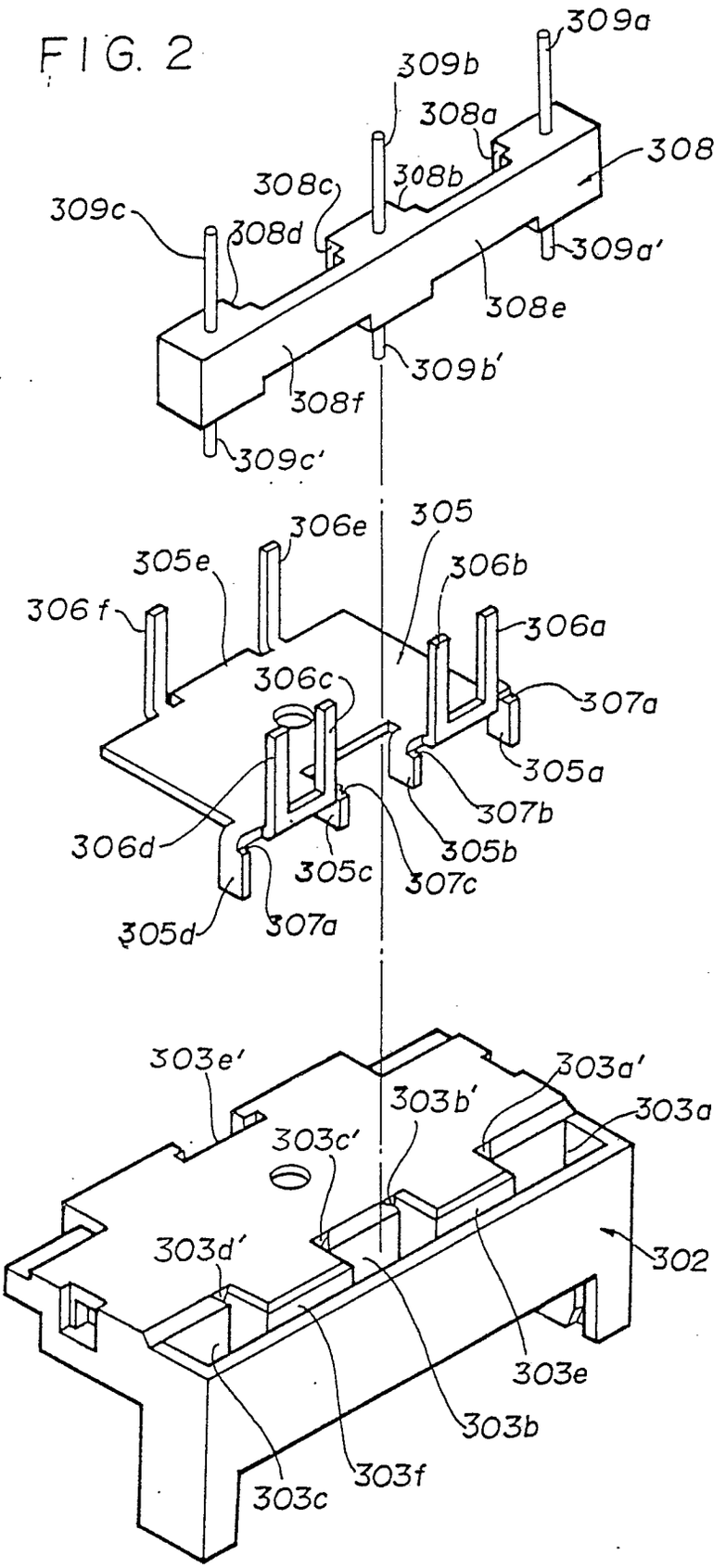
FIG. 2


309a
309b
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308
308c
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305e
306b
306 f
306a
306c
307a
305a
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306d
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FIG.3

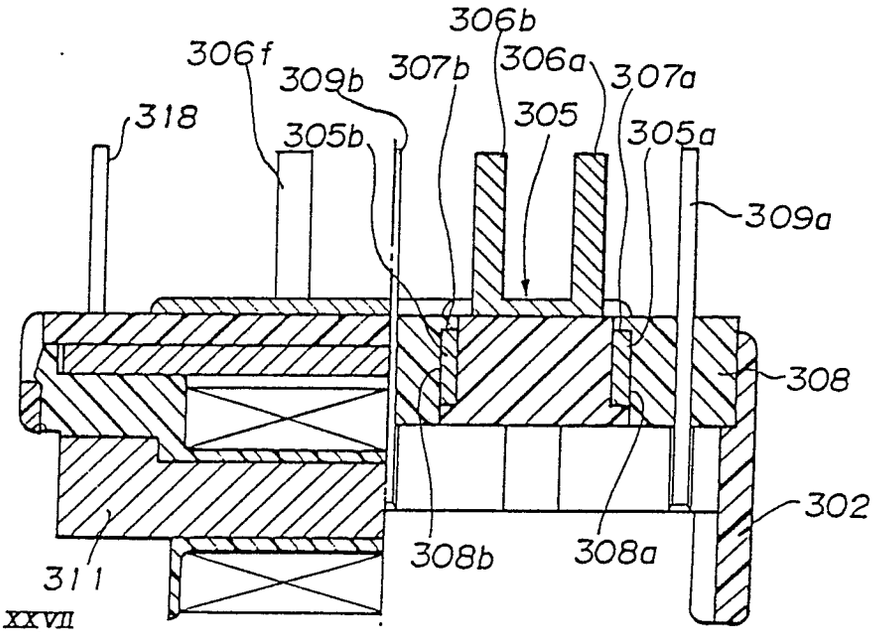

FIG.4

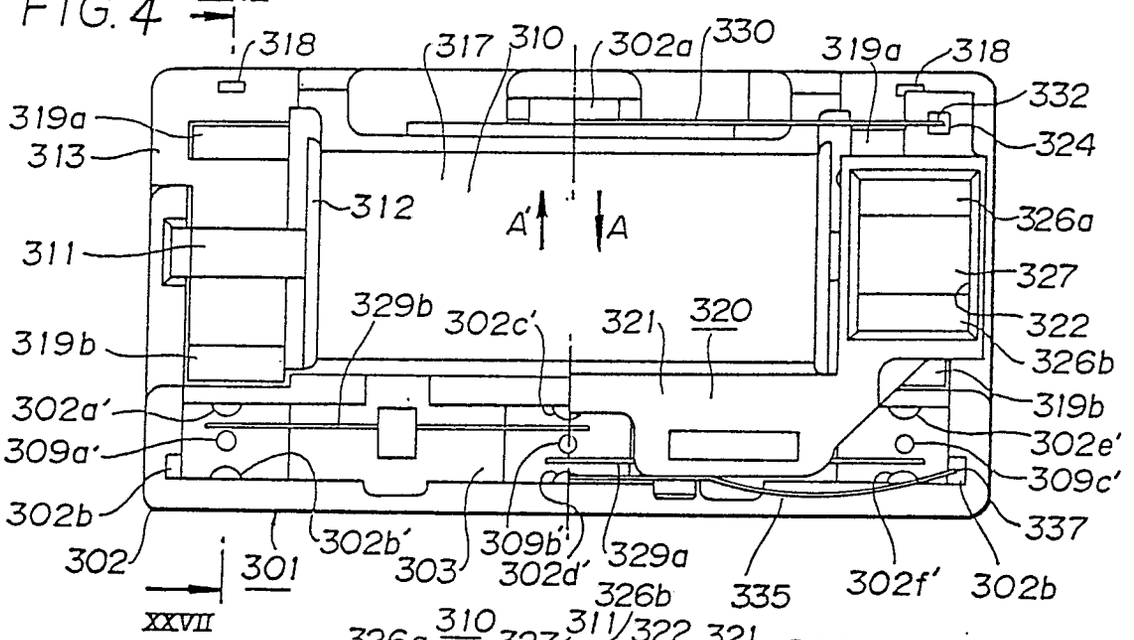

FIG.5