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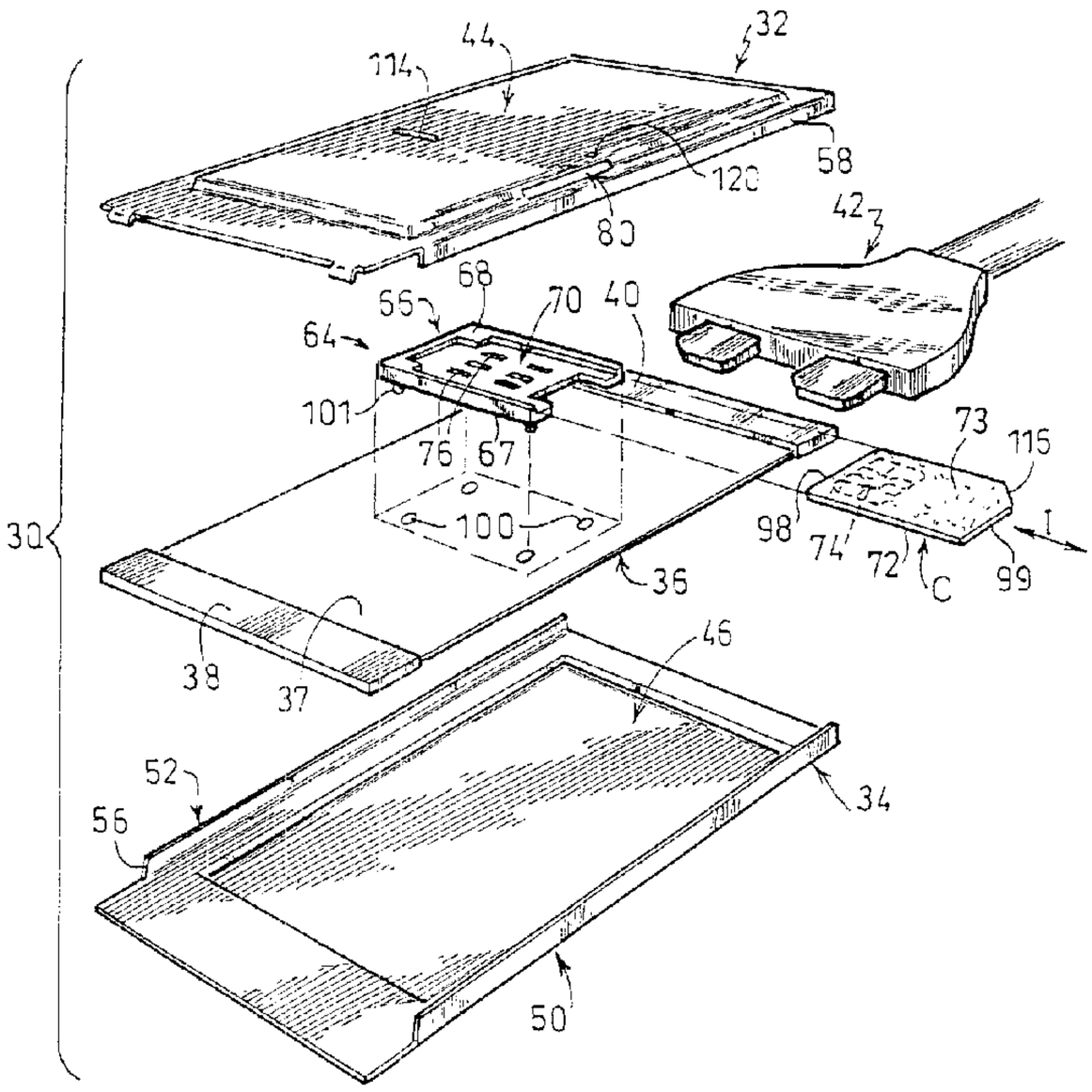

(57) Abrégé/Abstract:
The invention proposes an electronic connection unit (30), in particular for a personal computer, in the general form of a card of the type comprising a shell (32, 34) with upper (32) and lower (34) parallel and opposite plane main walls (44, 46) which, between them, delimit a cavity (48) inside which an intermediate board (36), in particular a printed-circuit board, is arranged which extends substantially halfway between the opposite inner faces (45, 47) of the main walls, and parallel to the latter, and of the type in which the unit (30) is associated with a connector (64) for connecting a contact card (C) with integrated circuit(s) which includes a support (66) made of insulating material to the unit, and of the type wherein the support (66) is arranged on the upper face (37) of the intermediate board (36), characterized in that the support (66) of the connector (64) includes means (101) for positioning it, which interact with complementary means (100) of the intermediate board (36).

ABSTRACT

"Electronic connection unit, for a personal computer, equipped with a connector for a smart card"

The invention proposes an electronic connection unit (30), in particular for a personal computer, in the general form of a card of the type comprising a shell (32, 34) with upper (32) and lower (34) parallel and opposite plane main walls (44, 46) which, between them, delimit a cavity (48) inside which an intermediate board (36), in particular a printed-circuit board, is arranged which extends substantially halfway between the opposite inner faces (45, 47) of the main walls, and parallel to the latter, and of the type in which the unit (30) is associated with a connector (64) for connecting a contact card (C) with integrated circuit(s) which includes a support (66) made of insulating material to the unit, and of the type wherein the support (66) is arranged on the upper face (37) of the intermediate board (36), characterized in that the support (66) of the connector (64) includes means (101) for positioning it, which interact with complementary means (100) of the intermediate board (36).

The present invention relates to an electronic connection unit, in particular for a personal computer.

The invention more particularly relates to a connection unit in the general form of a card which can be inserted into a complementarily shaped slot in the computer with a view to making one or more connections between, for example, the computer and peripherals.

In the case of its application to personal computers, an electronic connection unit of this type, also referred to as a "PC card" will henceforth be standardized in accordance with the PCMCIA ("Personal Computer Memory Card International Association") standard which relates, in particular, to the external dimensions of the connection unit, in order to make it possible to insert it into any personal computer which includes an insertion slot whose dimensions are complementary and correspond to the PCMCIA standard.

Thus, the electronic connection unit in the general form of a card is of the type including a metal shell which, in particular, may be made in two parts, with upper and lower parallel and opposite plane main walls which, between them, delimit a cavity which is open at its two opposite longitudinal ends and is transversely delimited by two opposite side walls, designed in the form of guide rails for the unit, inside which cavity an intermediate board, in particular a printed-circuit board, is arranged which extends substantially halfway between the opposite inner faces of the main walls, and parallel to the latter.

The intermediate printed-circuit board may carry various electronic components and, at its opposite longitudinal ends, linking connectors which emerge on either side in the open longitudinal ends of the unit, so

as to connect the latter to the computer, as regards the connector arranged at the unit's inner end which is inserted into the computer and, if appropriate, to another device or a communication line, as regards the other *connector*, arranged at the unit's outer longitudinal end which, for example, may receive a plug for connection to a telephone line.

For some applications, and for example to allow a personal computer user to access a telecommunications network, it has become necessary to be able to associate the electronic connection unit with a contact card with integrated circuit(s), also commonly referred to as a smart card, the latter including information in memory which are processed by the connection unit and the associated computer when the computer is connected to a telecommunications network.

This principle of authorizing access to a user owning a smart card is commonly applied in the field of radiotelephony, the smart card corresponding to one or other of the two dimensional standards, and most often to the miniature card, also referred to as a "MICRO SIM" card, which is particularly compact.

Connection of a smart card of this type to any particular electronic device for processing data which it contains is commonly carried out via a connector of known general design, which includes a support, made of insulating material, including an open housing in its upper face which receives the smart card including, on its main face, conductive zones which interact with the contact ends of electrical contact elements arranged in the bottom of the housing of the insulating support of the connector.

It has already been proposed to associate a connector of this type with a PCMCIA connection unit, but the designs known to date have the main drawback of significantly affecting the structure of the unit, thus unacceptably reducing its rigidity and the electronic screening characteristics which the metal shell must necessarily provide in order to protect the components internal to the electronic connection unit.

The object of the invention is to propose a novel design of an electronic connection unit of the type mentioned above, which allows a smart card to be associated with it without modifying the dimensional and structural characteristics of the standardized unit.

To this end, the invention proposes an electronic connection unit, of the type wherein the support is arranged on the upper face of the intermediate board, wherein the shell has a slot for insertion or extraction of the card into or from the unit in a direction substantially parallel to the plane of the card, and wherein when inserted in the unit, the card is arranged entirely inside the unit, characterized in that:

- the support of the connector includes means for positioning it, which interact with complementary means of the intermediate board.

According to other characteristics of the invention:

- the means for positioning the connector are complementarily shaped interaction means;

- the support of the connector includes at least one part forming a spacer, which extends through the intermediate board and the free lower end face of which is adjacent to the opposite inner face of the lower main wall;

- the part which forms a spacer extends through an opening, of complementarily shaped, in the intermediate board;

- it includes means for extracting the card from the unit, said extraction means including an extraction carriage, mounted so as to slide on the support of the connector between a card insertion position and an extraction position in which the card at least partly projects out of the unit, the extraction carriage includes an active front transverse edge which extends facing the rear transverse edge of the card, and means, accessible from outside the unit, are provided for controlling the sliding displacements of the carriage;

- the extraction carriage is returned elastically towards the card extraction position, and in that it is retained in the card insertion position by automatic locking means;

- the means for automatically locking the carriage include a retractable locking finger which is carried by the carriage and which, in the card insertion position, is received in an opposite hole in the upper main wall of the unit, towards which hole it is elastically returned;

- the means for automatically locking the carriage include a retractable locking bar which is carried by the support of the connector and normally extends in a position for locking the card in the inserted position, towards which it is elastically returned and in which the bar extends facing the transverse edge of the card;

- the locking bar normally extends facing the slot for inserting the card into the unit, and in that the locking bar includes a cam profile, with which the rear transverse edge of the card interacts when it is being

inserted, in order to cause retraction of the locking bar in a substantially vertical direction;

- means are provided for at least partially closing the slot for inserting the card into the unit;

- the closure means are elastically deformable means which, at rest, extend facing the insertion slot and which can be withdrawn automatically when the card is being inserted;

- the closure means are carried by the support of the connector;

- the closure means include a closure lip which is mounted so as to move vertically with respect to the support of the connector and includes a cam profile with which the rear transverse edge of the card interacts when it is being inserted, in order to cause retraction of the lip in a substantially vertical direction;

- the lip is a profiled strip, carried by the support of the connector via two elastically deformable arms which extend longitudinally along the parallel edges of the support;

- the closure lip belongs to a closure seal mounted in a recess formed in the upper face of the support of the connector;

- on its inner face, the upper main wall includes a protuberance which, when the card is in the inserted position, extends facing a portion of the front transverse edge of the card in order to prevent any accidental ejection of this card from the unit;

- the bottom of the housing for the card includes a ramp which causes the front transverse edge of the card to be raised during the movement for extracting it from the unit.

Other characteristics and advantages of the invention will emerge on reading the following detailed description, in order to understand which, reference will be made to the appended drawings, in which,

- Figure 1 is an exploded perspective view of the main components of a connection unit produced in accordance with the teachings of the invention;

- Figure 2 is a perspective detail view of the unit illustrated in Figure 1, which illustrates, on a larger scale, the arrangement of the slot for inserting the card into the unit;

- Figure 3 is a plan view of a first embodiment of a smart card connector, intended to be integrated in a connection unit;

- Figure 4 is a side view along the arrow F4 in Figure 3;

- Figure 5 is a side view along the arrow F5 in Figure 3;

- Figure 6 is a plan view of the connection unit, with partial cut-away, which illustrates the installation of the connector on the printed-circuit board, in proximity to the card insertion slot;

- Figure 7 is a view in partial section along the line 7-7 in Figure 6;

- Figure 8 is a similar view to the one in Figure 3, which illustrates a second embodiment of the connector which, in this case, is equipped with a first alternative embodiment of the card extraction carriage, and on which the carriage and the card are shown in solid lines in the card insertion position and in stippled lines in the partial card extraction position;

- Figures 9 and 10 are similar views to the ones in

Figures 4 and 5, along the arrows F9 and F10 in Figure 8;

- Figure 11 is a similar view to the one in Figure 8, which illustrates a third embodiment of the connector which, in this case, is equipped with a second alternative embodiment of the card extraction carriage, and on which the carriage and the card are shown in stippled lines in the card insertion position;

- Figure 11A is a perspective view along the arrow F11A in Figure 11, which illustrates the design of the extraction carriage on a larger scale;

- Figure 12 is a perspective view of a fourth embodiment of the support, made of insulating material, of the connector intended to be equipped with the slot closure means illustrated in Figure 13;

- Figure 13 is a perspective view of the closure device intended to be fitted to the connector whose insulator is represented in Figure 12;

- Figure 14 is a similar view to the one in Figure 6, which illustrates the connector and the closure device which are represented in Figures 12 and 13, with the card in the inserted position;

- Figure 15 is a similar view to the one in Figure 7, in partial section along the line 15-15 in Figure 14;

- Figure 16 is a similar view to the one in Figure 15, without the card;

- Figures 17 and 18 are similar views to the ones in Figures 15 and 16, which illustrate an alternative embodiment of the closure device which also fulfills the function of a device for locking the card in the position in which it is inserted into the unit;

- Figure 19 is a similar view to the one in Figure

18, which illustrates an alternative embodiment of the locking and closure device illustrated in Figure 18, in association with an alternative embodiment of the automatic extraction carriage illustrated in Figure 11;

- Figure 20 is a similar view to the one in Figure 18, which illustrates an alternative embodiment of the means for locking the card and the carriage in the card insertion position;

- Figure 21 is a view along the line 21-21 in Figure 20:

- Figure 22 is a similar view to the one in Figure 15, which illustrates another alternative embodiment of the slot closure means, in the form of a flexible closure seal;

- Figure 23 is a similar view to the one in Figure 22, which illustrates the closure seal when the card is in the position in which it is inserted into the connection unit;

- Figure 24 is a plan view of the connector illustrated in Figures 22 and 23, which illustrates the arrangement of the closure seal in the front part of the connector.

Figure 1 represents a connection unit 30, of known general design, which essentially consists of a metal shell including an upper half-shell 32 and a lower half-shell 34, each of which is a piece of cut, stamped and folded sheet metal.

The shapes and the dimensions of the shell, in two parts 32, 34, are in accordance with the PCMCIA standard which, further to its dimensions, also determines the

design details of the shell so as to allow it to be inserted into a complementarily shaped standardized slot (not shown) belonging, for example, to a personal computer.

A printed-circuit board 36 is arranged inside the unit 30, between the half-shells 32 and 34, and extends parallel to the general plane of the unit and, at each of its opposite longitudinal ends, carries connectors 38, 40, illustrated schematically in Figure 1, it being possible for one or other of the connectors, depending on the applications, to be replaced by an element of the same size which constitutes a plug for closing the unit 30 at its corresponding longitudinal end.

The printed-circuit board, which constitutes the intermediate board of the unit, can receive electronic components (not shown) on its two faces.

As represented in Figure 1, one of the connectors 40 may, for example, be designed to allow wiring of a plug 42 which connects the unit 30, for example, to a telecommunication line.

The upper half-shell 32 delimits a plane upper main wall 44 which, in cooperation with the plane lower main wall 46 of the lower half-shell 34, delimits an internal cavity 48 (see Figure 2) inside which the printed-circuit board 36 extends, parallel to the walls 44 and 46 and substantially halfway between the opposite inner faces 45 and 47 of the walls 44 and 46.

According to the standardized design of the unit 30, it is delimited transversely by two opposite side walls 50 and 52, which are parallel to the general longitudinal direction of the unit 30 and which here consist of folded

vertical edges 54 and 56 of the lower half-shell 34, which are crimped around the opposite side edges of the upper half-shell 32, one 58 of which is illustrated in Figure 1.

Without departing from the scope of the invention, the unit 30 may be produced with a one-piece shell.

The side walls 50 and 52 of the connection unit 30 are designed in the form of rails for guiding the unit 30 in corresponding slideways (not shown) belonging to the standardized slot intended to receive the unit 30.

To this end, the side end portions of the upper 32 and lower 34 half-shells are deformed 60, 62 to give the side walls 50 and 52 a height which is less than the overall height of the unit 30, that is to say its thickness in its central part.

A connector 64 intended to receive a contact card C with integrated circuit(s), of the "MICRO SIM' type, is arranged inside the unit 30.

According to a known design which is, for example, described and represented in French Patent Application No. 95.14767, the connector 64 essentially consists of a support 66, made of insulating material, which, in its upper face 68, delimits a housing 70 whose shape is complementary with that of the card C and which is intended at least partly to receive the latter whose lower face 72 includes conductive zones 74 which, when the card C is in the position in which it is inserted into the housing 70, are in contact with contact ends 76 belonging to contact blades 78 of the connector.

According to this embodiment of the invention, the connector 66 is intended to be mounted with the lower face 67 of the insulator 66 bearing on the upper face 37 of the

printed-circuit board 36.

Once the unit 30 is assembled and closed with the connector 64 carried by the printed-circuit board 10, and in order to allow insertion or extraction of the card C into or from the connector 64, a slot 80 is provided which, in the preferred embodiment illustrated in the figures, is arranged in the vicinity of one of the side walls 50 of the connection unit 30.

More particularly, and as can be seen in detail in Figure 2, the insertion slot 80 extends essentially in the inclined portion 82 of the side part of the upper half-shell 32 which joins the upper main wall 44 to the fold 60 extending in the plane portion 84 corresponding to the reduced-thickness side portion of the unit 30.

The portion 84' of the said part 84, which extends in line with the slot 80 cut out from the inclined part 82, is slightly deformed vertically downwards with respect to the general plane of the part 84.

The insertion slot 80 is thus delimited by two upper main edges 86 and 88 and by two end edges 90 and 92.

In this preferred design of the slot 80, it does not extend in the main upper wall 44 and its width, measured in the general longitudinal direction of the unit, is slightly greater than the width of the card C, so as to allow insertion and extraction of the latter in a direction I which is transverse with respect to the general longitudinal direction of the unit.

As represented in detail in Figures 3 to 5, the housing 70 of the connector 64, intended to receive the card C, is delimited by two opposite edges 92 and 94 which are parallel to the insertion direction I and, to the

rear, on the left as regards Figure 3, by a rear transverse edge 96 which, when the card C is in the position in which it is inserted into the housing 70, constitutes a stop for the rear transverse edge 98 of the card C.

At its other front end, on the right as regards Figure 3, the housing 70 is open so as to allow insertion and extraction of the card C into and from the housing 70 by sliding it in the direction I parallel to the general plane of the card C, the height of the housing 70 being slightly greater than the thickness of the card C.

In this embodiment of the connector 64, it includes, on its lower face 67, four feet 101 in the form of cylindrical studs which are intended, on the one hand, to position and fix the connector 64 on the printed-circuit board 36 which, to this end, includes corresponding holes 100 through which the feet 101 extend and, on the other hand, to allow the connector 64 to fulfil a spacer function between the upper 44 and lower 46 main boards of the unit 30, in order to prevent accidental crushing of the unit 30.

To this end, and as can be seen in particular in Figure 7, the height of the feet 101, which are in the form of cylindrical studs and form a spacer, is such that the lower end face 102 of each foot 101 is in contact with the inner face 47 of the lower wall 46, while the plane upper face 68 of the insulating support 66 of the connector 64 bears against the opposite inner face 45 of the upper wall 44.

As can be seen in Figure 3, the design of the connector 64, which includes a recess 110 formed in its

front edge 112, and its positioning on the printed-circuit card 36, with respect to the slot 80, are such that the connection ends of the contact blades 78 are set-back with respect to the axis region constituted by the slot 80, thus avoiding any risk of accidental short-circuit should a metallic object be inserted into the slot 80.

As can also be seen in Figures 6 and 7, when the card C is in the position in which it is inserted into the unit, and thus in the connection position of the housing 70 of the connector 64, its front transverse edge 99 is located entirely within the unit 30, that is to say slightly set-back inwards with respect to the upper main edge 86 of the insertion slot 80. In order to facilitate full insertion of the card, an additional cut-out may be provided in the edge of the slot 80.

The unit 30, equipped according to the teachings of the invention, of the connector 64, thus has an outer "contour", after insertion of the card C, which is identical to that of a conventional unit, so as to allow it to be inserted into a corresponding slot of a personal computer.

The extremely small dimensions of the insertion slot 80 do not modify the general structure of the unit 30, that is to say nor its rigidity, and the slot does not affect the electromagnetic screening function which the unit fulfills with respect to the components (not shown) carried by the printed circuit board 36.

According to the first embodiment, illustrated in Figures 1 to 7, in order to allow the card C to be extracted from the unit 30, a notch or extraction groove 114 is provided in the upper main board 44, this being

illustrated by a dotted and dashed line in Figure 6, and extending transversely with respect to the unit 30, that is to say parallel to the insertion or extraction direction I of the card. The notch 114 is positioned in such a way as to extend on either side of the rear transverse edge 98 of the card C and, preferably, opposite a region of the connector 64 which does not include metallic parts belonging to the contact blades 78.

It is thus possible to insert a small tool into the notch 114 in order to act on the rear transverse edge 98 of the card C, in order to push it out from its housing 70, that is to say by making it slide from left to right, as regards Figure 6, over the travel permitted by the length of the notch 114, so that its front transverse edge 99 at least partly emerges from the unit 30 through the slot 80 such that, after this first extraction phase, the user can grasp the card in order to extract it fully from the unit 30.

According to the standardized definition of "MICRO SIM" cards, an example of which is illustrated in the scope of the present description, the card C has, in the vicinity of its front transverse edge 99, a cut-out surface 116 which, for some applications, constitutes an orienting means for the position of the card C in its connector.

In order to hold the card C in the position in which it is inserted into the unit 30, and to prevent it from accidentally emerging, even partially, from the unit, a protuberance 120 may be provided, formed in the upper main wall 44 in line with the cut-out surface 116 and extending, over a small height, into the cavity

48 in order to constitute a stop which extends in front of the cut-out surface 116.

When the card is extracted using a tool inserted into the notch 114, the user must apply a slightly greater effort, so that, by means of a slight elastic deformation of the corresponding part of the upper wall 44, the stop constituted by the protuberance 120 withdraws as the cut-out surface 116, then the upper face 73 of the card C, passes by.

The embodiment illustrated in Figures 9 to 10 will now be described, according to which the connector 64, which has a slightly different design from the one described and represented above, is equipped with a carriage 130 for manual extraction of the card C.

To this end, the support 66, made of insulating material, of the connector 64 includes, on one of its side edges 132, a slideway 134 on which the side portion 136, in the form of a slide, of the extraction carriage 130 is mounted so as to slide, this side portion 136 being extended by an extraction tab 138 which extends above the upper face 68 of the support 66, in the plane corresponding to the thickness of the card C.

The extraction tab 138 is delimited by a rear transverse edge 140 which, when the extraction carriage is in the "card insertion" position (as represented by a solid line in Figure 8), abuts against the rear transverse edge 96 of the housing 70. The tab 138 is also delimited by a front transverse edge 142, against which the rear transverse edge 98 of the card C bears.

The extraction carriage 130 can slide from its card insertion position, from left to right as regards Figure

8, to a card C extraction position, during which it causes simultaneous displacement of the card C because of the interaction of the edge 142 of the tab 138 with the rear transverse edge 98 of the card.

In order to make the extraction carriage 130 slide, its part 136 which forms a slide includes a hollow 144 intended to receive the end of a complementarily shaped tool which is inserted into a notch in the upper face 44 of the unit 30, which is a notch similar to the notch 114 described above but which then extends in front of the slide 136.

This design is particularly advantageous because it avoids having to act directly with a tool on the rear transverse edge 98 of the card C, thus preventing damage to the card.

In addition, the upper face, in the form of a board 137 of the metal slide 130 always extends in front of the notch 114, thus ensuring electromagnetic closure of the notch 114.

The embodiment illustrated in Figures 11 and 11A will now be described, in which the connector 64 is equipped with a card extraction carriage 130 which automatically extracts this card.

To this end, the design of the extraction carriage 103 is similar to the one described with reference to Figures 8 to 10, but it is equipped with a tension coil spring 150 which continuously returns elastically to a card extraction position.

To this end, a first end 152 of the spring is hooked on a lug 154 belonging to the slide 130, while its opposite end 156 is hooked on a lug 158 formed integrally

with the insulator 66 of the connector 64.

Because of the presence of the tension spring 150, the card C, illustrated in stippled lines in Figure 11, is continuously urged from left to right by the extraction tab 138, that is to say in a direction corresponding to its extraction from the connector 64 and therefore from the unit 30.

In order to hold the card in the inserted position, that is to say in the position in which it is illustrated in stippled lines in Figure 11, there is a means for locking the extraction carriage 130 in the card insertion position, which means here consists of a locking finger 160 which is intended, in the card insertion position, to be received in a complementary hole 162 formed opposite in the upper main wall 44 of the unit 30, as illustrated in Figure 11A.

The finger 160 consists, for example, of a protuberance or of a ball arranged at the end of an arm 166 which extends the main body of the extraction carriage 130, in the plane of the upper face 137 of the latter, the bar constituted by the arm 166 can be flexed by elastic deformation vertically downwards in order to release the locking finger 160 from the hole 162, using a tool (not shown) by means of which pressure is exerted on the finger 160, which is then retracted into the unit, allowing automatic extraction of the card under the action of the spring 150, with the finger 160 rubbing, during the extraction travel, against the opposite inner face 45 of the upper main wall 44.

Further to the fact that it allows the card to be extracted automatically, the design of the automatic

extraction carriage 130, associated with an extraction spring 150, makes it possible to do without the notch 114 in the unit 30, and to replace it by a simple small hole 162 which is closed either by that end of the arm 166 which constitutes the locking finger 160, or by an opposite portion of the upper face 167 of the arm 166, during the extraction travel of the carriage 130.

A first illustrative embodiment of the means for at least partial closure of the insertion slot 80 will now be described with reference to Figures 12 to 16.

To this end, the support, made of insulating material 66 of the connector 64 is modified in its front part, on the right as regards Figure 12, to include two opposite longitudinal ribs 170 for mounting a closure device 172 in a fixed position.

The device 172 essentially consists of a closure lip 174, of hollow semicylindrical curved general profile, the convex upper face 176 of which is oriented upwards in order to extend in proximity to and in front of the slot 80.

The closure lip 174 is joined to two longitudinal and opposite parallel arms 178, each of which carries a tab 180 at its free end, for attaching the closure device 172 on the connector 164 by inserting the ribs 170 into the attachment tabs which are curved back in a U-shape.

The closure device 172 is, for example, made by cutting and stamping a thin metal sheet.

As can be seen in Figures 14 to 16, the arms 178 which carry the closure lip 174 extend in the plane of the lower faces of the ribs 170 and, by being flexed vertically, they allow displacements of the lip 174 in a

substantially vertical plane, between its position, normally retracted downwards when the card C is in place in the connector 64, and a normal rest position illustrated in Figure 16, in which, in the absence of a card, the lip 174 extends in front of the slot 80, the size of which in this case is slightly greater than that illustrated above, that is to say it extends slightly into the unit, in the upper face 44 of the half-shell 32.

The closure lip 174 retracts automatically when the card C is inserted in the direction I, insofar as the rear transverse edge 98 of the card C interacts with the upper face 176 which acts as a cam to cause elastic deformation of the arms 178, the lip 174 then bearing against the opposite portion of the lower face 72 of the card C.

The embodiment illustrated in Figures 17 and 18 will now be described, in which figures the closure device 172 also constitutes a device for retaining the card C in the position in which it is inserted into the connector 64 and into the unit 30.

To this end, the arms 178 are slightly longer and the lip 174 includes a rear cut-out 180, the profile of which is complementary to that of the front transverse edge 99 of the card C with a cut-out surface 182.

When the card is in the inserted position, the edge of the rear cut-out 180 extends facing the front transverse edge 99 of the card C, and it is therefore impossible to extract the card, since the closure device 172 thus fulfils a function of locking the card C in the inserted position and then avoids any accidental emergence of the card.

In order to extract the card, irrespective of

whether the extraction mode is manual or automatic, it is necessary to unlock it by acting through the slot 80 using a tool (not shown) on the lip 174 in order to cause a downwards vertical displacement of the latter until it passes below the plane of the card C to release the latter which can then slide, from left to right as regards Figures 17 and 18, out of the unit 30.

In the alternative embodiment illustrated in Figure 19, the closure device 172 is similar to the one illustrated in Figures 17 and 18, but is associated with an extraction carriage 130 of the type described and represented in Figures 11 and 11A, the lug 158 for attaching the extraction spring 150 being formed integrally with the closure device 172.

By virtue of this design, the automatic extraction carriage 130 can be simplified in so far as it is not necessary for it to have its own means for locking the card in the inserted position, locking being ensured by the closure device 172, the card being continuously urged by the extraction carriage 130 in such a way that its front transverse edge 99 abuts against the edge of the rear cut-out 180 of the lip 174.

In order to cause automatic extraction of the card C, it is sufficient to act, as in the case of the embodiment described with reference to Figures 17 and 18, on the lip 174 through the slot 80 in order to cause retraction of the lip 174 and automatic extraction of the card C, which is then urged, from left to right as regards Figure 19, by the extraction carriage 130.

In the embodiment illustrated in Figures 20 and 21, the device for locking the card consists of a rocker bar

200 which is mounted so as to pivot on the insulator 66 of the connector 64 about a pin 202, the extraction spring 150 being hooked on a lug which is carried by the rocker bar 200 so as to urge the latter continuously into the card locking position, in which the rear cut-out 180 of the rocker bar 200 extends in front of the front transverse edge 99 of the card C when the latter is in the inserted position, as is illustrated, in particular, in Figure 20.

The upper face 174 of the rocker bar 200 fulfills a function equivalent to that of the closure lip 174, insofar as it can extend in the closure slot 80.

Reference will now be made to Figures 22 to 24, which illustrate another design of the means for closing the slot 80.

These closure means here consist of a closure seal 220 which is arranged in a complementarily shaped housing 222 formed in the insulator 66 of the connector 64, in the vicinity of the front edge of the latter.

In its upper part, the closure seal 220 includes a sealing lip 174 which extends normally in front of the insertion slot 80, that is to say when there is no card in the unit 30, and which can retract by elastic deformation when a card C is inserted into the unit 30 through the slot 80, as is illustrated in Figure 23.

The closure seal 220 is mounted in the housing 222 by means of its base 224, a ramp 226 being provided in the insulator 66 in order to facilitate insertion of the card, that is to say in order to bring it level with the bottom of the housing 70.

Finally, in the vicinity of its front edge, the

bottom of the housing includes a ramp 236 which makes it possible to raise the card when it is being extracted, in order to direct it through the slot 80 and to clear a thin step which is constituted by a stop for retaining the card in the connector and which is adjacent to the ramp. In this case, the protuberance 120 is superfluous.

As a variant, the slot 80 may be arranged transversely, with the direction I parallel to the general longitudinal direction of the unit, in the shell or at one longitudinal end of the unit.

If means for closing the slot 80 are not provided, it is observed that dust which enters the unit is confined in the housing 70 and cannot extend inside the unit 30.

CLAIMS

1. Electronic connection unit (30), in particular for a personal computer, in the general form of a card of the type comprising a shell (32, 34) with upper (32) and lower (34) parallel and opposite plane main walls (44, 46) which, between them, delimit a cavity (48) which is open at its two opposite longitudinal ends and is transversely delimited by two opposite side walls (50), designed in the form of guide rails for the unit, and inside which cavity an intermediate board (36), in particular a printed-circuit board, is arranged which extends substantially halfway between the opposite inner faces (45, 47) of the main walls, and parallel to the latter, and of the type in which the unit (30) is associated with a connector (64) for connecting a contact card (C) with integrated circuit(s) which includes a support (66) made of insulating material to the unit, and of the type wherein the support (66) is arranged on the upper face (37) of the intermediate board (36), wherein the shell (32) has a slot (80) for insertion or extraction of the card (C) into or from the unit in a direction (I) substantially parallel to the plane of the card (C), and wherein, when inserted, the card (C) is arranged entirely inside the unit (30), characterized in that the support (66) of the connector (64) includes means (101) for positioning it, which interact with complementary means (100) of the intermediate board (36).

2. Connection unit according to Claim 1, characterized in that the means for positioning the

connector are complementarily shaped interaction means.

3. Connection unit according to any one of Claims 1 or 2, characterized in that the support of the connector includes at least one part (101) forming a spacer, which extends through the intermediate board (36) and the free lower end face (102) of which is adjacent to the opposite inner face (47) of the lower main wall (46).

4. Connection unit according to Claim 3, taken in combination with Claim 2, characterized in that the part (101) which forms a spacer extends through an opening (100), of complementary shape, in the intermediate board (36).

5. Connection unit according to any one of Claims 1 to 4, characterized in that it includes means for extracting the card from the unit, said extraction means including an extraction carriage (130), mounted so as to slide on the support (66) of the connector between a card (C) insertion position and an extraction position in which the card at least partly projects out of the unit, in that the extraction carriage (130) includes an active front transverse edge (142) which extends facing the rear transverse edge (98) of the card (C), and in that means, accessible from outside the unit, are provided for controlling the sliding displacements of the carriage.

6. Connection unit according to Claim 5, characterized in that the extraction carriage (130) is returned elastically (150) towards the card (C) extraction position, and in that it is retained in the card insertion position by automatic locking means.

7. Connection unit according to Claim 6, characterized in that the means for automatically locking

the carriage (130) include a retractable locking finger (160) which is carried by the carriage (130) and which, in the card (C) insertion position, is received in an opposite hole (162) in the upper main wall (44) of the unit, towards which hole it is elastically returned.

8. Connection unit according to Claim 6, characterized in that the means for automatically locking the carriage (130) include a retractable locking bar (172) which is carried by the support (66) of the connector (64) and normally extends in a position for locking the card (C) in the inserted position, towards which it is elastically returned and in which the bar (172) extends facing the front transverse edge (99) of the card.

9. Connection unit according to Claim 8, characterized in that the locking bar (172) normally extends facing the slot (80) for inserting the card (C) into the unit, and in that the locking bar includes a cam profile (174), with which the rear transverse edge (98) of the card (C) interacts when it is being inserted, in order to cause retraction of the locking bar (172) in a substantially vertical direction.

10. Connection unit according to any one of Claims 1 to 9, characterized in that closure means (174) are provided for at least partially closing the slot (80) for inserting the card into the unit.

11. Connection unit according to Claim 10, characterized in that the closure means are elastically deformable means which, at rest, extend facing the insertion slot (80) and which can be withdrawn automatically when the card (C) is being inserted.

12. Connection unit according to Claim 11,

characterized in that the closure means are carried by the support (66) of the connector.

13. Connection unit according to Claim 12, characterized in that the closure means include a closure lip (174) which is mounted so as to move vertically with respect to the support (66) of the connector (64) and includes a cam profile (76) with which the rear transverse edge (98) of the card (C) interacts when it is being inserted, in order to cause retraction of the lip (174) in a substantially vertical direction.

14. Connection unit according to Claim 13, characterized in that the lip is a profiled strip (174), carried by the support (66) of the connector (64) via two elastically deformable arms which extend longitudinally along edges of the support (66) parallel to the insertion direction of the card.

15. Connection unit according to Claim 13, characterized in that the closure lip (174) belongs to a closure seal (220) mounted in a recess (222) formed in the upper face of the support of the connector (64).

16. Connection unit according to any one of Claims 1 to 15, characterized in that, on its inner face (45), the upper main wall (44) includes a protuberance (120) which, when the card (C) is in the inserted position, extends facing a portion (116) of the front transverse edge (99) of the card (C) in order to prevent any accidental ejection of this card from the unit (30).

17. Connection unit according to any one of Claims 1 to 16, characterized in that the support (66) includes an open housing (70) in its upper face (68), and in that the bottom of the housing (70) for the card includes a

ramp (236) which causes the front transverse edge of the card to be raised during the movement for extracting it from the unit (30).

FIG.1

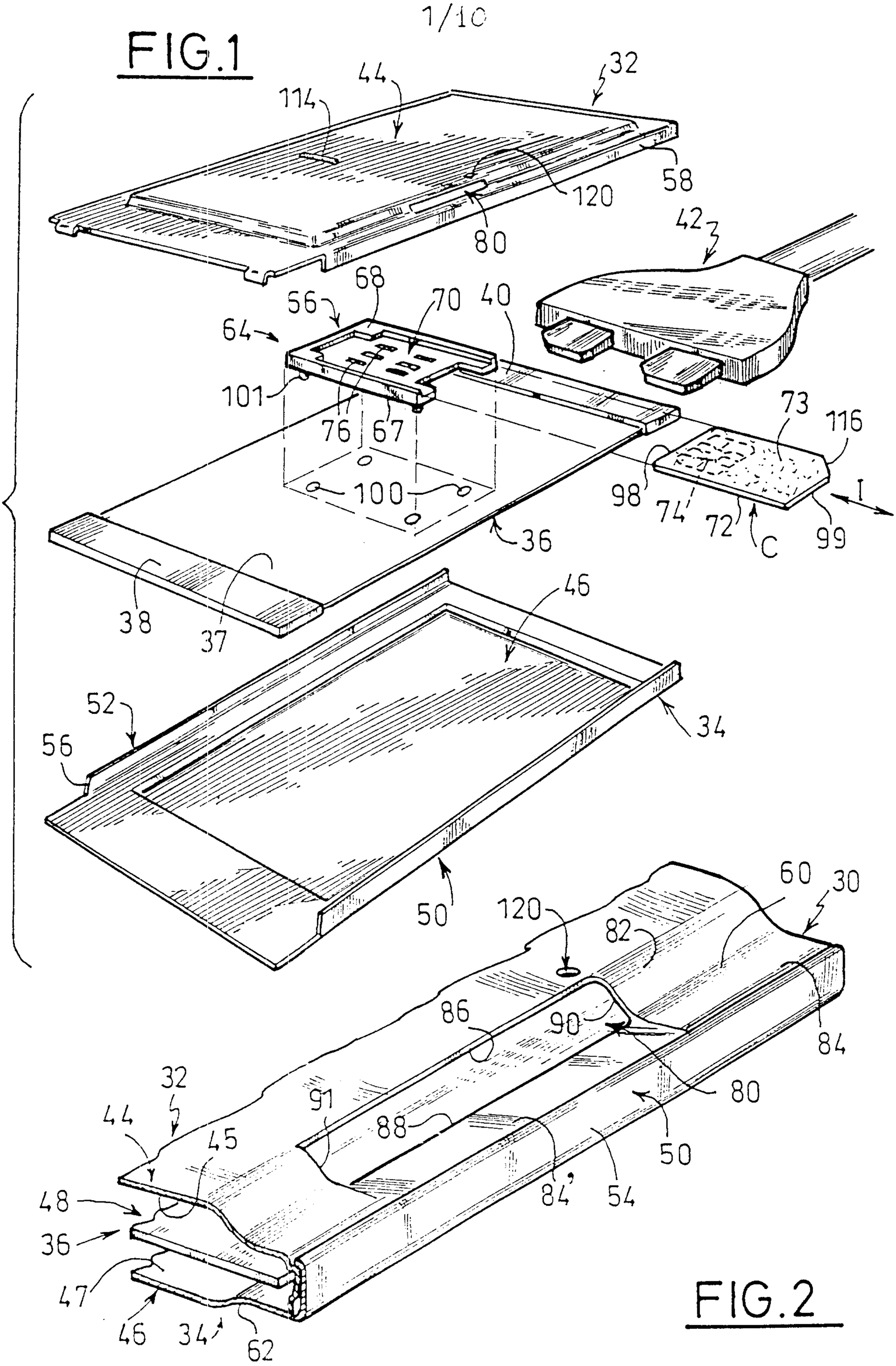
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FIG.2

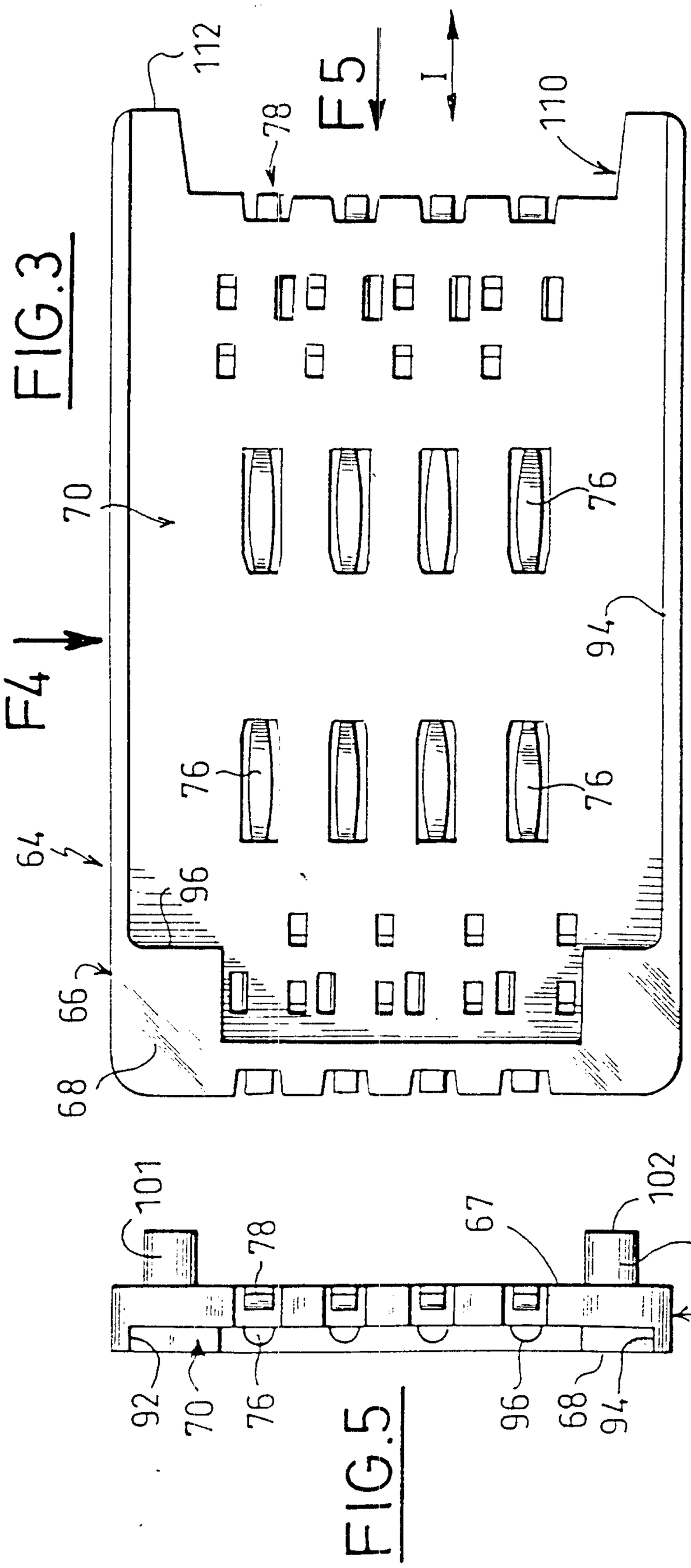

FIG.3

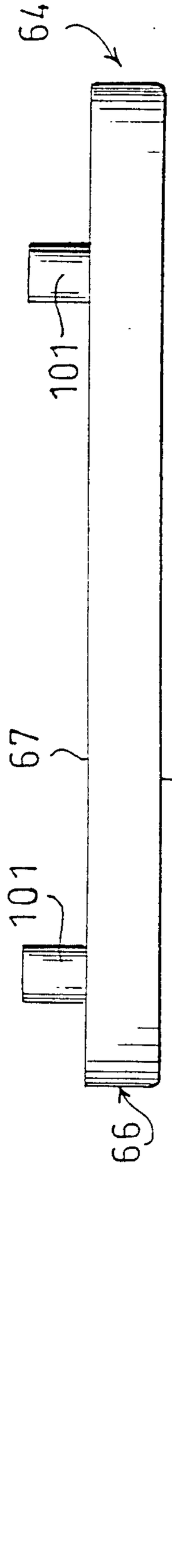

FIG.4

FIG.5

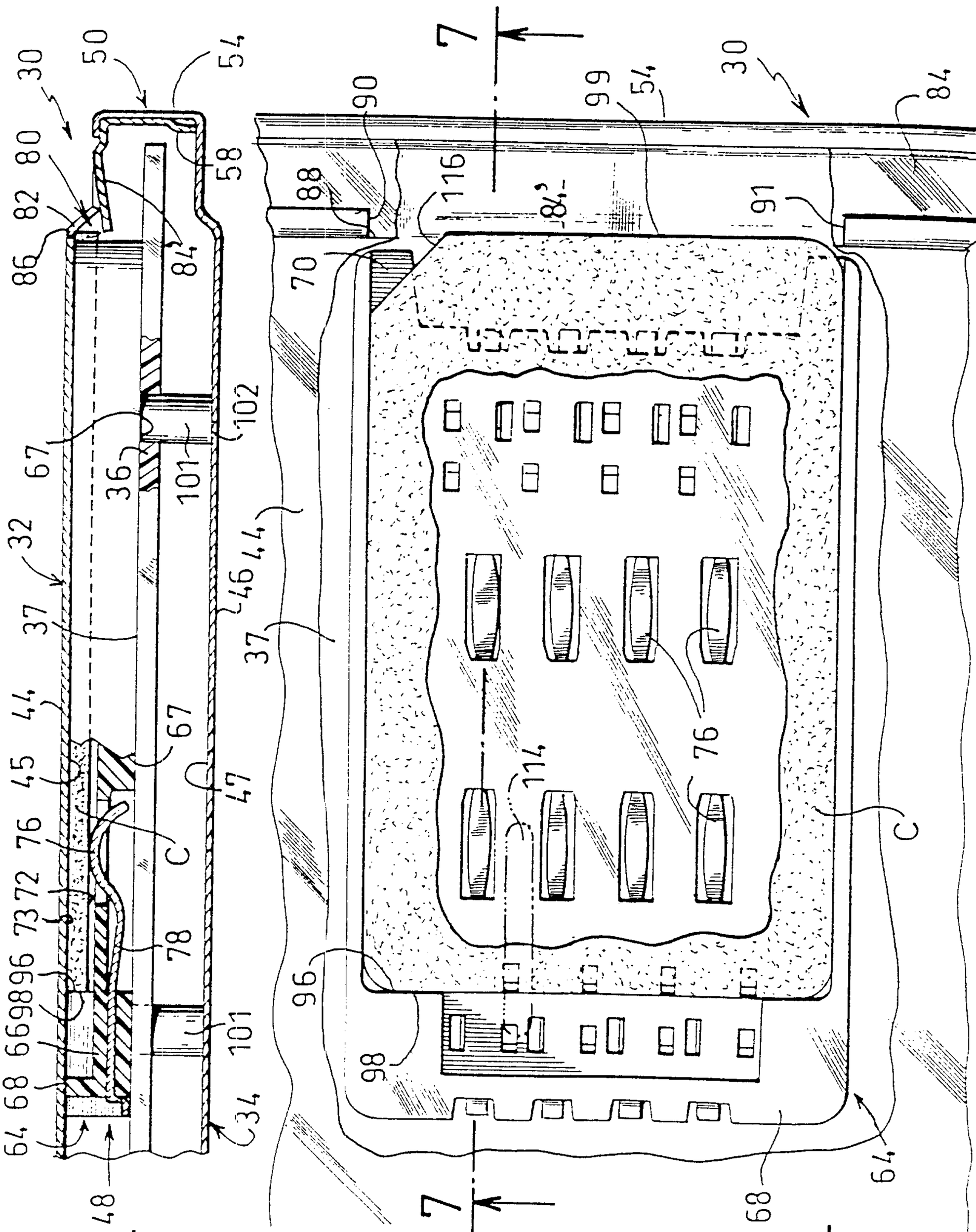
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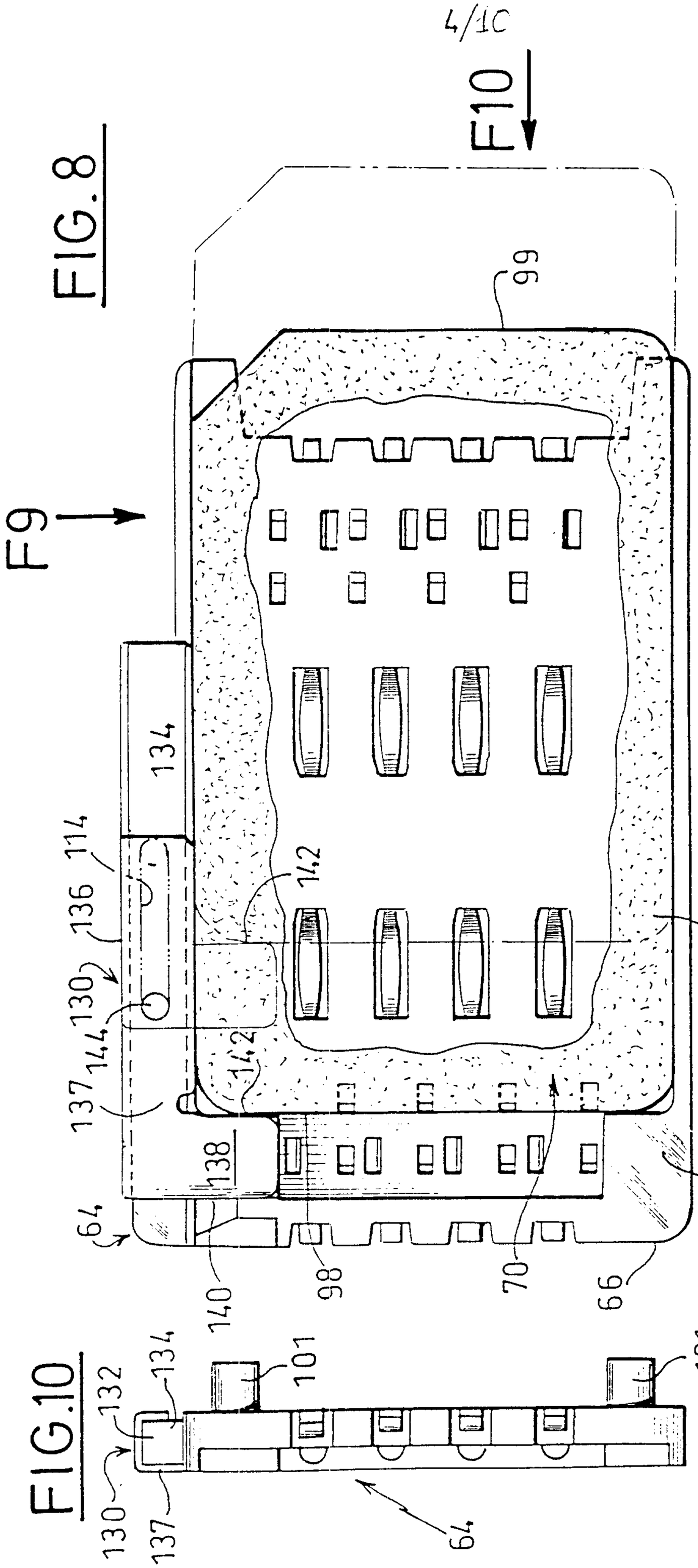
FIG.7

FIG.6

FIG.8



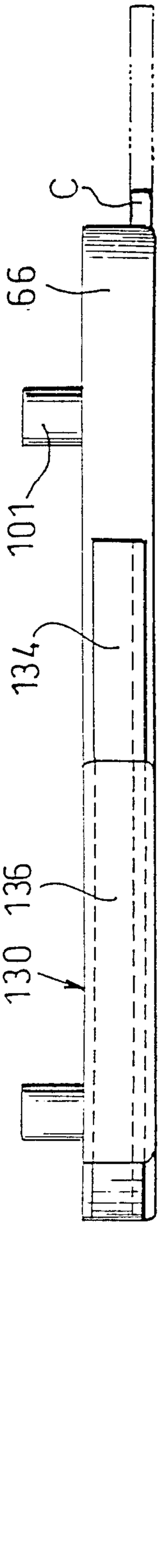


FIG.9

FIG.10

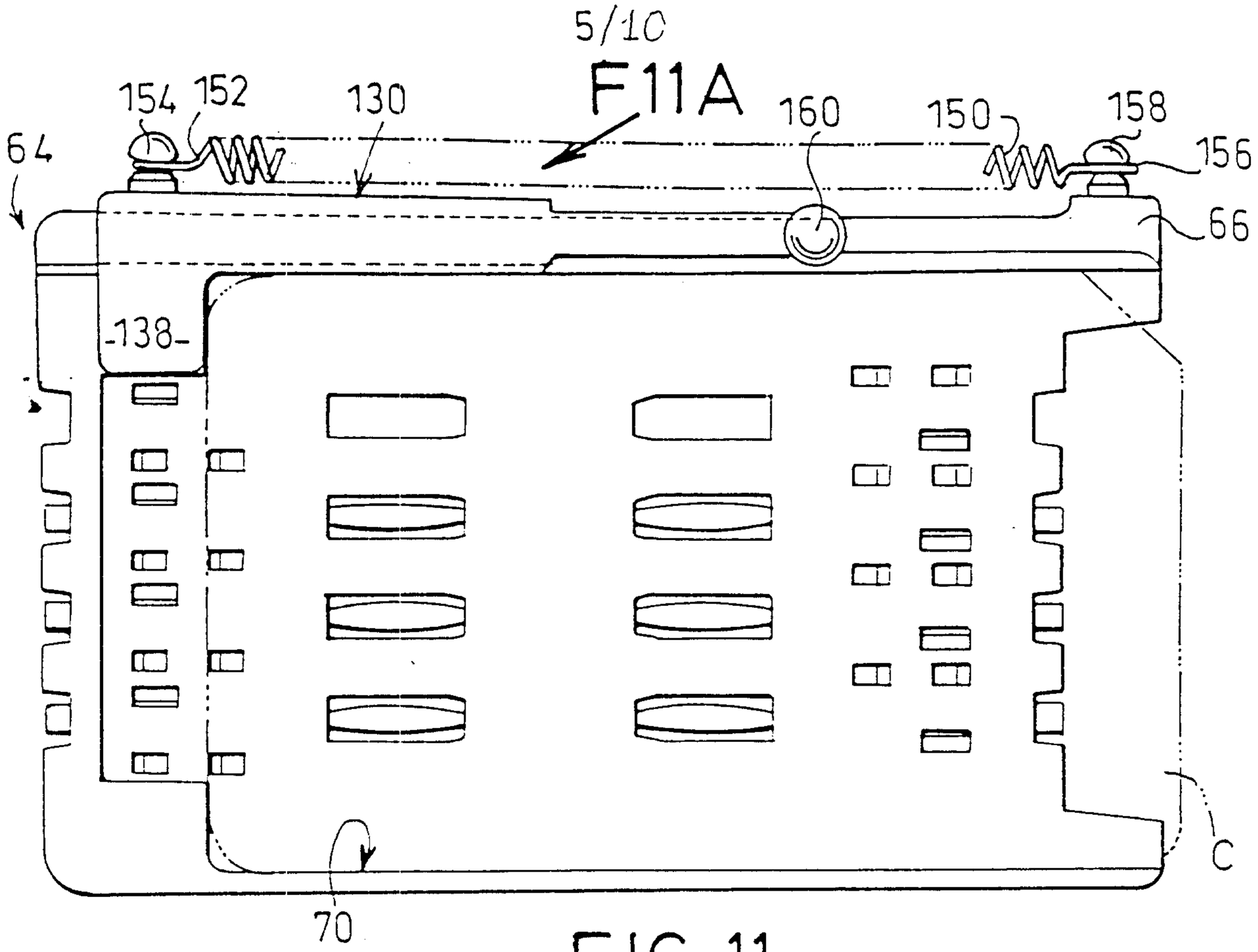


FIG. 11

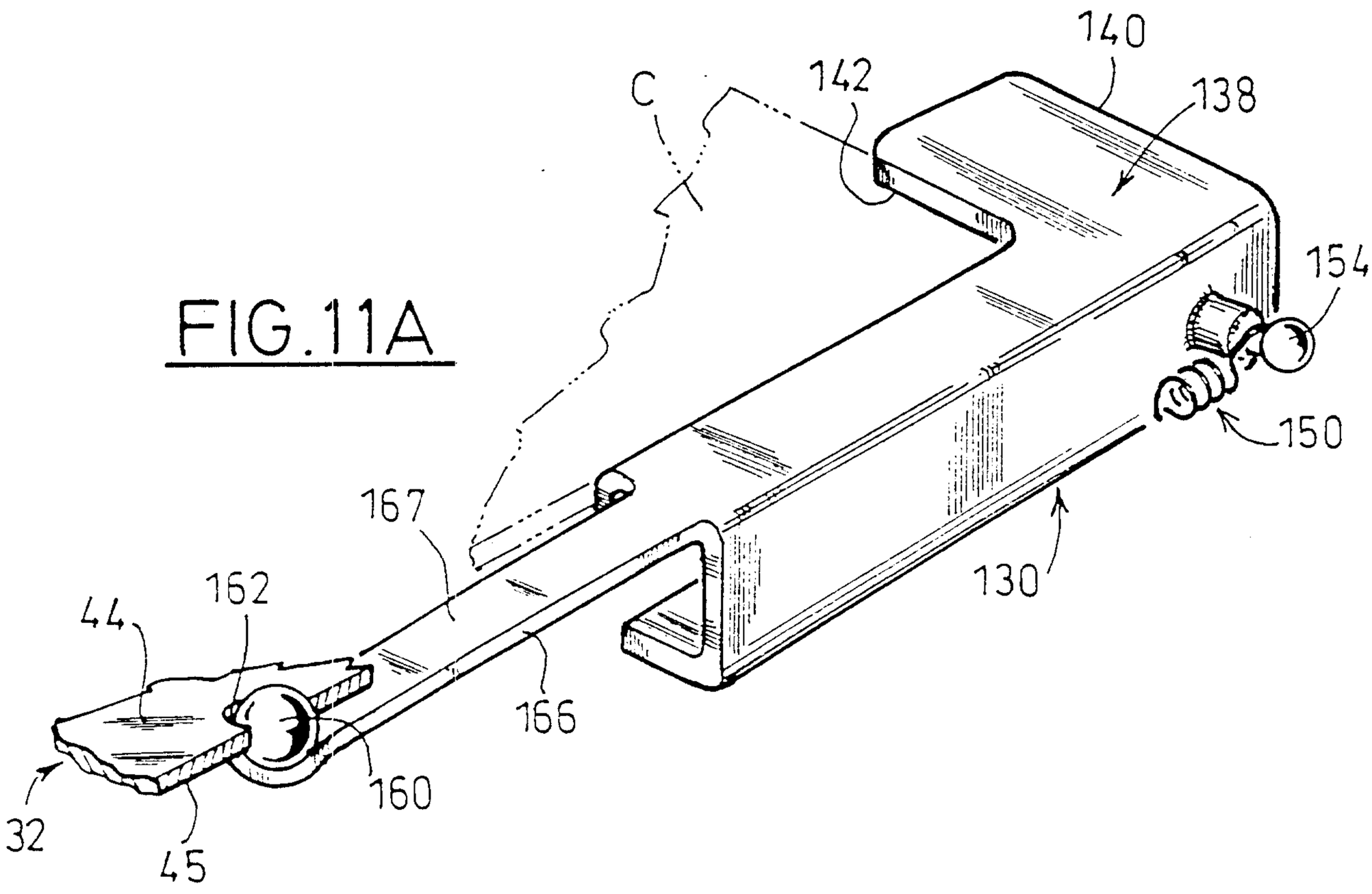


FIG. 11A

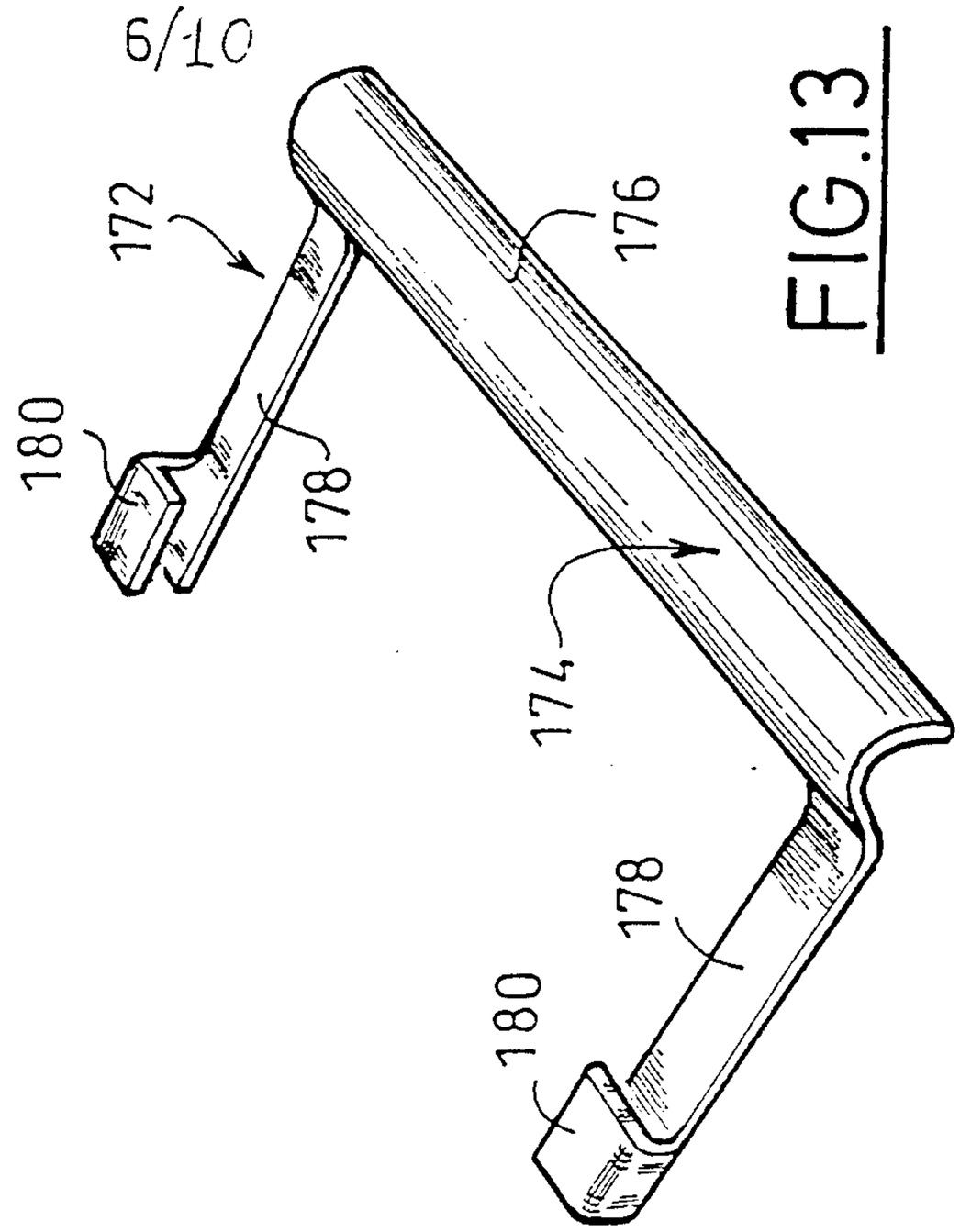


FIG.13

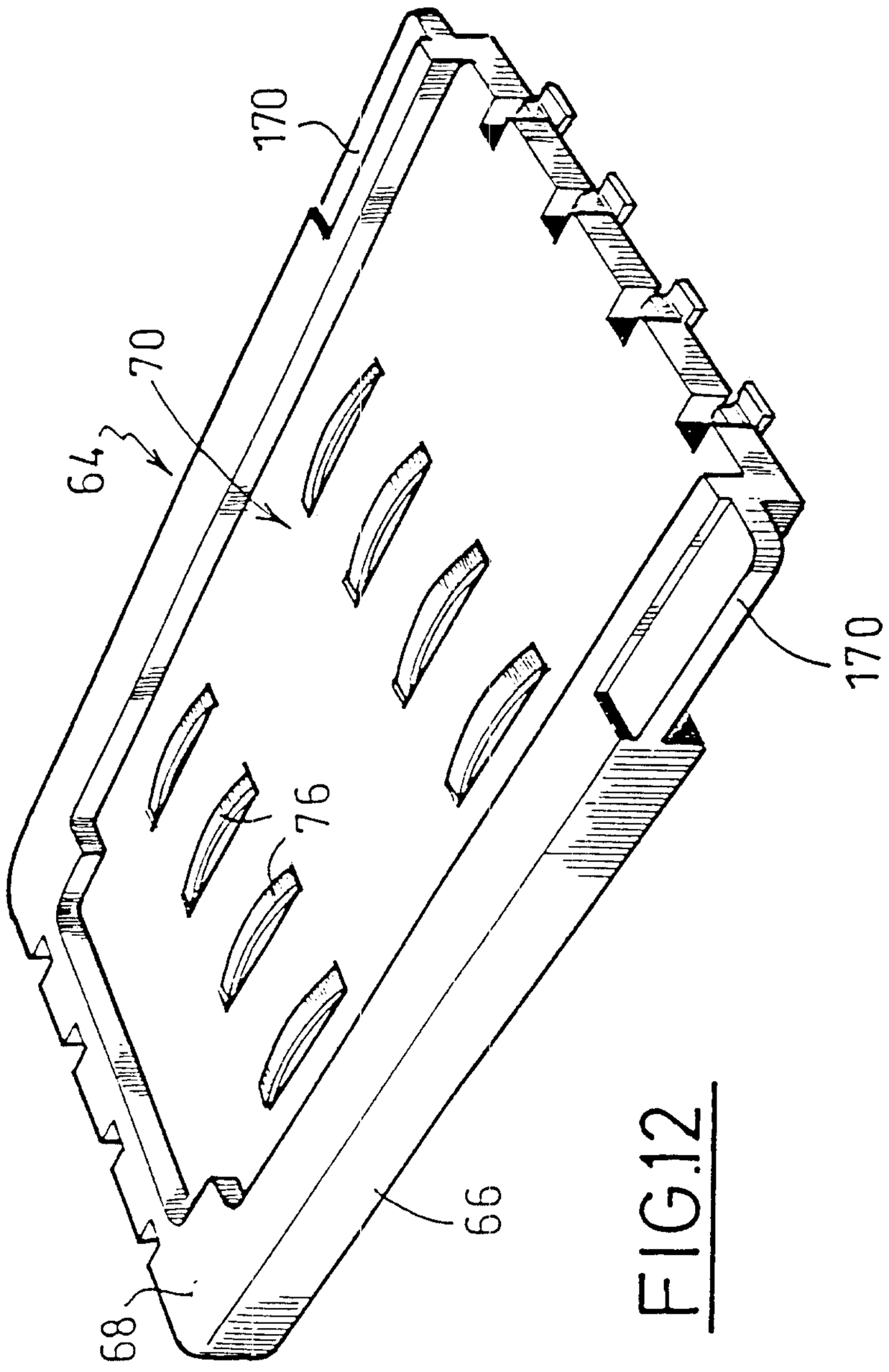


FIG.12

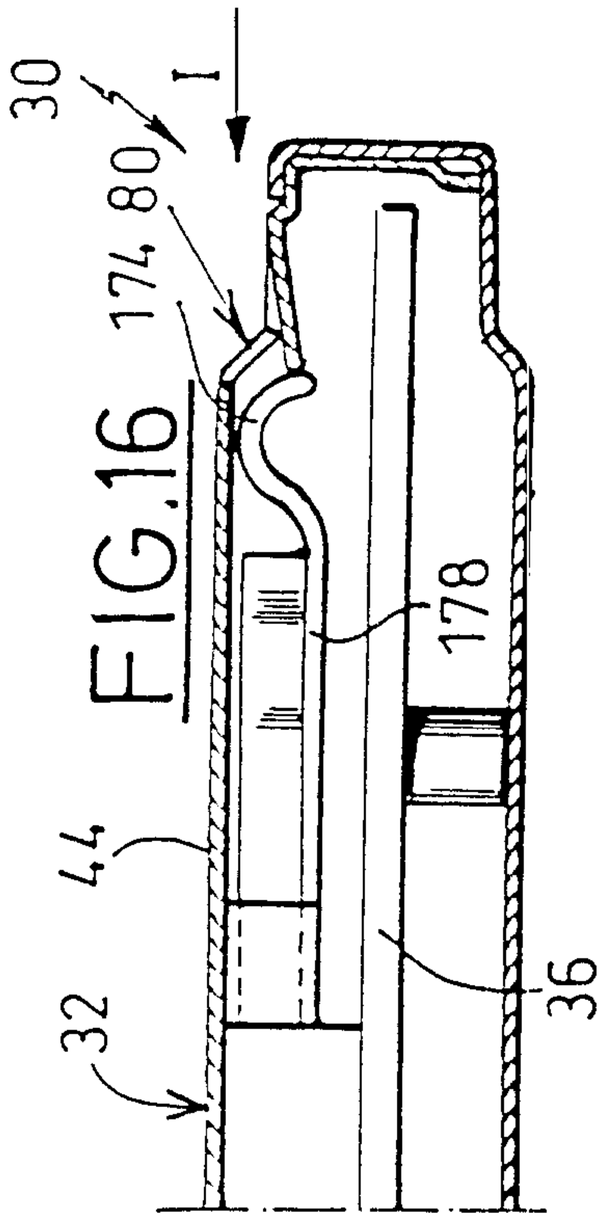


FIG.16

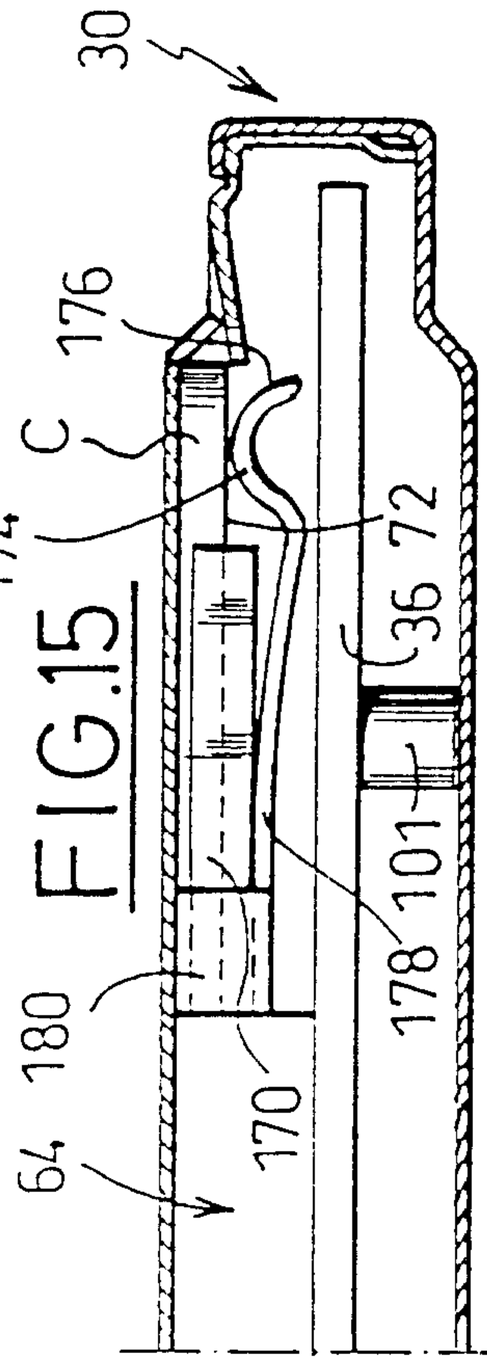


FIG.15

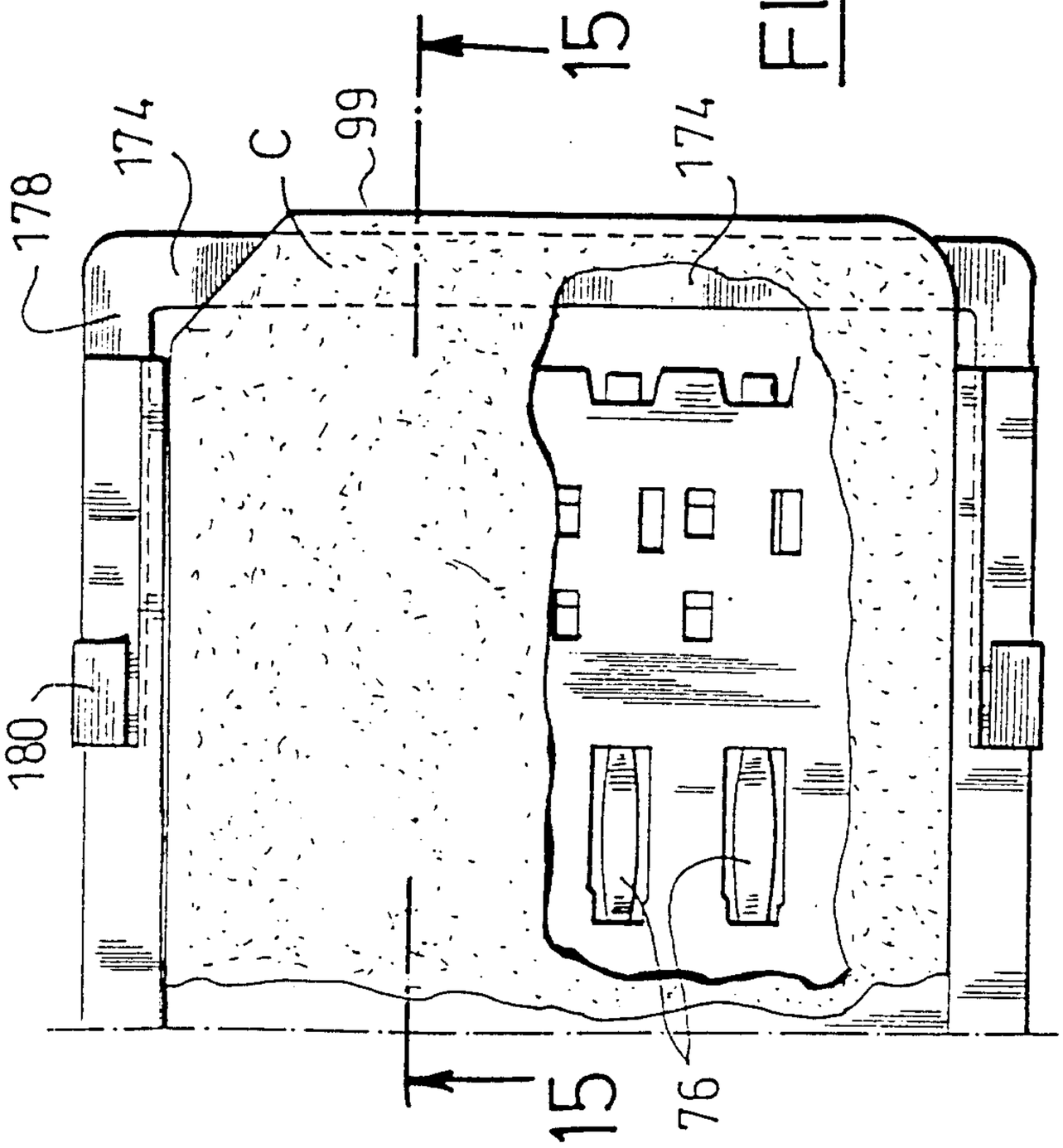


FIG.14

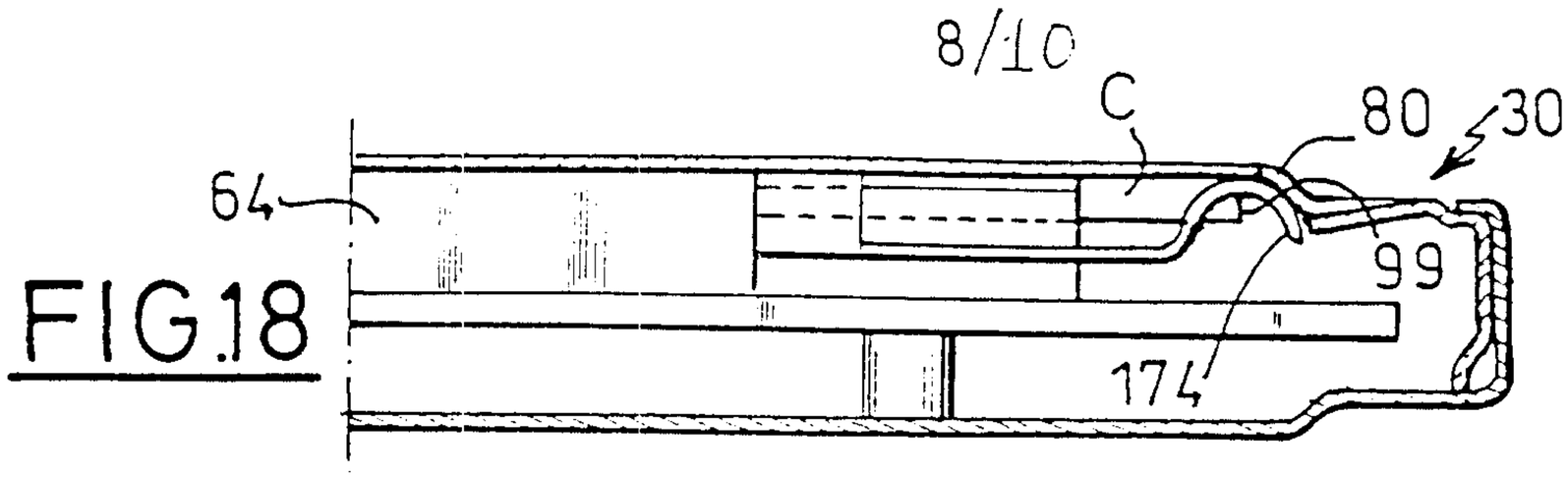


FIG.18

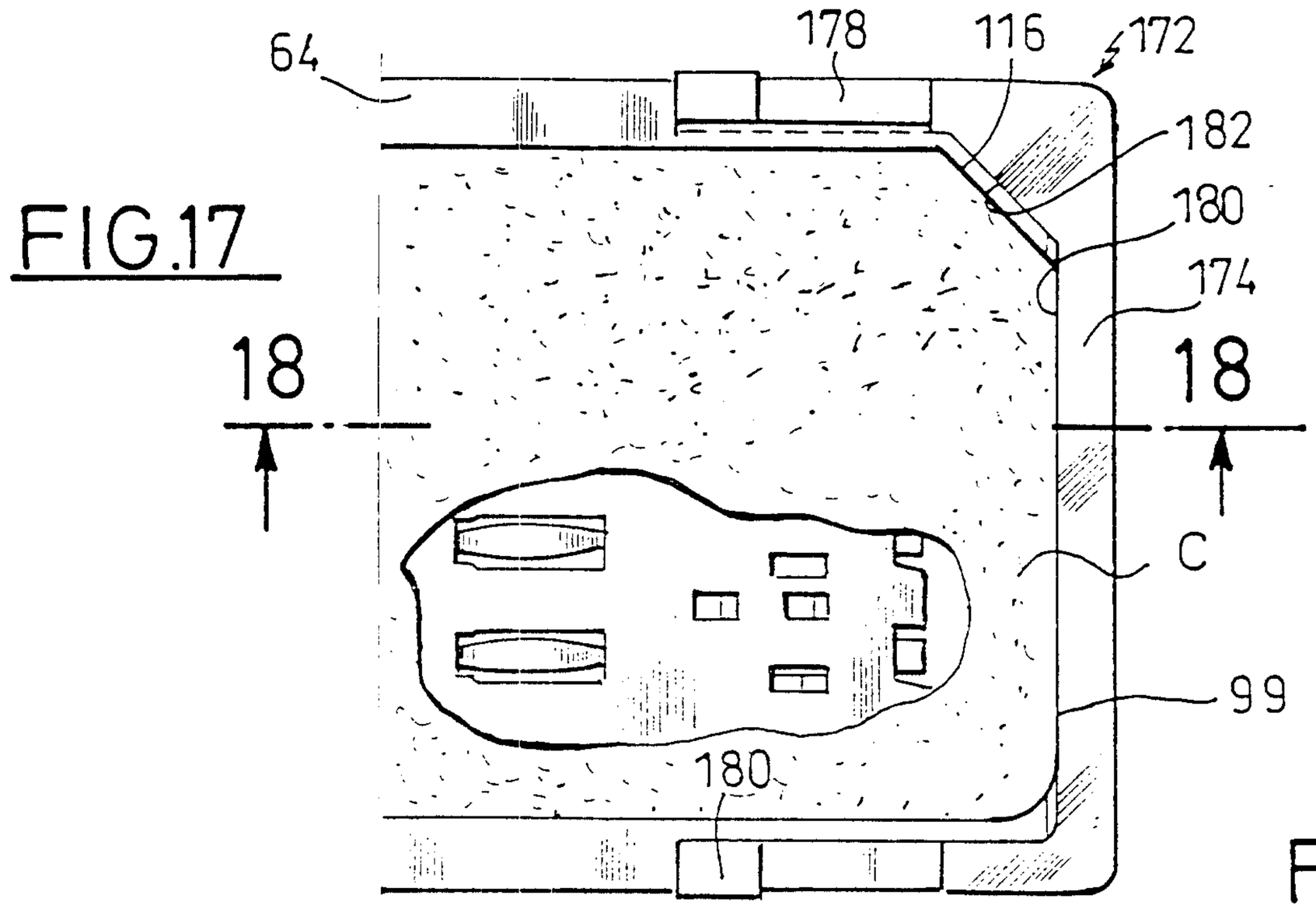
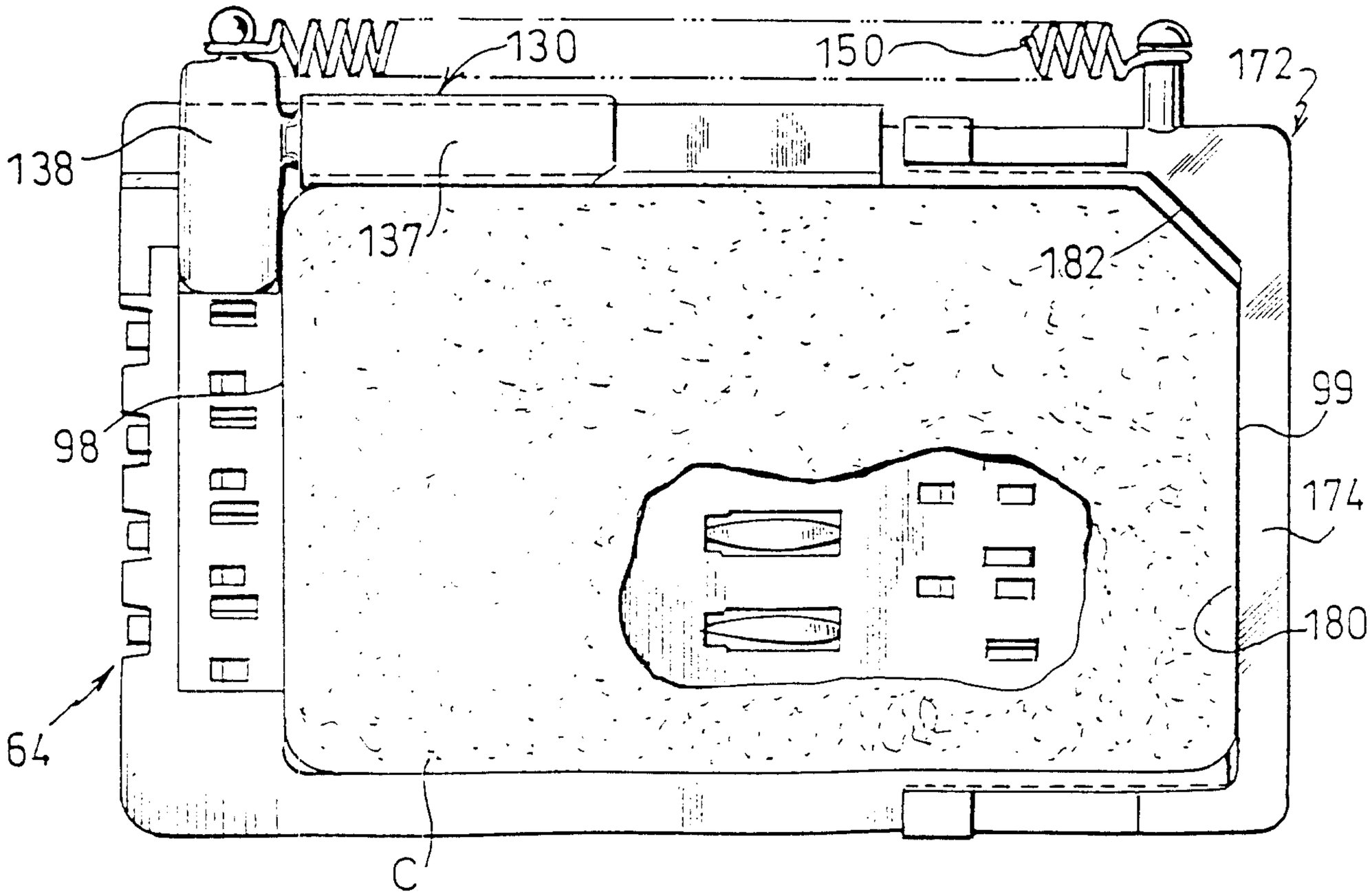


FIG.17

FIG.19



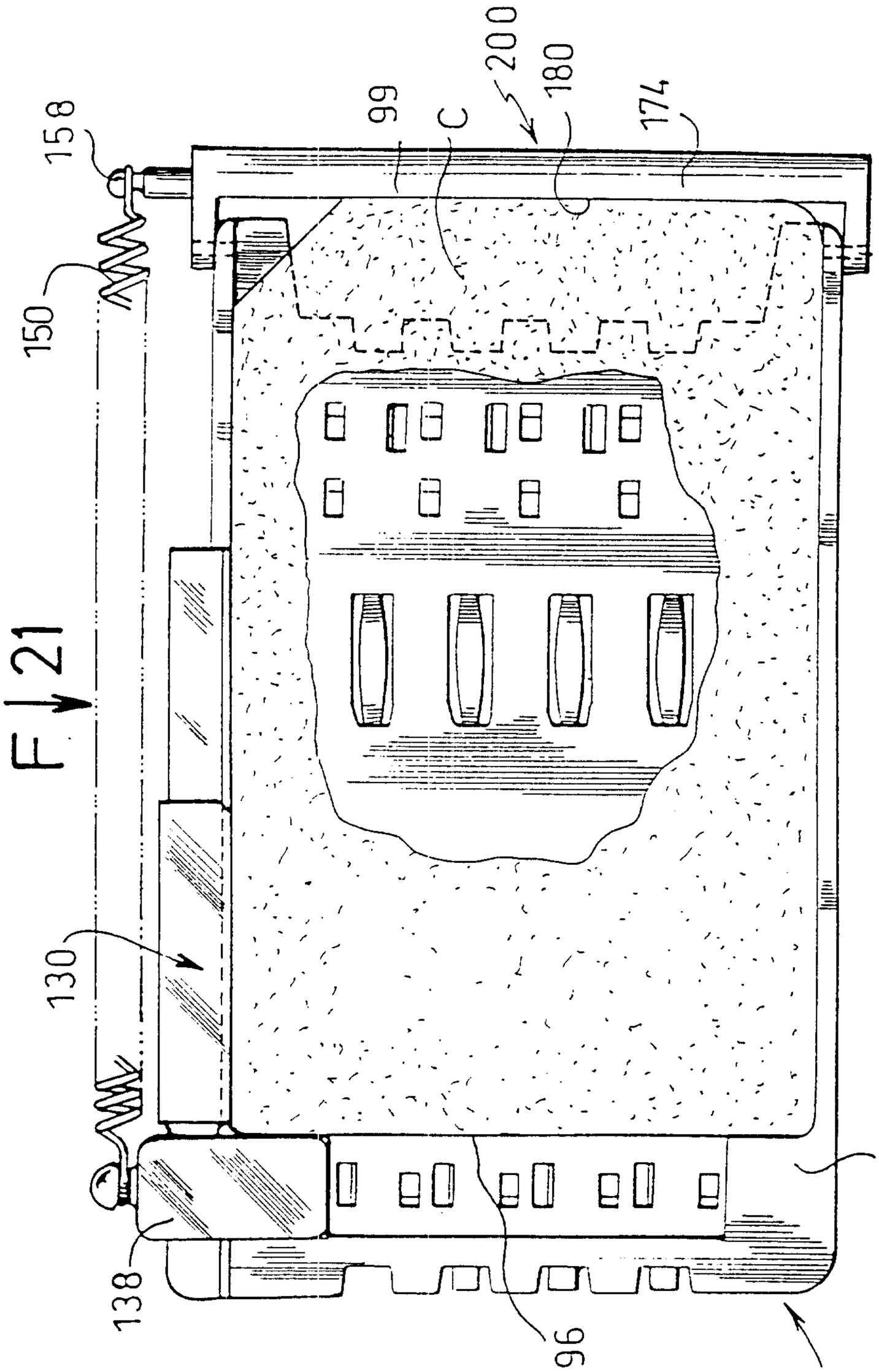

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FIG.20

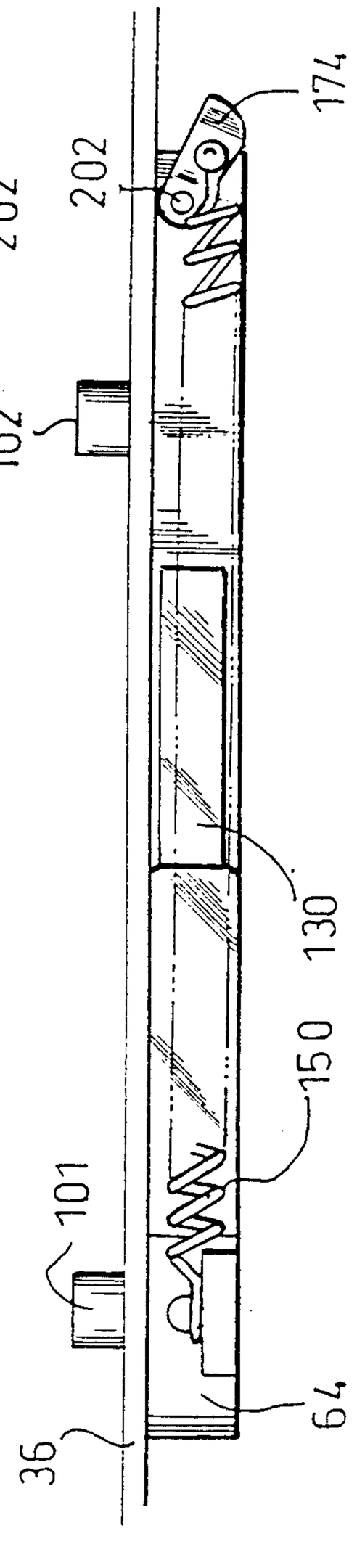
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FIG.21

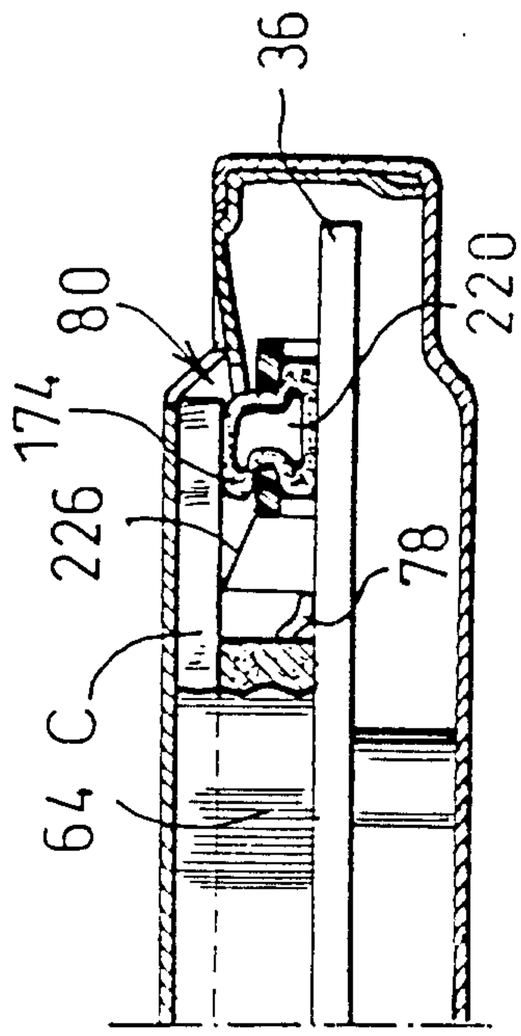
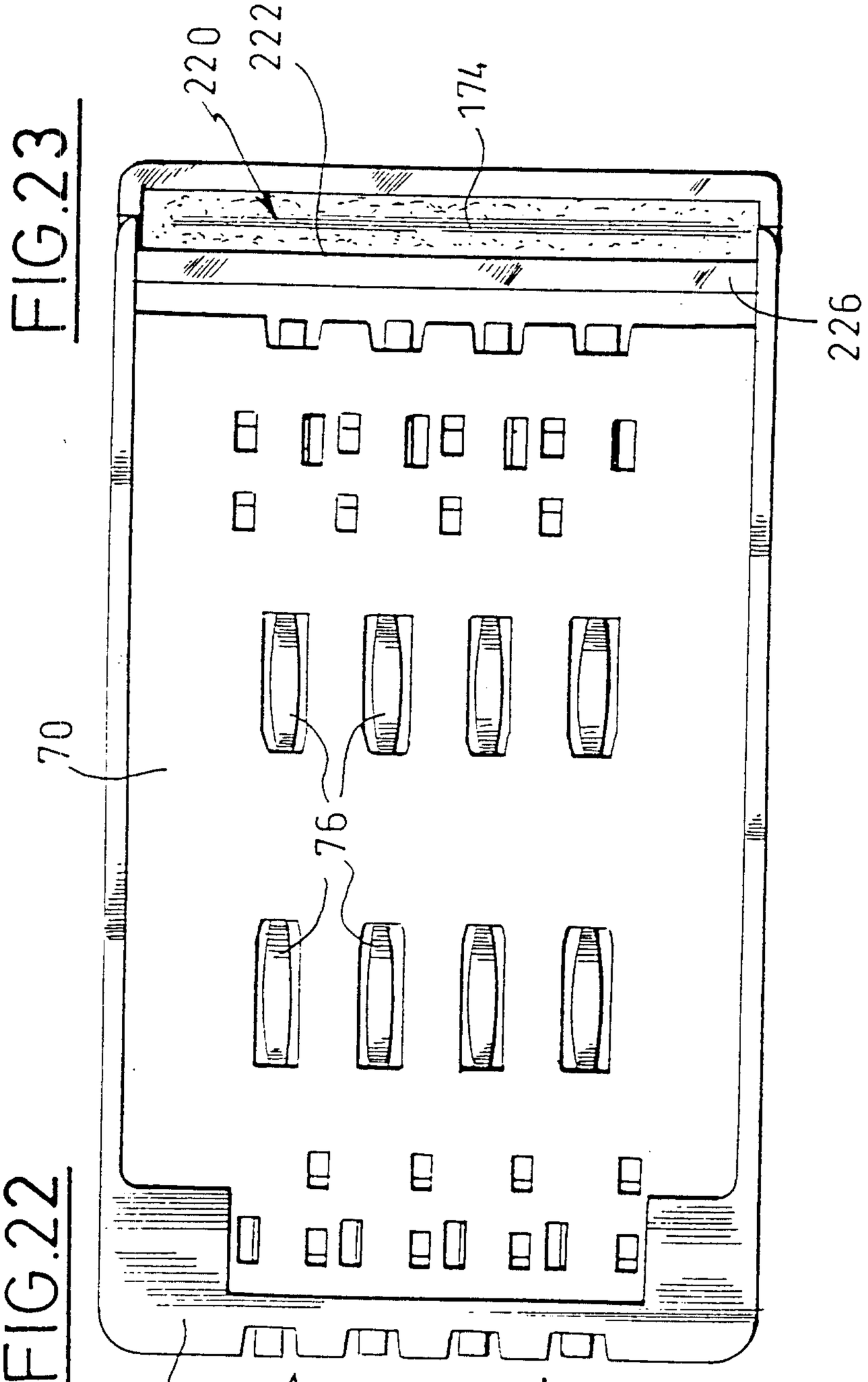


FIG.23



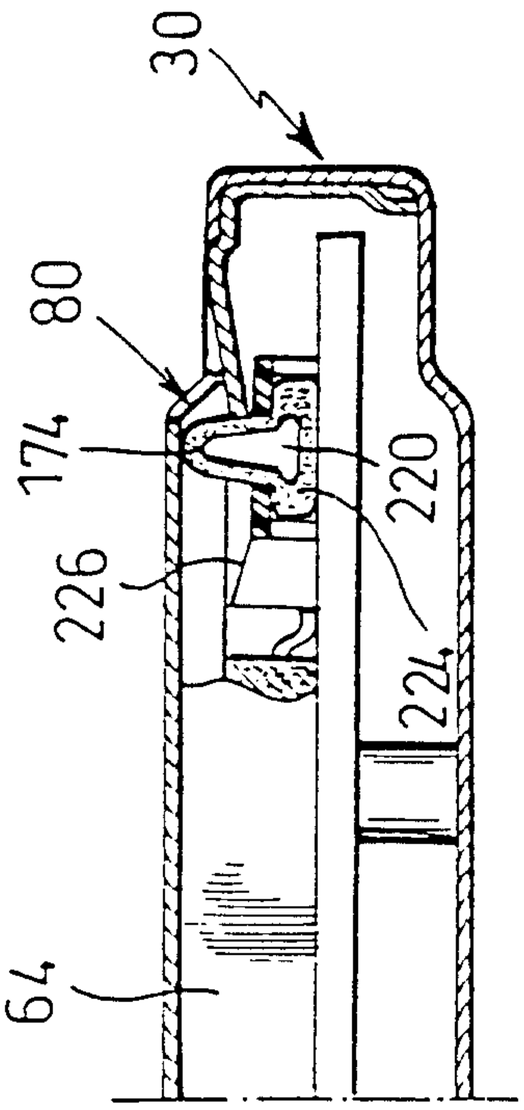
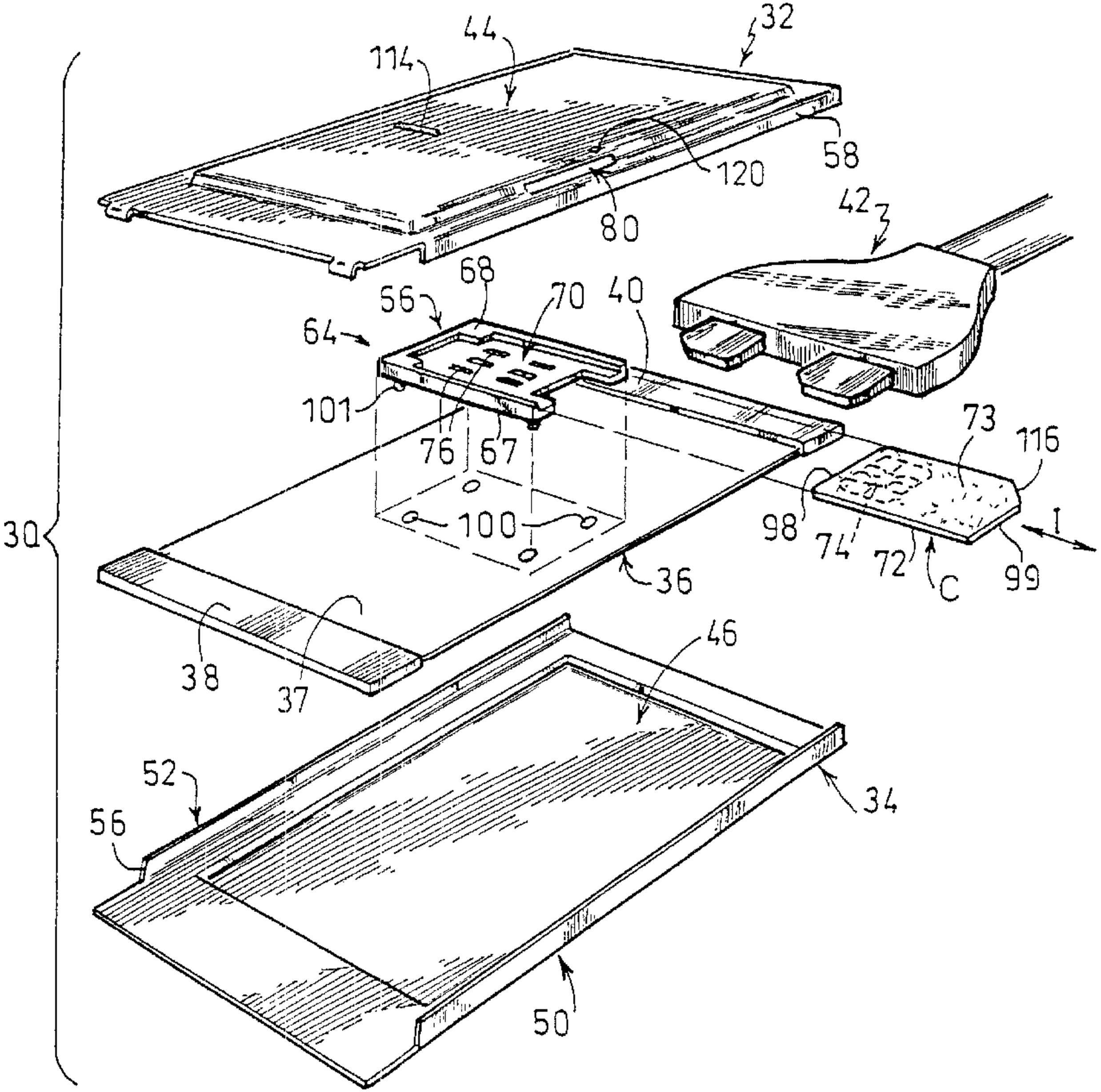


FIG.22

FIG.24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