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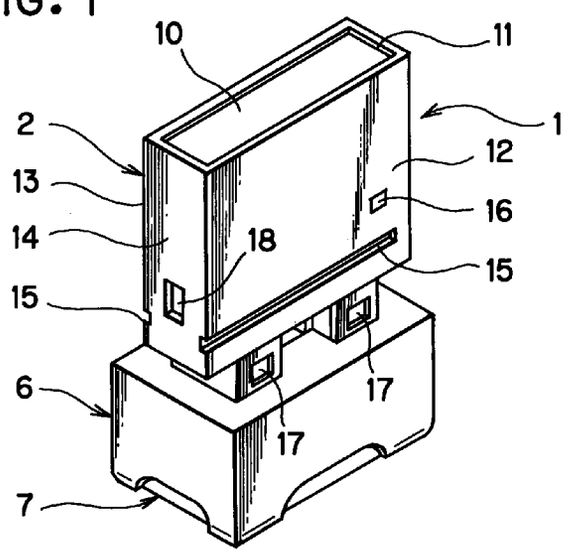
(54) Cassette for housing sheets of heat-sensitive paper

(57) A cassette includes a grip portion for grasping by hand; a body base formed in a single unit on the lower end of the grip portion; a platen urged downward from the body base; a cut-sheet heat-sensitive sheet, which is slightly wider than a stamp face of a stamp assembly; and a cover detachably and rotatably attached to the body base.

FIG. 1



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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a cassette for housing sheets of heat-sensitive paper.

2. Description of the Related Art

Conventionally, various types of stamps used to stamp images such as a company's name, address, or other information on sheets have conventionally had a stamp face formed of rubber. This type of stamp is ordinarily made to order, and thus is expensive and takes a long time to receive after ordering.

United States Patent No. 5,285,725 describes a stencil plate for replacing the aforementioned rubber-type stamp. The stencil plate includes a heat-sensitive stencil sheet and an ink-impregnated member impregnated with ink. The stencil plate is formed by adhesively attaching a synthetic resin film to the ink-impregnated member and to a frame member surrounding the ink-impregnated member. A heat-sensitive stencil sheet is adhesively attached to the opposite surfaces of the ink-impregnated member and the frame member.

A stamp assembly can be obtained by adhesively attaching the stencil plate, via a cushion member, to the lower face of a stamp member having a grip portion and then using a thermal head to perforate a desired image, such as a character array or other pattern, in the heat-sensitive stencil sheet of the stencil plate.

United States Patent No. 5,253,581 describes a stamp unit including a stamp assembly and a thermal perforating device for perforating the stamp face of the stamp assembly. The stamp assembly includes a grip portion; a body case; a supply reel and a take-up reel housed in the body case and being for supplying and winding up a tape-like, heat-sensitive stencil sheet; and an ink pad in contact with the perforated heat-sensitive stencil sheet.

The thermal perforating device is constructed from a perforation mount portion to which the stamp assembly is freely detachable; a feed mechanism for feeding the heat-sensitive stencil sheet of the stamp assembly; a thermal head for perforating the heat-sensitive stencil sheet of the stamp assembly; a keyboard; and a control unit for controlling the feed mechanism and the thermal head to perforate a stamp image in the heat-sensitive stencil sheet according to the inputted data.

After the desired image has been perforated on the stamp face of the stamp assembly by the thermal perforating device, ink is automatically supplied from the ink pad through the holes perforated in the stamp face. Therefore, the stamp face need not be coated with ink externally and can be used to print an image such as a character array many times.

SUMMARY OF THE INVENTION

To make the stamp assembly more practical to use, the stamp face could be composed of an ink-impregnated member impregnated with ink and a heat-sensitive stencil sheet fixedly covering the surface of the ink-impregnated member. This improved stamp assembly includes a grip portion; a stamp member fixed to the lower end of the grip portion; and the stamp face, including the ink-impregnated member impregnated with ink and the heat-sensitive stencil sheet, fixed to the underside of the stamp member.

The stamp face of this stamp assembly is perforated to form a mirror-image of the desired image in the stamp face. However, if incorrect data is inputted to the thermal perforating device, the resultant perforated stamp face will not print the image desired by the user. As a result, the stamp assembly will be unusable, and an expensive stamp assembly will be wasted.

This problem would be solved if before the stamp face of the stamp assembly is perforated it were possible to verify that the stamp assembly would produce the desired image. To achieve this, it is conceivable to first thermally print the image on a tape-shaped, heat-sensitive sheet housed in a tape-shaped, heat-sensitive sheet cassette. In this way, the appearance of the image which will be produced by stamping with the stamp assembly can be verified before the stamp image is perforated in the stamp face of the stamp assembly. In this way, it is possible to avoid wasting an expensive stamp assembly.

Because the printed heat-sensitive sheet would faithfully represents the image the stamp assembly will produce, it would be very convenient if the heat-sensitive sheet could be used as a label, for example, to indicate the image which the stamp assembly will produce. However, it is difficult to use a tape-shaped, heat-sensitive sheet to produce a cut sheet which indicates the image a stamp assembly will stamp. Because images formed by different devices appear different, it would be convenient if the image of the sheet for indicating the image which the stamp assembly will print were printed by the same device for thermally perforating the desired image in the stamp face of the stamp assembly.

It is an objective of the present invention to overcome the above-described problems and to provide a sheet cassette that allows verifying, on a cut-sheet heat-sensitive sheet, the stamp image of a stamp assembly before using a thermal head to thermally perforate the stamp face of the stamp assembly; that allows always thermally printing the stamp image on the printing surface of the cut-sheet heat-sensitive sheet without mistaking the heat-sensitive surface from the rear side of the sheet; and that allows using the sheet with the stamp image printed thereon as a label for indicating the stamp image of the stamp assembly.

It is further objective of the present invention to provide a sheet cassette that allows simple and easy load-

ing and unloading of a sheet designed for the heat-sensitive sheet cassette.

To achieve the above-described objectives, a cut-sheet heat-sensitive sheet cassette according to one aspect of the present invention for performing a trial print using a thermal head before using the thermal head to thermally perforate a stamp face of a stamp assembly including a heat sensitive stencil sheet, the cut-sheet heat-sensitive sheet cassette includes: a grip portion; a body base fixed to a lower end of the grip portion and having a flat platen corresponding to the stamp face of the stamp assembly; a cut-sheet heat-sensitive sheet following a surface of the platen and having a positioning hole; a frame-like cover holding a plurality of the sheets and detachably and pivotably provided to the body base by an engaging means; and a positioning pin formed on a lengthwise and of the cover and inserted into the positioning hole of the sheet.

According to another aspect of the present invention, the cut-sheet heat-sensitive sheet has a draw tab at each of two lengthwise ends. The positioning hole is formed in each draw tab at positions thereof shifted off center from a widthwise center of the sheet. The positioning pin is inserted into one of the positioning holes. A cut-sheet heat-sensitive sheet cassette according to this aspect of the present invention further includes a draw window formed on another lengthwise end of the cover and through which the sheet is pulled out via one of the draw tabs.

A cut-sheet heat-sensitive sheet cassette according to a further aspect of the present invention further includes a separable sheet laminated to the sheet via an adhesive, the sheet being cut through to the separable sheet to form cut portions in the sheet.

In a cut-sheet heat-sensitive sheet cassette according to a still further aspect of the invention, the engaging means includes: a first protrusion formed on one lengthwise end of the body base at a position corresponding to an engaging window formed on the one lengthwise end of the cover; a second protrusion formed on another lengthwise end of the body base; a first set of fastening pawls provided to the cover so as to protrude into the engaging window, the first set of fastening pawls elastically engaging the first protrusion; and a second set of fastening pawls formed on the another lengthwise end of the cover, the fastening pawls elastically engaging the second protrusion.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and advantages of the invention will become more apparent from reading the following description of the preferred embodiment taken in connection with the accompanying drawings in which:

Fig. 1 is a perspective view of a stamp assembly of a stamp unit according to an embodiment of the present invention;

Fig. 2 is a vertical cross-sectional front view showing the stamp assembly in a condition wherein its stamp face is perforated,

Fig. 3 is a vertical cross-sectional front view showing the stamp assembly in a condition in which the stamp assembly stamps an image;

Fig. 4 is a view showing an example of a pattern formed in the stamp face of the stamp assembly by thermally perforating the stamp face;

Fig. 5 is a perspective view showing a thermal perforating device of the stamp unit;

Fig. 6 is a perspective view showing the thermal perforating device and the stamp assembly;

Fig. 7 is a planar view showing the thermal perforating device with a portion removed to facilitate explanation;

Fig. 8 is a front view showing the thermal perforating device with portions cut away to facilitate explanation;

Fig. 9 is a side view showing the thermal perforating device with portions cut away to facilitate explanation;

Fig. 10 is a perspective view showing a thermal perforating unit of the thermal perforating device;

Fig. 11 is a vertical cross-sectional front view showing the stamp assembly mounted on the perforation mount portion;

Fig. 12 is a block diagram showing a control unit showing the thermal perforating device;

Fig. 13 is a vertical cross-sectional front view showing a cut-sheet heat-sensitive sheet cassette;

Fig. 14 is a front view showing the sheet cassette in a closed condition;

Fig. 15 is a front view showing the sheet cassette in an open condition;

Fig. 16 is a bird's eye view showing a cover of the sheet cassette and a sheet loaded in the cover;

Fig. 17 a bird's eye view showing the sheet being pulled out from the cover of the sheet cassette;

Fig. 18 is a left-side view showing the sheet cassette;

Fig. 19 is a vertical cross-sectional side view, with portions removed to facilitate explanation, showing the thermal perforating device with the sheet cassette mounted therein; and

Figs. 20 (A) through 20 (C) are bottom views showing modified heat-sensitive sheets with areas thereof half cut to specific sizes.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A cut-sheet heat-sensitive sheet cassette according to a preferred embodiment of the present invention will be described while referring to the accompanying drawings wherein like parts and components are designated by the same reference numerals to avoid duplicating description.

The present embodiment is an example of the present invention applied to a stamp unit including a stamp assembly 1 and a thermal perforating device 50; and to a cut-sheet heat-sensitive sheet cassette 130. As will be described in further detail later, the sheet cassette 130 holds heat-sensitive sheets 160 on which a stamp image to be perforated in a stamp face 30 of the stamp assembly 1 is first printed to confirm correctness of the stamp image before perforating the stamp face 30.

First, the stamp unit will be described. Unless otherwise noted, descriptive terms such as "upper," "lower," "left," "right," "front," and "rear" will be used to describe the stamp unit oriented in the posture in which it is normally used. More specifically, these and similar terms will be used to describe the stamp assembly 1 when oriented as shown in Figs. 2 and 3 and the thermal perforating device 50 when oriented as shown in Fig. 8.

First, the stamp assembly 1 of the stamp unit will be described with reference to Figs. 1 to 4. The stamp assembly 1 includes a grip portion 2 for grasping by hand; a stamp member 3 fixedly connected to the grip portion 2; a skirt member 6 covering the outer-peripheral side of the stamp member 3; and a protection cap 7 freely detachably mounted on the stamp member 3.

A recess portion 11 into which a label 10 is attached is formed at the top portion of the grip portion 2. A guide groove 15 is formed on both the front wall 12 and the rear wall 13 of the grip portion 2. An engaging recess 16 is formed on the front wall 12. A guide hole 18 is formed on the left wall 14.

The stamp member 3 includes a stamp member body 4 and an outer-periphery holding member 5. The stamp member body 4 is inserted into the outer-periphery holder member 5 from the lower side of the holding member 5, thereby fixing it to the holding member 5. Four engaging pawls 17 extend from lower side of the grip portion 2 and protrude outward. The outer-periphery holding member 5 is fixed to the grip portion 2 via the engaging pawls 17.

The stamp member body 4 includes a synthetic resin base member 26 provided with a shallow recess portion 25 on the lower surface thereof; an ink-impregnated member 27 mounted on the recess portion 25 and impregnated with oil-based ink; and a heat-sensitive stencil sheet 28 which covers the lower surface of the ink-impregnated member 27 and the outer-peripheral surface of the base member 26 and which is adhesively attached to the outer-peripheral surface of the base member 26.

The base member 26 is formed from a synthetic resin material having excellent oil-resistant properties or from a metal material. The ink-impregnated member 27 is mounted on the recess portion 25 to prevent the ink-impregnated member 27 from shifting out of position and to prevent ink from seeping out of the ink-impregnated member 27. The ink-impregnated member 27 is made from a foam member, which is an elastic synthetic resin material, or from a non-woven fabric. The ink-impregnated member 27 is impregnated with ink to a saturated state. The heat-sensitive stencil sheet 28 includes a thermoplastic film; a porous carrier; and an adhesive layer through which the thermoplastic film and the porous carrier are adhesively attached to each other.

The portion of the heat-sensitive stencil sheet 28 in contact with the surface of the ink-impregnated member 27 serves as the stamp face 30. The stamp face 30 substantially covers the entire lower surface of the stamp member 3.

The skirt member 6 is freely movable vertically in regards to the grip portion 2 and the outer-periphery holding member 5. A spring 20 for resiliently urging the skirt member 6 downward is mounted between a protrusion 29 at the center of the skirt member 6 and the upper wall of the grip portion 2. Engaging holes 19 are formed in the protrusion 29 at positions which fall into horizontal alignment with the engaging hole 18 when the skirt member 6 is disposed in its uppermost position.

The protection cap 7 is freely detachably disposed to cover the lower end side of the stamp member body 4, thereby protecting the stamp member body 4. The protection cap 7 is engaged with and supported by the outer-peripheral wall portion of the skirt member 6.

The thermal perforating device 50 includes a thermal head for perforating dot-pattern perforations in the stamp face 30 to form a mirror image of the desired stamp image. An example of a mirror image is shown in Fig. 4, wherein a character train for "ABC" is surrounded by six concentric rectangular frames. Perforating the stamp face 30 with this patter forms a stamp unit capable of stamping the character train "ABC" and the six concentric rectangular frames. Accordingly, like an ordinary stamp having a stamp face formed of rubber, the base member 26 is capable of stamping the desired image approximately 1,000 times.

To perforate the heat-sensitive stencil sheet 28, which constitutes the stamp face 30, the stamp assembly 1 is mounted to the perforation mount portion 71 of the thermal perforating device 50 and a guide bar 83 of the perforating device 50 is inserted through engaging holes 18 and 19 so that the skirt member 6 is maintained in its uppermost position during perforation. Although, the protection cap 7 is mounted to the stamp assembly 1 when the stamp, assembly 1 is not being used, when the desired image is to be stamped, the protection cap 7 is removed as shown in Fig. 3 and the skirt member 6 is positioned on the surface of a sheet at the stamping position, thereby positioning the stamp face 30 of the stamp member 3. Thereafter, the grip portion 2 is pressed downward to stamp the image.

Next, the thermal perforating device 50 will be explained with reference to Figs. 5 to 12. As shown if Figs. 5 to 7, the thermal perforating device 50 includes a body frame 51; a keyboard 52 and a liquid crystal display 53 provided at the front portion of the body frame

51; a thermal perforating unit 54 provided at the rear portion of the body frame 51; and a control unit 110 provided to the interior of the body frame 51.

A plurality of character and symbol keys 56, various function keys, and a main switch 67 are provided to the keyboard 52. The character and symbol keys 56 include a plurality of character and symbol keys, which are used for both Japanese kana and Roman alphabet. Some function keys include a cursor shift key 57, an execution key 58, a line-feed key 59, a determine/end key 60, a cancel key 61, a delete key 62, a shift key 63, a lowercase letter switch 64, a letter-type selection switch 65, and a perforation switch 66.

The liquid crystal display 53 is designed to display character trains of plural lines corresponding to the pattern to be stamped by the stamp assembly 1.

Next, the thermal perforating unit 54 will be described. As shown in Figs. 8 to 11, the thermal perforating unit 54 includes a subframe 70; a perforation mount portion 71 for freely detachably mounting the stamp assembly 1; and a thermal perforating mechanism 72 for perforating in dot form the stamp face 30 of the stamp assembly 1 mounted on the perforation mount portion 71.

The perforation mount portion 71 will be described next. An opening 74 is formed in the right-side wall 73 of the subframe 70. The opening 74 has substantially the same shape as a cross-section of the lower half of the stamp assembly 1, wherein the greatest width of the stamp member 3 is from front to rear direction. A sector gear 76 is fixedly provided to an open/close door 75 for opening and closing the opening 74. The open/close door 75 and the sector gear 76 are freely rotatably mounted on the right-side wall 73 by a pivot shaft 77. A pair of front and rear parallel guide members 78 and 79 are provided to the upper portion of the subframe 70. Guides 80 extending in parallel with, and leftward and rightward horizontally toward, each other are provided to the lower ends of the guide members 78 and 79.

A pair of right and left rollers 81 are provided on the front side of the guide member 78 through an elongated hole so as to be movable within a short distance frontward and rearward. A spring 82 urges the rollers 81 rearward.

The guide bar 83 is fixed to the front guide member 78 at a middle position between the guide members 78 and 79. A tapered face 84, which slants downward to the right, is formed on the upper surface on the right end portion of the guide bar 83. An engaging portion 85 for defining the leftmost limit the stamp assembly 1 can travel is formed at the left end portion of the guide bar 83.

The stamp assembly 1 is inserted through the opening 74 and the pair of front and rear guide portions 80 are engaged in the pair of front and rear guide grooves 15 in the grip portion 2 of the stamp assembly 1. As a result the stamp assembly 1 is supported by the pair of guide portions 80 and is urged rearward by the spring 82, with the aid of the pair of rollers 81, to be accurately positioned in the front and rear directions. The stamp assembly 1 also abuts against the engaging portion 85 and the right roller 81 engages with the engaging recess 16 of the grip portion 2, allowing the position of the stamp assembly 1 to be accurate]y set in the left and right directions.

When the stamp assembly 1 is mounted on the perforation mount portion 71, the guide bar 83 is inserted through the guide holes 18 and 19 of the stamp assembly 1, whereby the skirt member 6 is moved upward to, and maintained in, its highest position, as shown in Fig. 2.

The thermal perforating mechanism 72 will be described next. A guide rod 88 and a head-switching rod 89 are suspended across the right-side wall 73 and the left-side wall 86 of the subframe 70 so as to extend leftward and rightward on the lower side of the perforation mount portion 71. The guide rod 88 guides a carriage 87. The head-switching rod 89 operates a cam member 91 for switching the position of a thermal head 90 mounted on the carriage 87. The cam member 91 is mounted on the head-switching rod 89 so that it rotates with rotation of the head-switching rod 89 and so that it is freely slidable in the axial direction of the head-switching rod 89. The carriage 87 is supported by the guide rod 88 and the head-switching rod 89 so as to be freely movable in the right and left directions. A rack 92 extending the entire length of the carriage 87 is formed at the front end of the carriage 87.

A cam contact plate 93 and a head heat-radiating plate 94 are mounted on the carriage 87 so as to be freely vertically pivotable on a shaft 95 extending in the leftward and rightward direction. The thermal head 90 is fixed to the head heat-radiating plate 94. A spring 97 is wound around a pin 96 fixed to the head heat-radiating plate 94, thereby elastically urging the head heat-radiating plate 94 upward relative to the cam contact plate 93.

The cam member 91 is designed in an elliptical shape and is in abutment contact with the lower surface of the cam contact plate 93. When the cam member 91 is oriented into a reclining posture by rotation of the head-switching rod 89, the thermal head 90 will be released downward together with the head heat-radiating plate 94. When the cam member 91 is oriented into an upright posture, the thermal head 90 will be swung upward by the cam contact plate 93 and the spring 97 and switched into a perforation position.

A gear 98 is provided on the right end portion of the head-switching rod 89 and is engaged with the Sector gear 76 on the outside wall of the right-side wall 73 of the subframe 70. When the open/close door 75 is opened, the cam member 91 will be oriented into its reclining posture. When the open/close door 75 is closed, the cam member 91 will be switched into its upright posture.

The front wall 99 of the subframe 70 is provided with a stepping motor 100 for driving the carriage 87; a driving gear 101 engaged with the rack 92; and a decelerating mechanism 103 for transferring the rotation of

an output gear 102 of an output shaft of the stepping motor 100 to the driving gear 101.

Because rotational force of the stepping motor 100 is decelerated and transferred to the driving gear 101, the carriage 87 can be driven to move leftward and rightward by the stepping motor 100. The thermal head 90 is the same type as the thermal head of a thermal printer. For example, the thermal head 90 is provided with ninety-six heating elements aligned in a row in the front and rear directions.

Next, an explanation will be provided for a control system which includes a control unit 110 and a liquid crystal display 53. The control unit 110 drive-controls the heat perforation mechanism 72.

As shown in Fig. 12, the control unit 110 is connected to the keyboard 52; the thermal head 90; the carriage feeding motor 100; the liquid crystal display 53; two contactless switches 104 and 105 which detect the presence of the stamp unit 1 and its width in the front and rear direction; and a contactless switch 106 for detecting the sheet cassette 130.

In the present embodiment, there are two types of stamp assemblies 1 usable in the thermal perforation device 50. In Fig. 9, a narrow-width type is indicated by a solid line and a wide-width type is indicated by a chain line. As shown in Figs. 7 to 9, the two contactless switches 104 and 105 are fixed in an upright posture to the lower surface at the rear side of the guide member 79. A wide-width stamp assembly 1 is detected by the contactless switches 104 and 105, and a narrow-width stamp assembly 1 is detected by the contactless switch 104. Further, the contactless switch 106 for detecting the sheet cassette 130 described later is similarly fixed in a position to the left of, and a predetermined distance from, the contactless switch 104.

As shown in Fig. 12, the control unit 110 is provided with a CPU 111; a ROM 112; a RAM 113; a perforation CG-ROM 114; a display CG-ROM 115 for generating data of characters to be displayed on the display 53; an input interface 116 connected to the keyboard 52 and the contactless switches 104, 105, and 106; and an output interface 117. These elements are connected to one another through a bus 118. The control unit 110 is also provided with a head-driving circuit 119, a motor driving circuit 120, and a display driving circuit 121, which are connected to the output interface 117.

The ROM 112 is provided with a program memory 122 for storing a control program used to control the operation of the thermal perforating device 50. The ROM 112 is also provided with a dictionary memory 123 for kana/kanji conversion, and the like.

The RAM 113 is provided with an input buffer 124 for storing input data, a perforation buffer 125 for storing perforation data, a shift register 126, and various other counters and registers.

The perforation CG-ROM 114 stores the dot pattern data of many characters in correspondence with code data. The display CG-ROM 115 stores the display dot pattern data of many characters in correspondence with code data.

When it is desired to perforate an image in the stamp face 30 of the stamp assembly 1, then an operator inputs the desired image into the control unit 110 from the keyboard 52 of the thermal perforating device 50. Next, the dot pattern data for perforating a mirror image of the desired image is prepared and stored. Afterward, the operator mounts the stamp assembly 1 on the perforation mount portion 71, whereupon the stamp face 30 of the stamp assembly 1 is thermally perforated by the control unit 110 and the thermal perforating mechanism 72. After the stamp image has been perforated on the stamp face 30, ink in the ink-impregnated member 27 will seep from the perforations of the stamp image so that desired image can be stamped many times in the same way as an ordinary rubber stamp.

Next, the cut-sheet heat-sensitive sheet cassette 130 having the characteristic configuration of the present invention will be discussed with reference to Figs. 13 to 20. Hereinafter, descriptive terms such as "upper," "lower," "left," "right, "front," and "rear" will be used to describe the sheet cassette 130 oriented as shown in Figs. 13 and 15 unless otherwise noted. As shown in Figs. 13, 14, and 15, the cassette 130 includes a grip portion 140 for manual grasping; a body base 150 formed integrally to the lower end of the grip portion 140; a platen 180 urged downward from the body base 150; the cut-sheet heat-sensitive sheet 160 which is slightly wider than the stamp face 30 of the stamp assembly 1; and a cover 170 removably and pivotally attached to the body base 150.

The grip portion 140 is formed from a synthetic resin to substantially the same shape as the grip portion 2 of the stamp assembly 1. The grip portion 140 is hollow. A slit 141 for inserting the guide bar 83 of the thermal perforating device 50 is formed in the left-side wall of the grip portion 140. As shown in Figs. 14 and 15, guide grooves 142 similar to the guide grooves 15 of the stamp assembly 1 are formed in the lower portion of the front and rear surfaces of the grip portion 140.

The body base 150 is integrally connected to the lower edge of the grip portion 140. Left and right pairs of spring supports 151 are formed to the upper inner surface of the body base 150. As shown in Fig. 15, left and right pairs of engaging windows 152 and left and right protrusions 153A and 153B are formed on the front and rear faces 154 of the body base 150. The left protrusions 153A are disposed lower on the front and rear faces 154 than are the right protrusions 153B.

The platen 180 is disposed to the lower side of the body base 150. Left and right pairs of spring supports 181 are formed on the upper face of the platen 180 at positions corresponding to the spring supports 151 of the body base 150. Compression springs 183 are mounted between spring supports 151 and 181. As Shown in Fig. 15, left and right pairs of engaging pawls 182 for engaging in the engaging windows 152 of the

body base 150 are formed on the front and rear faces of the platen 180 at positions corresponding to the engaging windows 152. Also, guide grooves 184 for slidingly engaging sliding portions (not shown) at the confronting inside surface of the body base 150 are formed at the center of the front and rear faces of the platen 180. A rectangular rubber sheet 185 is affixed to the underside of the platen 180 by an adhesive 186.

The platen 180 is supported to the body base 150 by the springs 183 mounted between the spring supports 181 and the spring supports 151 of the body base 150, by engagement of the engaging pawls 182 in the engaging windows 152 of the body base 150, and by sliding movement of the guide grooves 184 in the sliding portion (not shown) on the inside of the body base 150. The platen 180 is also urged downward by the springs 183.

The sheets 160, otherwise known as heat-sensitive label sheets, are formed by laminating a separable sheet 160A and a heat-sensitive sheet 160B together. The heat-sensitive sheet 160B is formed with a heat-sensitive layer at its lower side and an adhesive at its upper side, the separable sheet 160A being adhered to the lower side of the heat-sensitive sheet via the adhesive. The sheets 160 are cut slightly wider than the stamp face 30 of the stamp assembly 1 and are loaded in the cover 170 beneath the platen 180. As shown in Fig. 16, a draw tab 161 is formed on both lengthwise sides of each sheet 160. A positioning hole 162 and a slit 163 are opened in each draw tab 161 at positions thereof off-center in the widthwise direction of the sheet 160. The slits 163 run from corresponding positioning holes 162 to the lengthwise edge of the corresponding draw tab 161

Alternative types of cut-sheet heat-sensitive sheets 160 are shown in Figs. 20 (A) through 20 (C). Cut-out portions 165, 166, and 167 corresponding to regions where desired images are to be printed are half cut into the sheet 160, that is, are cut into the heat-sensitive sheet 160B, but not through to the separable sheet 160A. The different types of cut-out portions 165 to 167 correspond to different size stamp faces 30. After a desired image is printed on the cut-out portions 165 to 167, the cut-out portions 165 to 167 are peeled off the separable sheet 160A and used as labels.

The cover 170 frames the sheets 160 loaded in a stack therein. A positioning pin 171 for mounting one of the positioning holes 162 is formed at the left side on the lower inside surface of the cover 170 at a position thereof off-center in the widthwise direction. A draw opening 176 through which one of the draw tabs 161 protrudes is formed on the lower part of the right-side face of the cover 170. An opening 172 having a shape slightly wider than the stamp face 30 of the stamp assembly 1 is formed on the lower face of the cover 170.

Further, an engaging window 174A is formed at the left side on the front and rear faces of the cover 170 at positions corresponding to positions of the left protrusions 153A of the body base 150. Engaging pawls 173A for engaging with the protrusions 153A are formed on the lower inside portion of the engaging windows 174A so as to protrude partially into the engaging windows. A notch 174B is formed at the right side on the front and rear faces of the cover 170 at positions corresponding to positions of the right protrusions 153B of the body base 150. Engaging pawls 173A are formed to the right side on the front and rear faces of the cover 170 so as to protrude into the notch 174B. Notches 175 into which lengthwise ends of the faces 154 are engaged are formed at the left side face of the cover 170.

Next, operation of the cassette 130 will be explained based on operations for perforating the sheet 160 using the thermal perforating device 50 explained previously.

To open the cover 170 of the cassette 130 from the closed condition shown in Fig. 14 to the open condition shown in Fig. 15, the engaging pawls 173A and 173B of the cover 170 must be disengaged from the protrusions 153A and 153B of the thermal perforating device 50. Because the engaging pawls 173A and 173B are made of an elastically deformable synthetic resin, they can be easily disengaged from the protrusions 153A and 153B by gripping the grip portion 140 and the cover 170 and pulling the grip portion 140 and the cover 170 apart.

Because the left protrusions 153A protrude only partially into the engaging windows 174A, a space is opened in the engaging windows 174A above the left engaging pawls 173A. Pulling the grip portion 140 downward will disengage the left protrusions 153A from the engaging pawls 173A and move the left protrusions 153A into the space. In this condition the cover 170 can be rotated open with the protrusions 153A serving as an axis of rotation as shown in Fig. 15.

By pivoting the cover 170, which has been separated from the body base 150, open from the closed condition, it is possible to secure a wide space between the cover 170 and the body base 150, thereby allowing multiple sheets 160 to be easily and uniformly placed in the cover 170. Therefore, it is easy to load the sheets 160 into the cover by inserting the positioning hole supplied on the draw tab of the sheet onto the positioning pin supplied on the other lengthwise side of the cover.

Next, the sheets 160 are stacked in the cover 170 by inserting the positioning hole 162 of one of the draw tabs 161 onto the positioning pin 171 provided to the cover 170. Because the positioning holes 162 and the positioning pin 171 are provided at positions off-center of the widthwise direction, the sheets 160 can always be placed in the cover 170 so that the heat-sensitive side of the sheet 160 is facing the opening 172, without mistaking the top for the bottom of the sheet 160. In this way, the desired image for the stamp assembly will always be printed on the correct side of the heat-sensitive sheet. This is especially effective when printing on sheets 160 with cut-out portions shown in Fig. 20, because printing will be reliably performed within the cut-out portions. Further, because the sheet 160 is disposed within the frame-like cover 170, the sheet 160 will not rotate

around the positioning pin 171 or move from side to side.

Next, in order to return the cover 170 from its open condition shown in Fig. 15 to its closed condition shown in Fig. 14, the cover 170 of the cassette 130 is pivoted closed around the left protrusion 153A and the engaging pawls 173A and 173B are brought into engagement with the protrusions 153A and 153B. Because the engaging pawls 173A and 173B are made of an elastically deformable synthetic resin, they can easily be brought into engagement with the protrusions 153A and 153B by grasping the grip portion 140 and the cover 170 and pushing them together.

In addition, the urging force applied to the platen 180 by the spring 183 moves the sheets 160 loaded inside the cover 170 to the lower part of the platen 180 and holds them between the platen 180 and the cover 170 in a position parallel to the surface of the platen 180. Therefore, regardless of the number of sheets 160 disposed in the cover 170, the sheets 160 will be urged against the cover 170, enabling reliable perforation (to be described later) without the sheet 160 moving vertically.

A trial of the desired stamp image is printed in the portion of the sheet 160 exposed in the opening 172 of the cover 170 and positioned below the platen 180. The trial of the desired stamp image is printed on the sheet 160 in a manner similar to perforation operation shown in Fig. 9 for the stamp face 30. First, data for the desired stamp image is inputted from the keyboard 52 into the control unit 110. The stamp image thermally printed as a trial on the sheet 160 must be a correct stamp image, rather than a mirror image of the stamp image as is the case when perforating the stamp face 30. The program memory of the control unit 110 stores a control program for reading dot pattern data, which is used during thermal perforation, from the perforating buffer 125 in response to a predetermined signal command. While retrieving the dot pattern data, the program also converts the dot pattern data into dot pattern data for thermally printing a non-mirror image form of the stamp image. The dot pattern data for printing the non-mirror stamp image is used to thermally print the stamp image in the sheet 160 of the sheet cassette 130.

After the input data has been established in the control unit 110, but before the stamp face 30 of the stamp assembly 1 is perforated, the cassette 130 is set in the perforation mount portion 71 of the thermal perforating device 50 as shown in Fig. 19. Then, the proper, non-mirror image stamp image is thermally printed on the sheet 160 beneath the platen 180 via the control unit 110 and the thermal perforating mechanism 72. Afterward, the cassette 130 is removed from the perforation mount portion 71.

After removing the cassette 130 from the thermal perforating device 50, the sheet 160, which has been thermally printed, is pulled out of the cassette 130. The draw opening 176 for removing the sheet 160 is located at the lower portion at the right side face of the cover 170. The draw tab 161 of the sheet 160 is exposed from the draw opening 176, as shown in Fig. 16. The slit 163 leading from the positioning hole 162 to the outer edge of the sheet 160 is also exposed outside the cover. Therefore, by grasping the draw tab 161 and pulling in the direction indicated by the arrow A shown in Fig. 17, one sheet at a time of the sheet 160 can be easily pulled out of the cassette 130.

In this way, when the stamp image thermally printed on the sheet 160 is confirmed as satisfactory, the data for the stamp image need not be revised. Then, an unperforated stamp assembly 1 is mounted in the thermal perforating device 50, and the stamp face 30 of the stamp assembly 1 is perforated with the stamp image.

The thermally printed sheet 160 can also serve as a label 10 for the stamp assembly 1, particularly when using one of the sheets 160 shown in Fig. 20, which have cut-out portions 165, 166, and 167 that can serve as adhesive labels. Labels 10 that match various types of stamp assemblies 1 can be easily prepared by thermally printing within the out-out portions 165, 166, and 167 with the thermal perforating device 50,

When the image thermally printed on the sheet 160 is not the desired stamp image, either the stamp image data inputted to the control unit 110 of the thermal perforating device 50 is revised or else new data for the stamp image is inputted. Then, the above-described processes, such as thermally printing the sheet 160 of the cassette 130 as described above, are repeated.

It is noted that the trial printing for the sheet 160B with cut-out portions is similar to the above-described printing operation for the sheet 160. Before inputting data for the desired stamp image, the user manipulates the key board 52 to select a size of his/her desired stamp face 30. For example, the user selects one of predetermined three sizes: small size, medium size, and large size. The cut-out portions 166, 167, and 165 of the heat-sensitive sheets 160B correspond to the small, medium, and large sizes, respectively. The user then manipulates the key board 52 to select to perform a perforation to a stamp face 30 or to perform a trial print on a heat-sensitive sheet 160B.

When selecting a trial print, the user sets, in the device 50, a cassette 130 loaded with sheets 160B formed with the cut-out portions corresponding to his/her desired size. The device 50 then prints the inputted stamp image on a heat-sensitive sheet at a position corresponding to the cut-out portion. Thus, the desired stamp image is properly printed within the cut-out portion of the desired size. A label of the desired size is thus obtained.

Although not shown in the drawings, each sheet 160B is formed with a specifying portion for specifying or indicating a size of cut-out portions formed therein. The device 50 is provided with a detector, such as a photosensor, for detecting the specifying portion. When a cassette 130 is set in the device 50, the photosensor can detect the specifying portion of a sheet 160B held in the cassette 130. The device 50 can judge whether the

detected size is consistent with the user's inputted size. When not, the display 53 indicates an error message and the device 50 does not perform a printing operation.

It is noted that each sheet 160B is formed with two cut-out portions. The positions of the two cut-out portions are the same with each other relative to the corresponding positioning holes 162. Accordingly, by changing the holes 62 to be inserted into the pin 171, both of the two cut-out portions can be used for labels.

The foregoing particulars apply to the cassette 130 of the present embodiment, in which the sheet 160 or 160B is loaded in the cover 170 by inserting the positioning hole 162 provided on the draw tab 161 of the sheet 160 onto the positioning pin 171 provided on the cover 170. Because the positioning pin 171 and the positioning hole 162 are both formed in a position off-center in the widthwise direction of the cover 170, the sheet 160 can be accurately placed in the cover 170 without mistaking the top from the underside of the sheet 160. In this way, the stamp image for the stamp assembly 1 can be properly printed by the thermal perforating device 50 on the correct side of the heat-sensitive sheet 160. Further, the frame-like shape of the cover 170 prevents the sheet 160, which is centered on the positioning pin 171, from moving horizontally.

In addition, cut-out portions 165, 166, and 167 are cut into the heat-sensitive sheet 160B laminated to the separable sheet 160A by an adhesive. The cut-out portions correspond to sizes of different stamp faces 30. Therefore, which sheet 160 is used for the trial printing is selected according to the size of the stamp face 30. After verifying the stamp image, the character size, and the arrangement of the stamp image to be perforated on the stamp face 30 of the stamp assembly 1, the printed cut-out portions 165 to 167 can be peeled from the separable sheet 160A and used as labels 10 for displaying the content of the stamp face 30 of the stamp assembly 1.

Further, by providing engaging pawls 173A at the lower part of the engaging window 174A so that the engaging pawls 173A engage with the left protrusion 153A, once the upper face of the cover 170 and the lower face of the body base 150 are separated, the cover 170 can be swung open on the protrusions 153A of the body base 150. Therefore, a wide space can be secured between the cover 170 and the body base 150, and the sheets 160 can easily be loaded in the cover 170.

The above-described present invention can provide a sheet cassette which enables printing an image for a stamp face of a stamp assembly on a sheet before using a thermal head to thermally perforate the stamp face. In this way, the details of the image can be verified by a trial printing on the sheet. Further, the stamp image can always be printed on the correct side of the heat-sensitive sheet without mistaking the top from the underside of the sheet. In addition, the sheet printed with the stamp image can be used as a label to indicate the stamp image of the stamp assembly. Additionally, the present invention offers a sheet cassette that allows for the easy loading and unloading of the sheet.

While the invention has been described in detail with reference to specific embodiments thereof, it would be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention, the scope of which is defined by the attached claims.

Claims

1. A cut-sheet heat-sensitive sheet cassette for performing a trial print using a thermal head before using the thermal head to thermally perforate a stamp face of a stamp assembly including a heat sensitive stencil sheet, the cut-sheet heat-sensitive sheet cassette comprising:

   a body base having a flat platen;

   a cut-sheet heat-sensitive sheet following a surface of the platen;

   a frame-like cover holding a plurality of said sheets; and

   engaging means for detachably and pivotably engaging said cover to said body base.

2. A cut-sheet heat-sensitive sheet cassette as claimed in claim 1 further comprising a grip integrally provided to said body base.

3. A cut-sheet heat-sensitive sheet cassette as claimed in claim 1 or 2 wherein said engaging means comprises:

   a first protrusion formed on one lengthwise end of said body base;

   a second protrusion formed on another lengthwise end of said body base;

   a first set of fastening pawls provided to said cover so as to protrude partially into a window formed on one lengthwise end of said cover at a position corresponding to the first protrusion, the first set of fastening pawls detachably elastically engaged with the first protrusion;

   a second set of fastening pawls formed on another lengthwise end of said cover, the fastening pawls detachably elastically engaging the second protrusion.

4. A cut-sheet heat-sensitive sheet cassette as claimed in one of claims 1 to 3, wherein:

   said sheet has a positioning hole formed in one lengthwise end thereof at a position shifted from a widthwise center of said sheet; and

   said cover includes a positioning pin formed on the one lengthwise end thereof, the positioning pin inserted into the positioning hole of said sheet.

5. A cut-sheet heat-sensitive sheet cassette as claimed in one of claims 1 to 4, wherein:

   said sheet includes a draw tab at at least one

lengthwise end; and
said cover has a draw window on a lengthwise end thereof, the draw tab protruding through the draw window.

6. A cut-sheet heat-sensitive sheet cassette as claimed in one of claims 1 to 5 further comprising an urging means for urging the platen against said sheet so that said sheet is urged against said cover.

7. A cut-sheet heat-sensitive sheet cassette for performing a trial print using a thermal head before using the thermal head to thermally perforate a stamp face of a stamp assembly including a heat sensitive stencil sheet, the cut-sheet heat-sensitive sheet cassette comprising:

a grip portion;

a body base fixed to a lower end of said grip portion and having a flat platen corresponding to the stamp face of said stamp assembly;

a cut-sheet heat-sensitive sheet following a surface of the platen and having a positioning hole;

a frame-like cover holding a plurality of said sheets and detachably and pivotably provided to said body base by an engaging means; and

a positioning pin formed on a lengthwise end of said cover and inserted into the positioning hole of said sheet.

8. A cut-sheet heat-sensitive sheet cassette as claimed in claim 7 wherein the cut-sheet heat-sensitive sheet has a draw tab at each of two lengthwise ends, the positioning hole being formed in each draw tab at positions thereof shifted off center from a widthwise center of said sheet, the positioning pin being inserted into one of the positioning holes, the cut-sheet heat-sensitive sheet cassette further comprising a draw window formed on another lengthwise end of said cover and through which said sheet is pulled out via one of said draw tabs.

9. A cut-sheet heat-sensitive sheet cassette as claimed in one of claims 1 to 8 further comprising a separable sheet laminated to said sheet via an adhesive, said sheet being cut through to the separable sheet to form cut portions in said sheet.

10. A cut-sheet heat-sensitive sheet cassette as claimed in one of claims 7 to 9 wherein the engaging means comprises:

a first protrusion formed on one lengthwise end of said body base at a position corresponding to an engaging window formed on the one lengthwise end of said cover;

a second protrusion formed on another lengthwise end of said body base;

a first set of fastening pawls provided to said cover so as to protrude into the engaging window, the first set of fastening pawls elastically engaging the first protrusion; and

a second set of fastening pawls formed on the another lengthwise end of said cover, the fastening pawls elastically engaging the second protrusion; and

wherein said cover is pivotably openable by disengaging the first and second protrusions from the first and second sets of fastening pawls and shifting the first protrusion in the engaging window away from the first set of fastening pawls.

11. A cut-sheet heat-sensitive sheet cassette as claimed in one of claims 4 to 10 wherein said positioning pin is provided on said cover at a position shifted in a widthwise direction.

FIG. 1

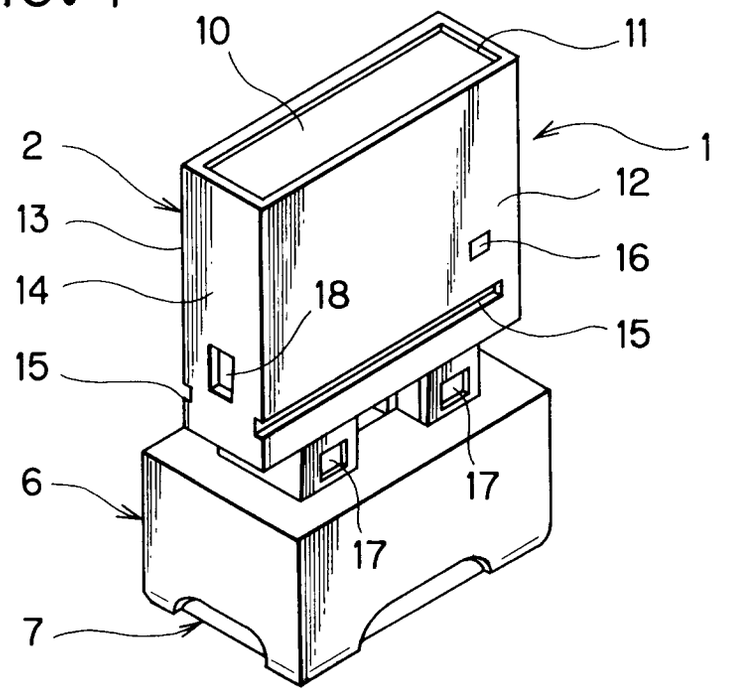
10
11
2
1
13
12
14
16
18
15
15
17
6
17
7

FIG. 2

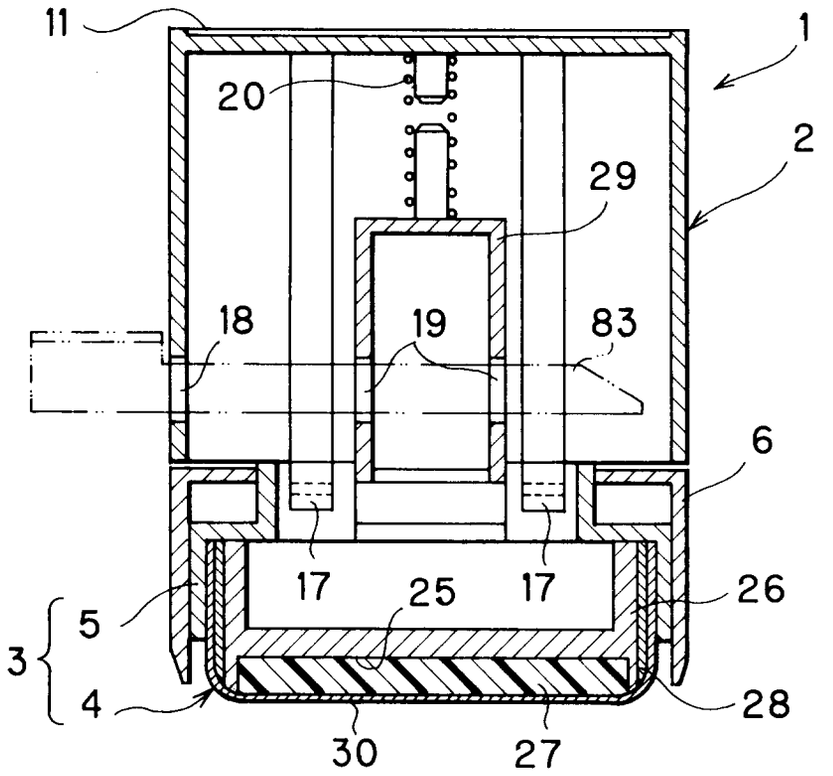
11
1
20
2
29
18
19
83
6
17
25
17
26
5
3
4
28
30
27

FIG. 3

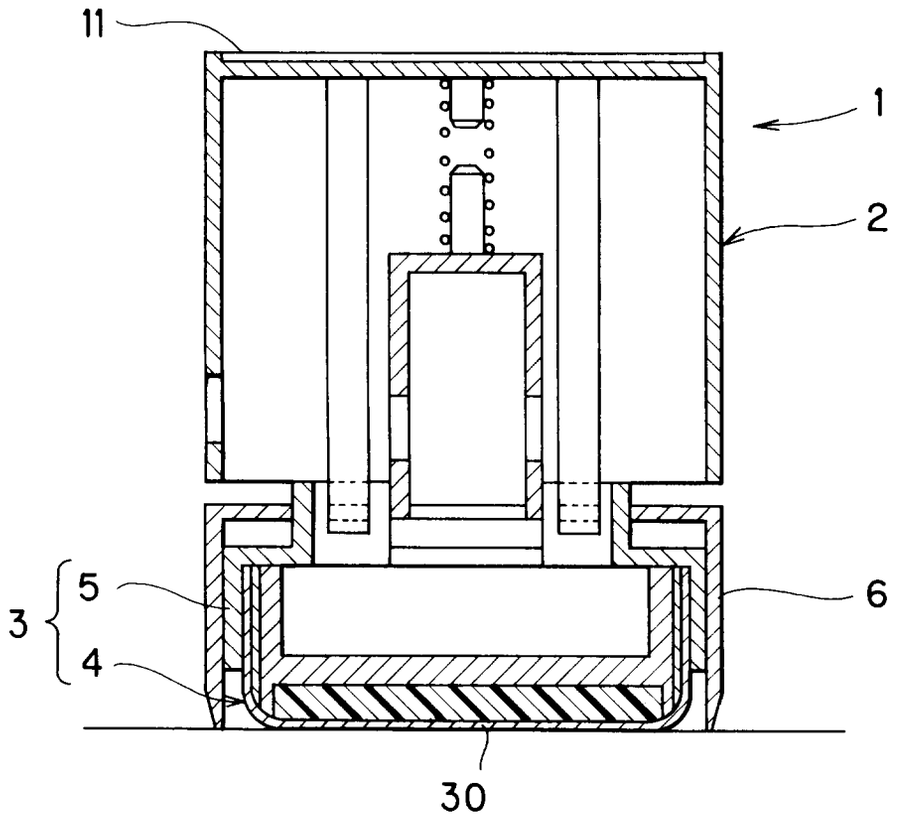

FIG. 4

FIG. 5

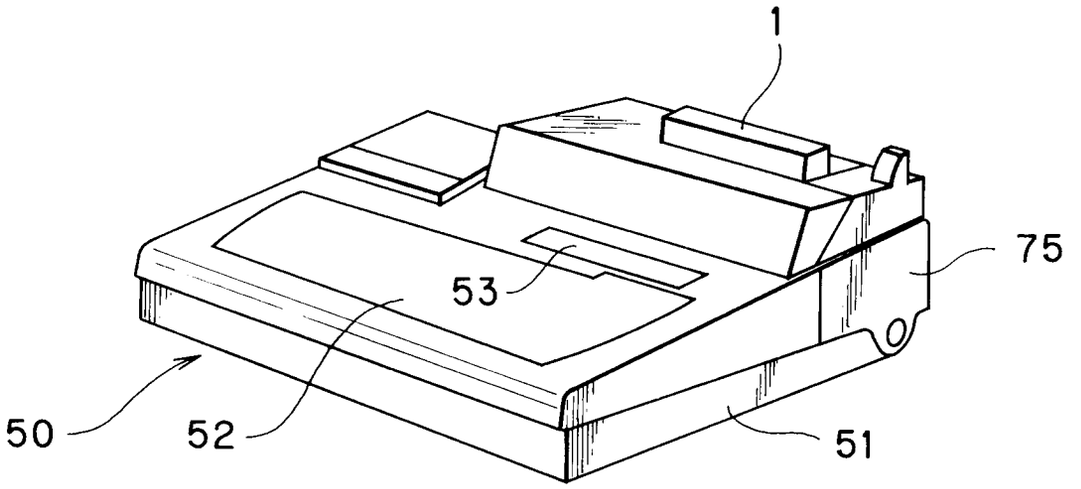

FIG. 6

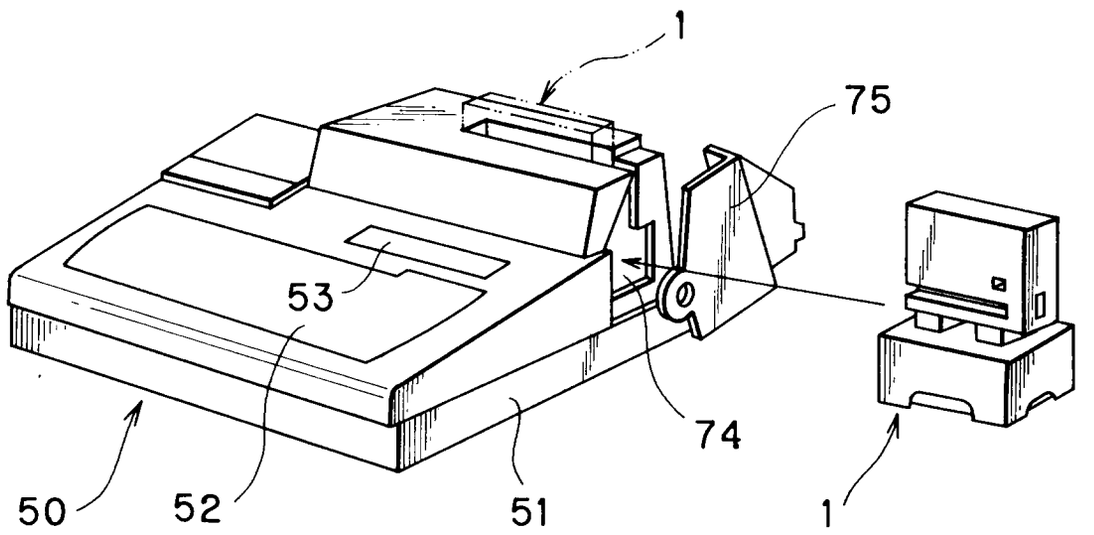

FIG. 7

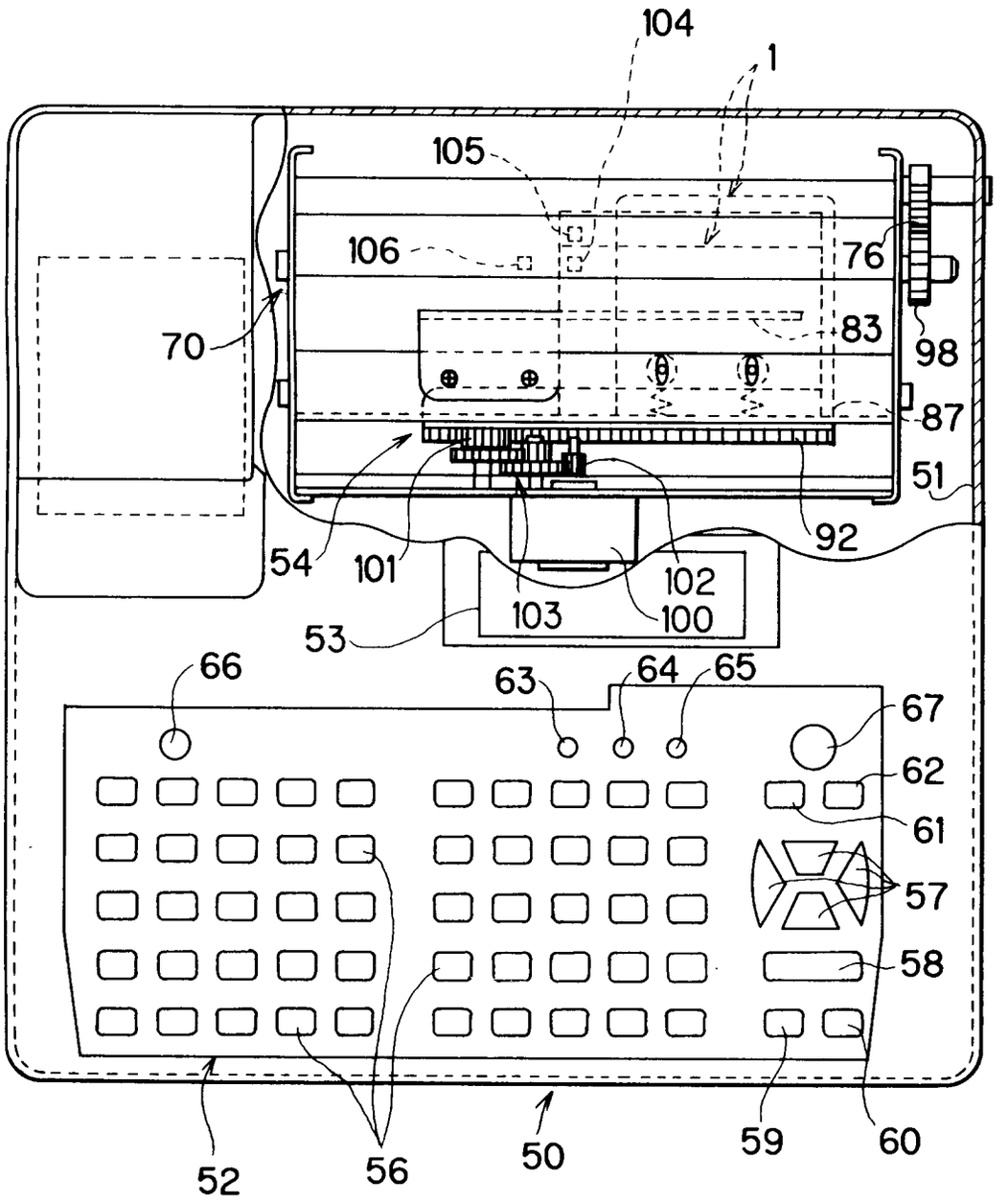
104
1
105
106
76
70
83
98
87
51
54
101
92
102
103
100
53
66
63
64
65
67
62
61
57
58
52
56
50
59
60

FIG. 8

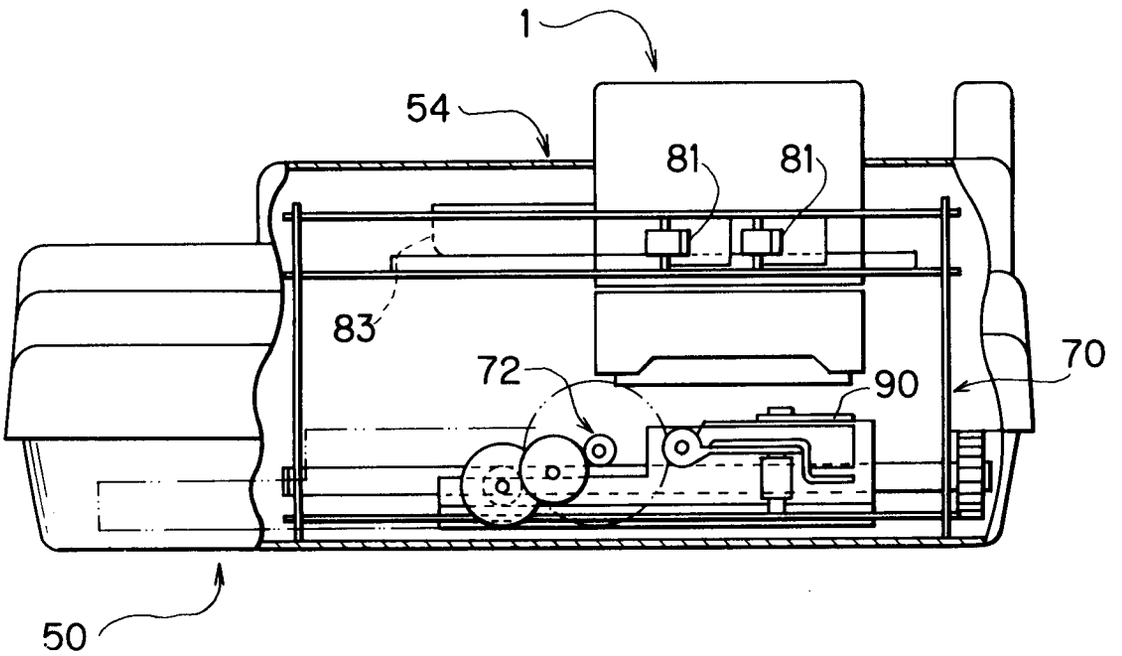
1
54
81
81
83
72
90
70
50

FIG. 9

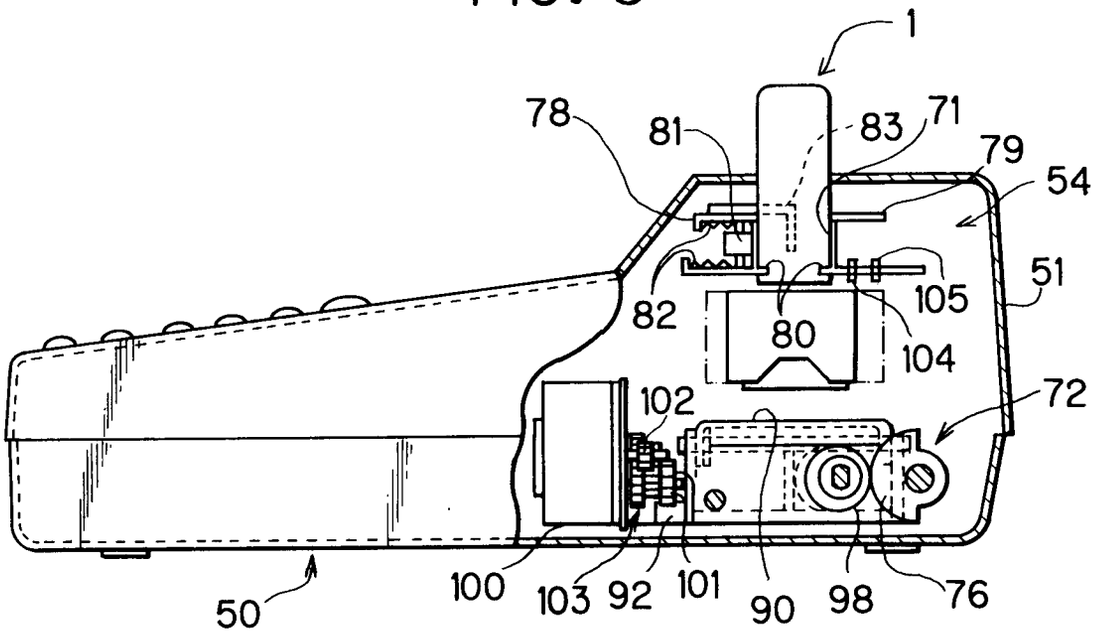
1
78
81
83
71
79
54
51
82
105
80
104
72
102
100
103
92
101
90
98
76
50

FIG. 10

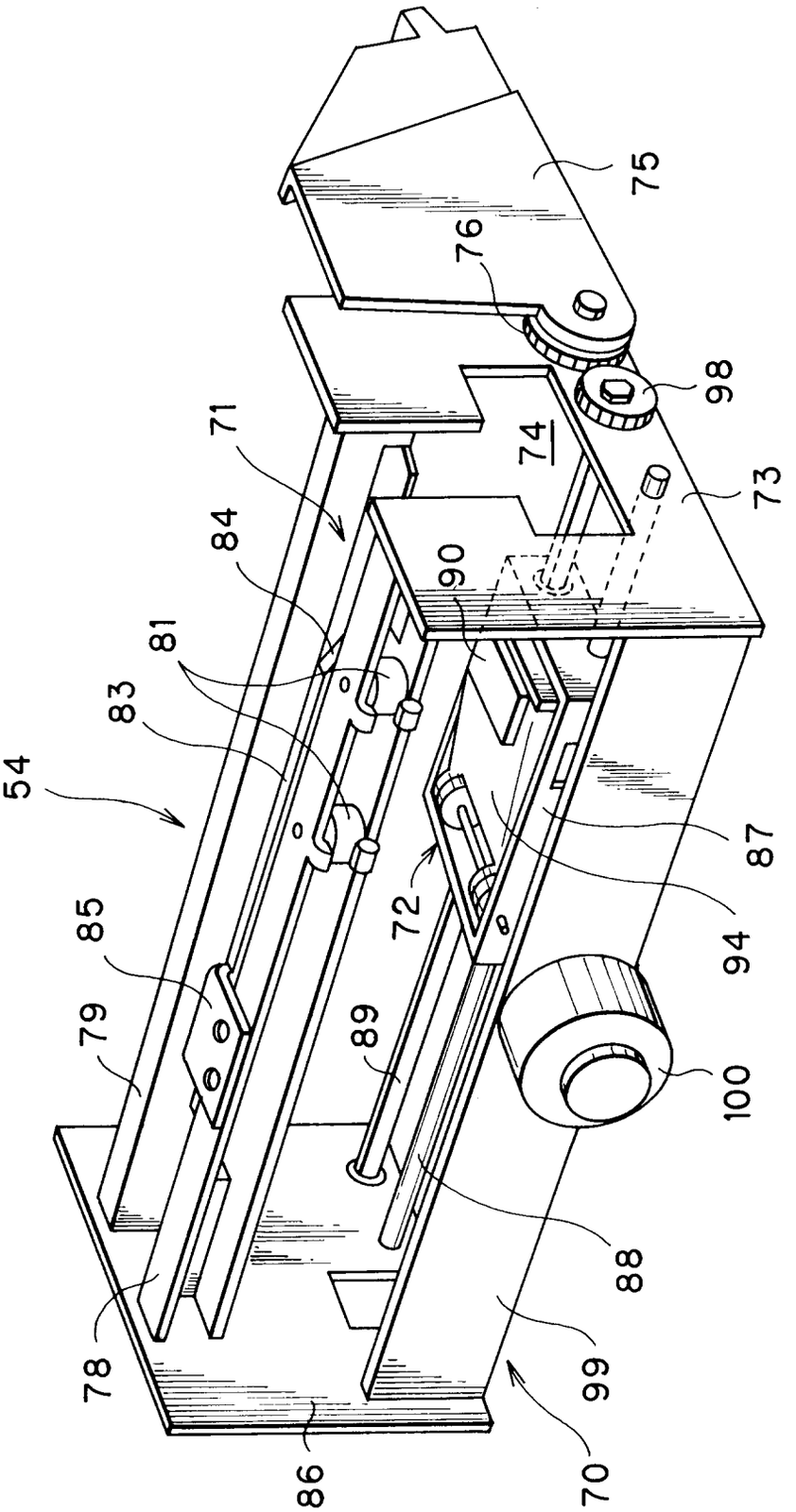

FIG. 11

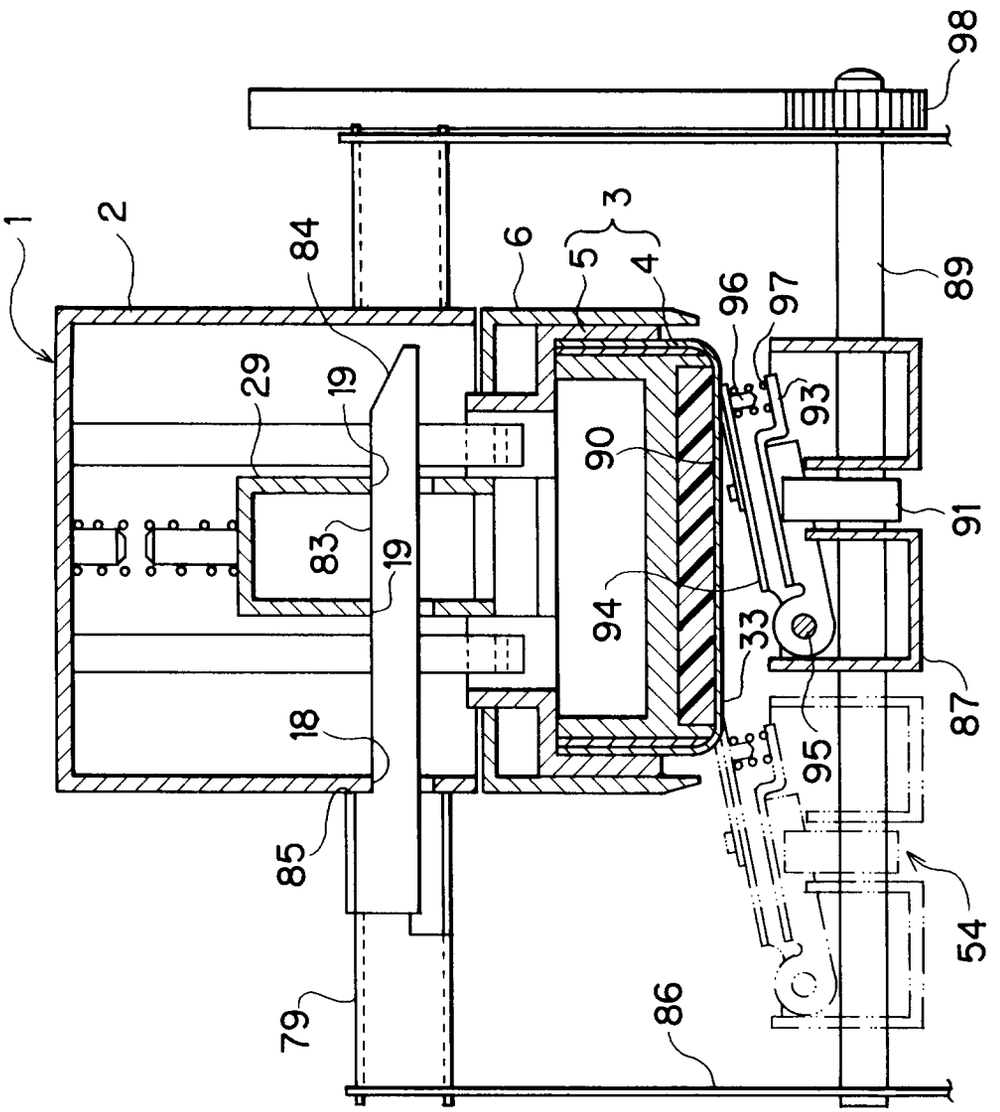

FIG. 12

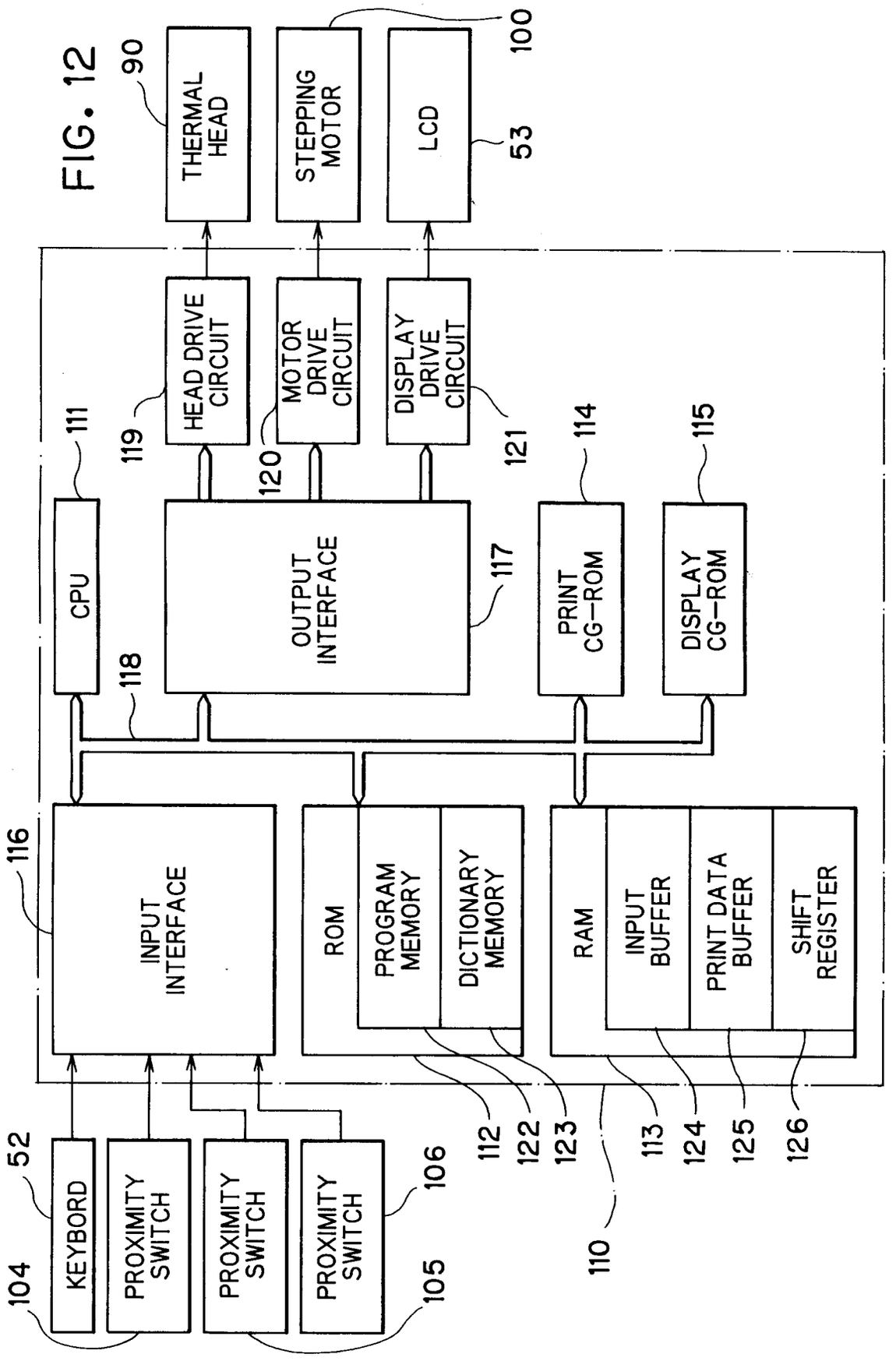
THERMAL HEAD
90
STEPPING MOTOR
LCD
100
53
HEAD DRIVE CIRCUIT
MOTOR DRIVE CIRCUIT
DISPLAY DRIVE CIRCUIT
119
120
121
CPU
111
OUTPUT INTERFACE
117
PRINT CG-ROM
114
DISPLAY CG-ROM
115
118
INPUT INTERFACE
116
ROM
PROGRAM MEMORY
DICTIONARY MEMORY
RAM
INPUT BUFFER
PRINT DATA BUFFER
SHIFT REGISTER
KEYBORD
52
PROXIMITY SWITCH
PROXIMITY SWITCH
PROXIMITY SWITCH
104
105
106
110
112
122
123
113
124
125
126

FIG. 13

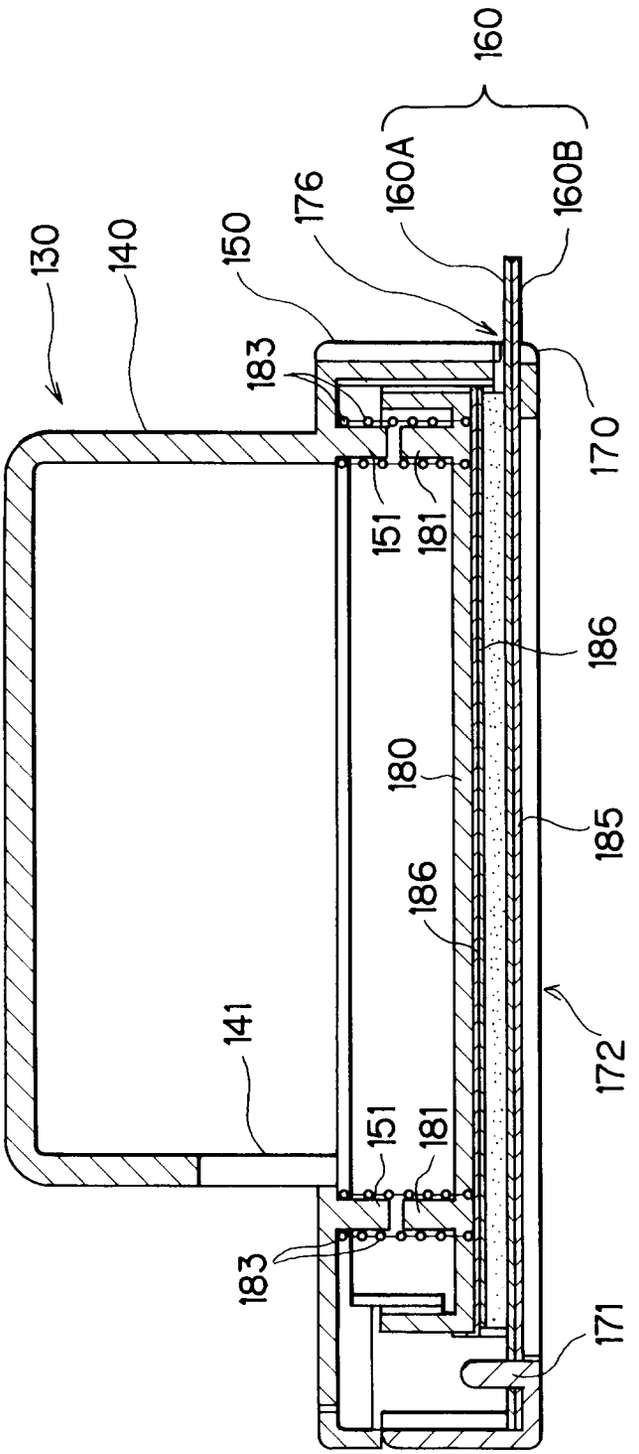
160
160A
160B
176
150
130
140
183
170
151
181
186
180
185
186
141
172
151
181
183
171

FIG. 14

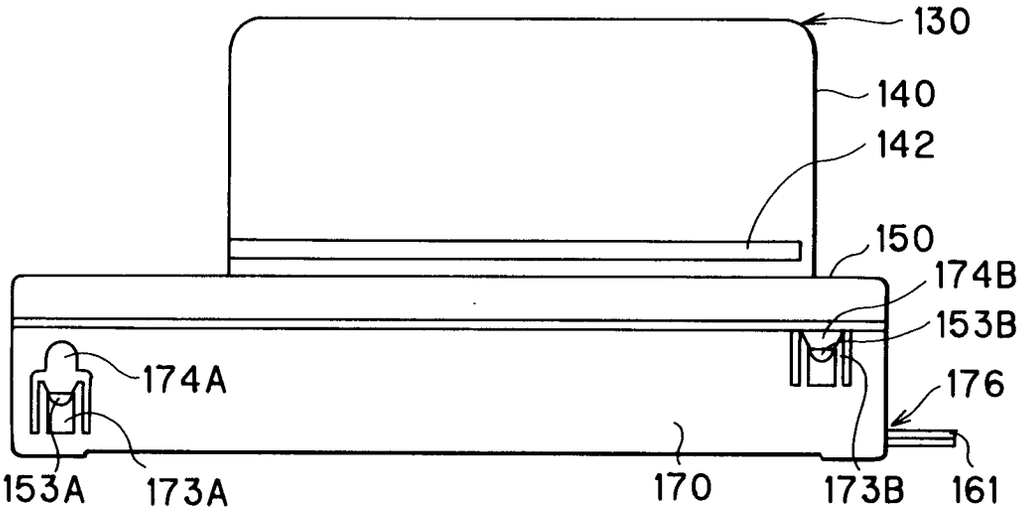
130
140
142
150
174B
153B
176
174A
153A
173A
170
173B
161

FIG. 15

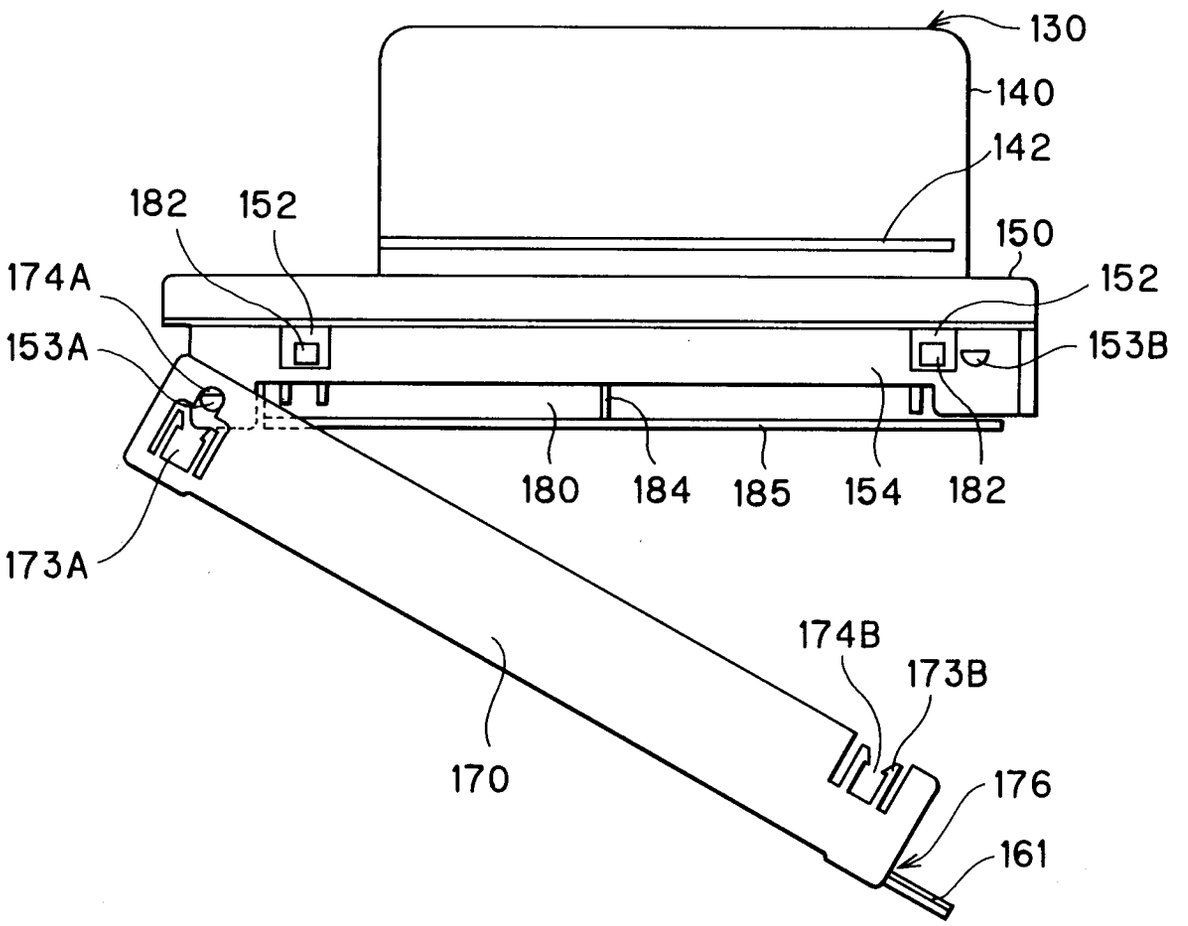
130
140
142
182
152
150
174A
152
153A
153B
180
184
185
154
182
173A
174B
173B
170
176
161

FIG. 16

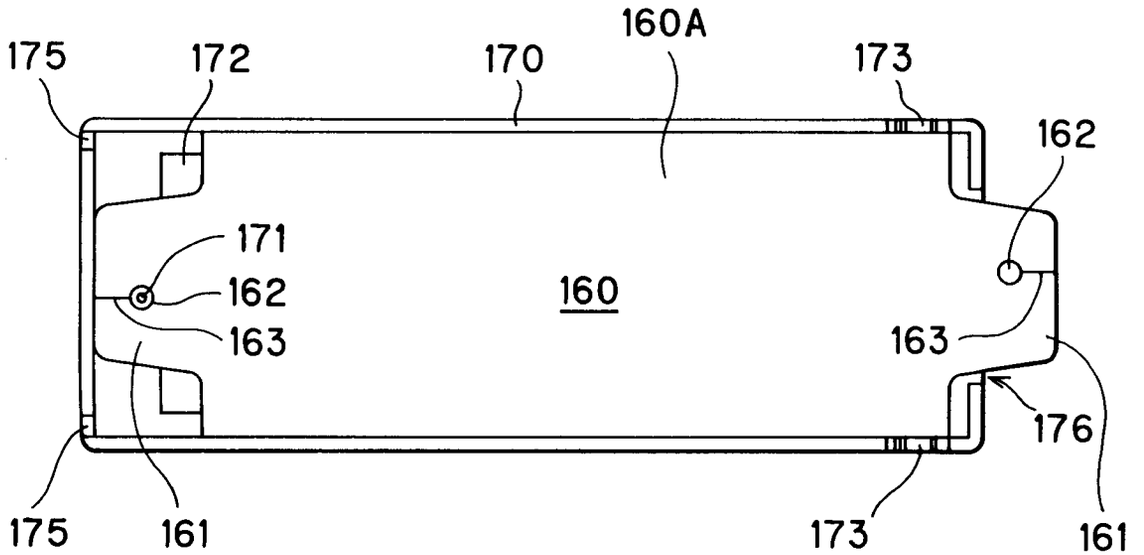
175
172
170
160A
173
162
171
162
160
163
163
176
175
161
173
161

FIG. 17

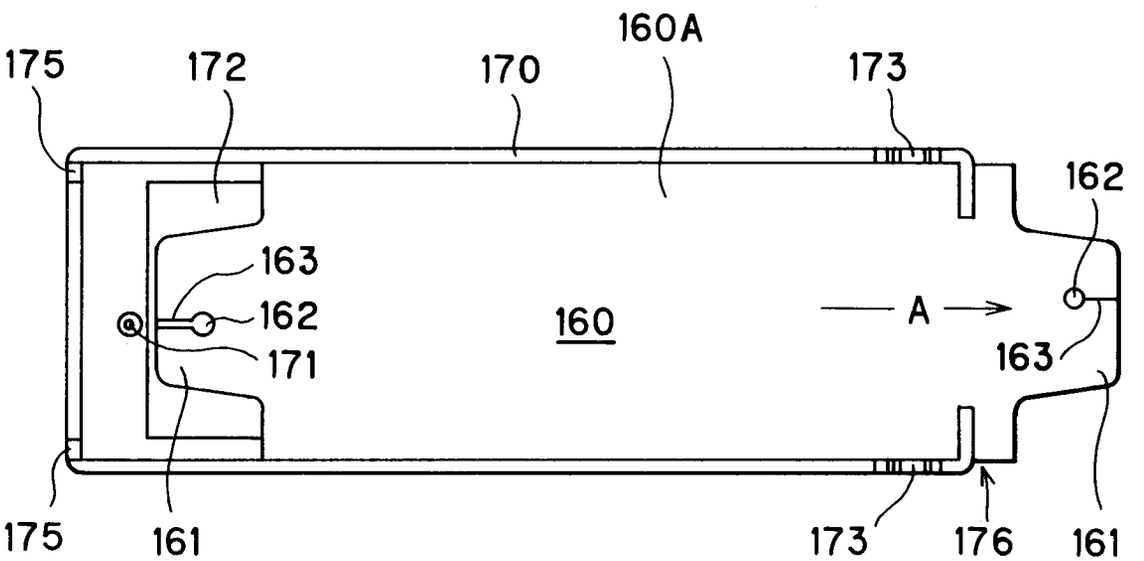
175
172
170
160A
173
162
163
162
160
A
171
163
175
161
173
176
161

FIG. 18

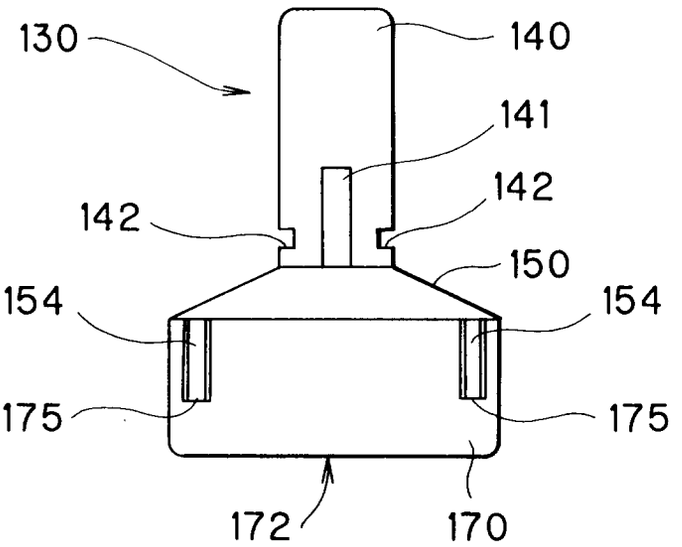
130
140
141
142
142
150
154
154
175
175
172
170

FIG. 19

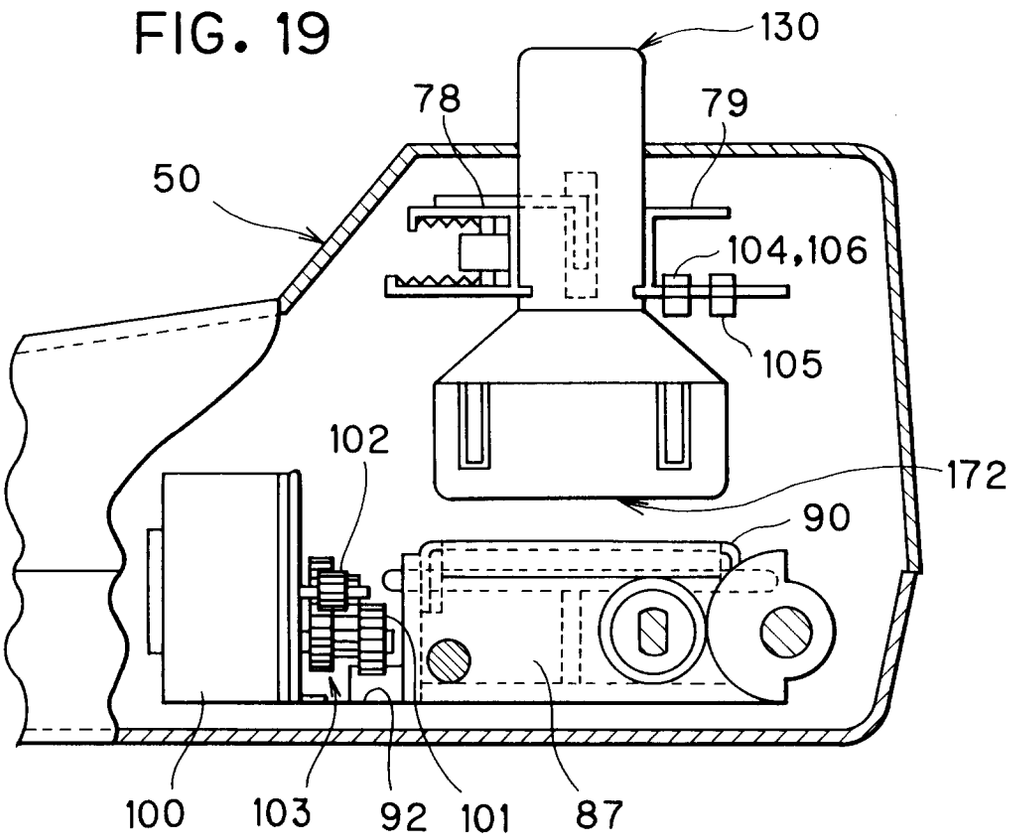
130
78
79
50
104,106
105
102
172
90
100
103
92
101
87

FIG. 20 (A)

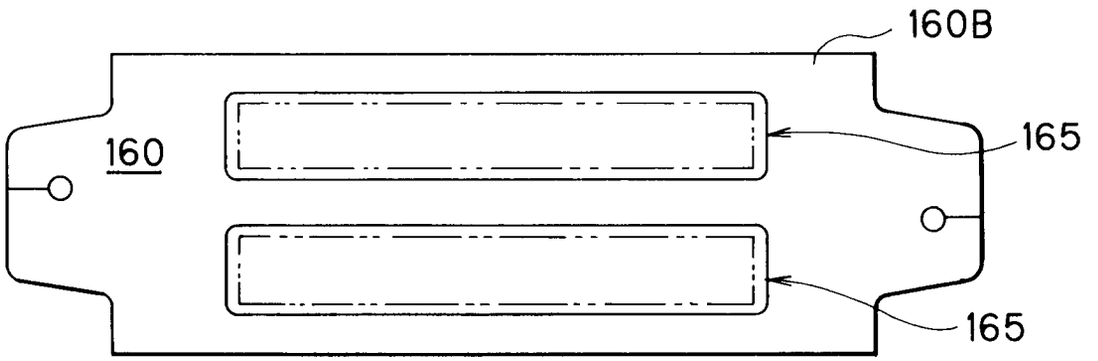

FIG. 20 (B)

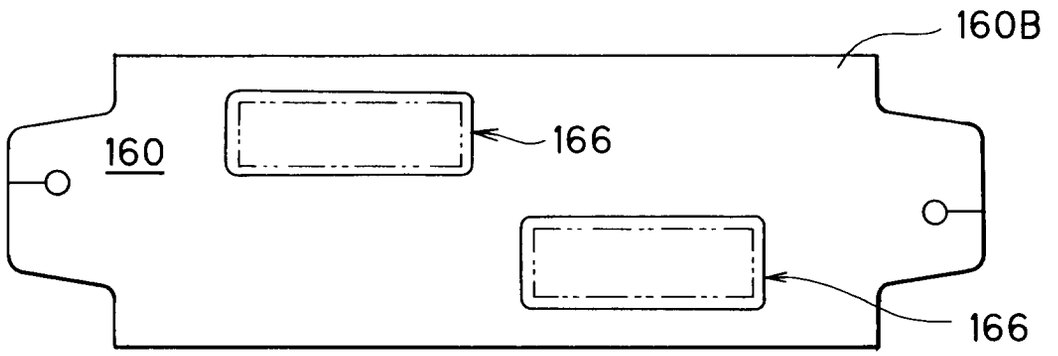

FIG. 20 (C)