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Shimizu et al.

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[54] **THERMAL TRANSFER RECORDING APPARATUS WITH INK PAPER CASSETTE**

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[21] Appl. No.: **865,022**

[22] Filed: **Apr. 7, 1992**

Related U.S. Patent Documents

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Filed: **Jul. 21, 1988**

[30] **Foreign Application Priority Data**

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[51] **Int. Cl.**[5] **B41J 3/02**

[52] **U.S. Cl.** **400/120;** 400/208; 400/703

[58] **Field of Search** 400/120, 207, 208, 241, 400/703, 225, 54, 196, 692

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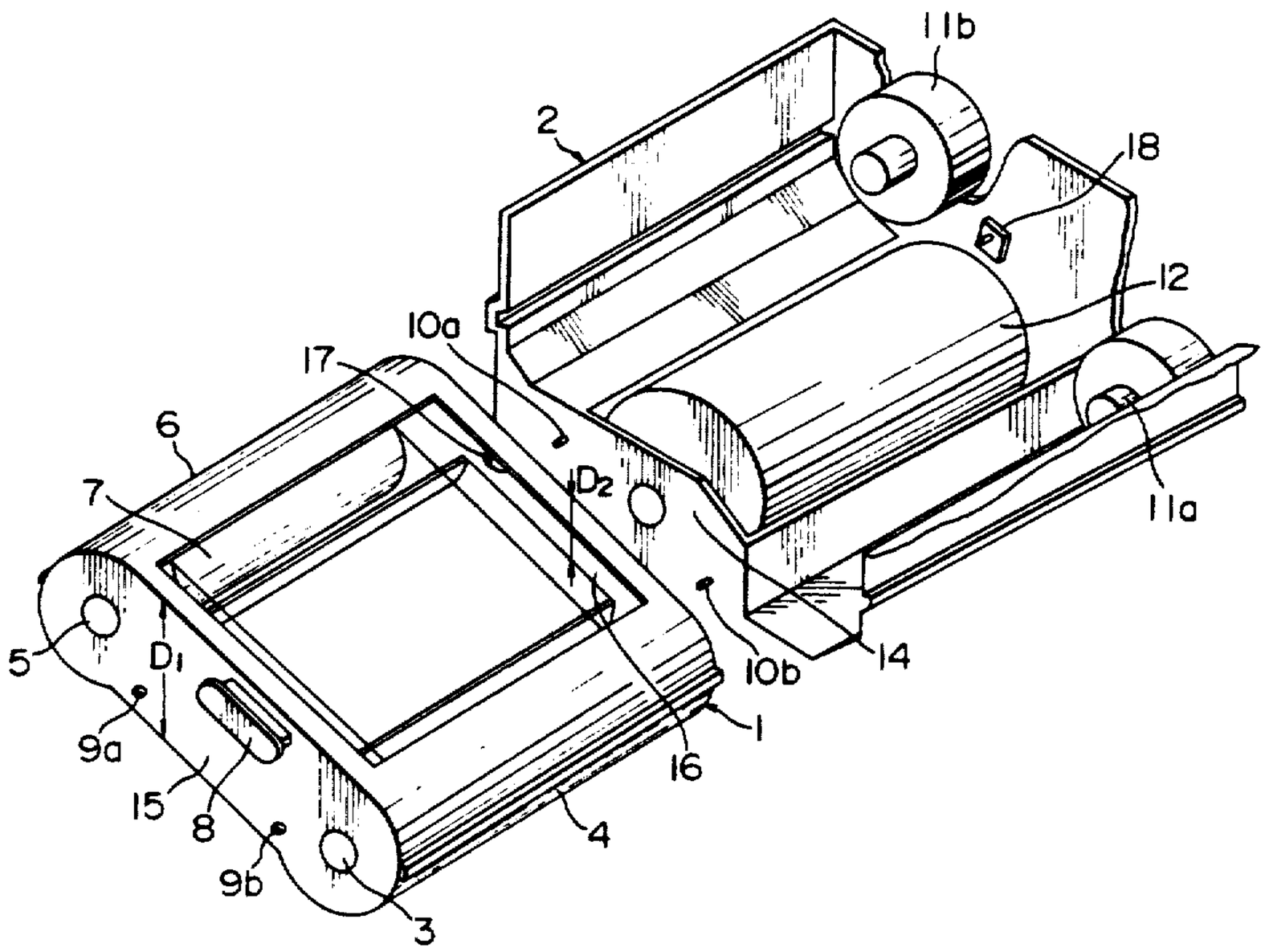
Primary Examiner—Eugene H. Eickholt
Attorney, Agent, or Firm—Antonelli, Terry, Stout & Kraus

[57] **ABSTRACT**

An ink paper cassette has ink paper, a supply shaft for supplying the ink paper, a take-up shaft for winding the ink paper, a front connecting portion for rotatably supporting first ends of the supply and the take-up shafts and a rear connecting portion for rotatably supporting second ends of the supply and the take-up shafts. The ink paper cassette is to be loaded into a printer. The printer performs thermal prints of characters and/or pictorial images onto a transfer paper with the ink paper loaded in the ink paper cassette. The front connecting portion has a depth so greater than that of the rear connecting portion that the front connecting portion is brought into abutment with a front face of a printer mechanism, whereby preventing the ink paper cassette from being loaded into the printer.

13 Claims, 14 Drawing Sheets



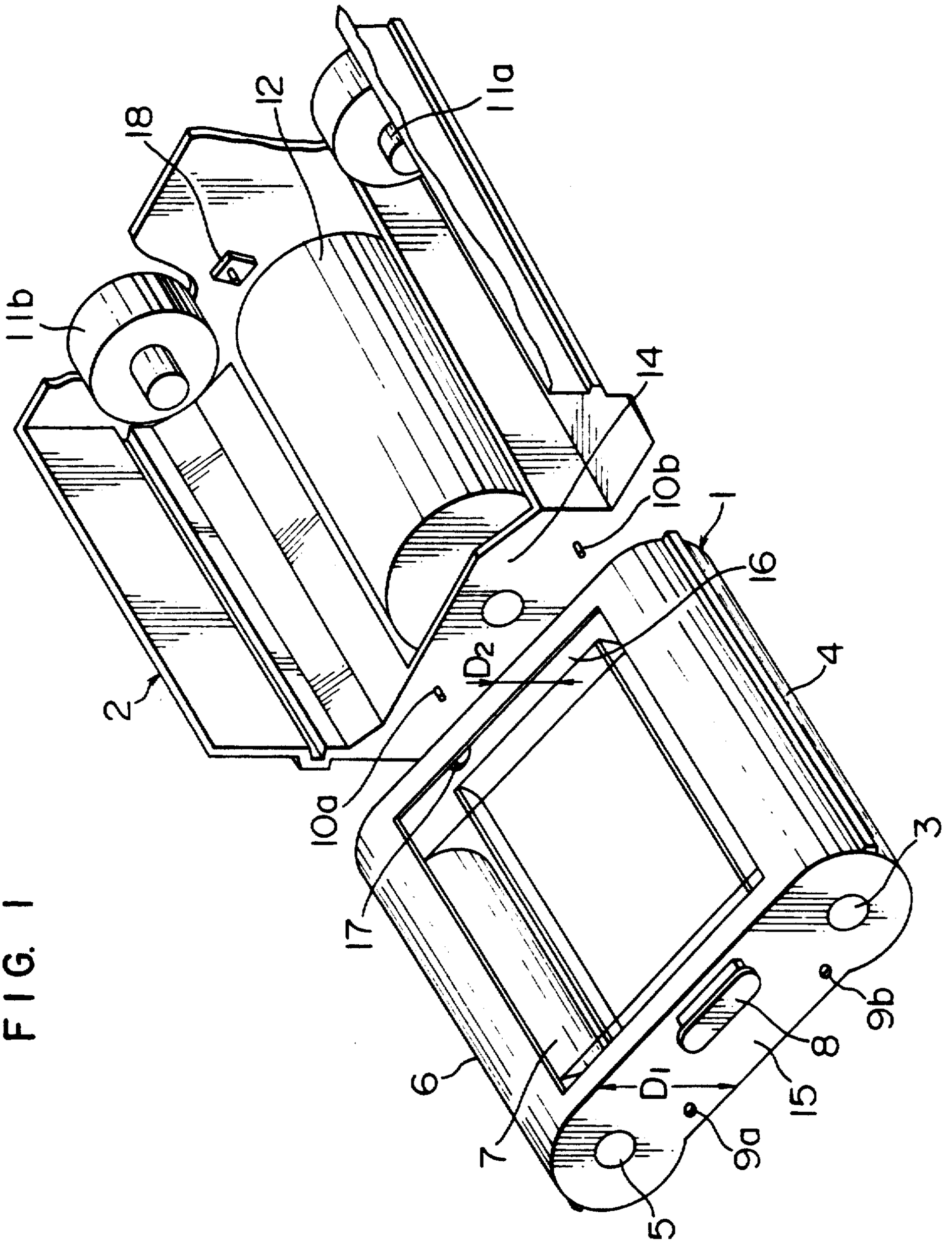


FIG. 1

FIG. 2

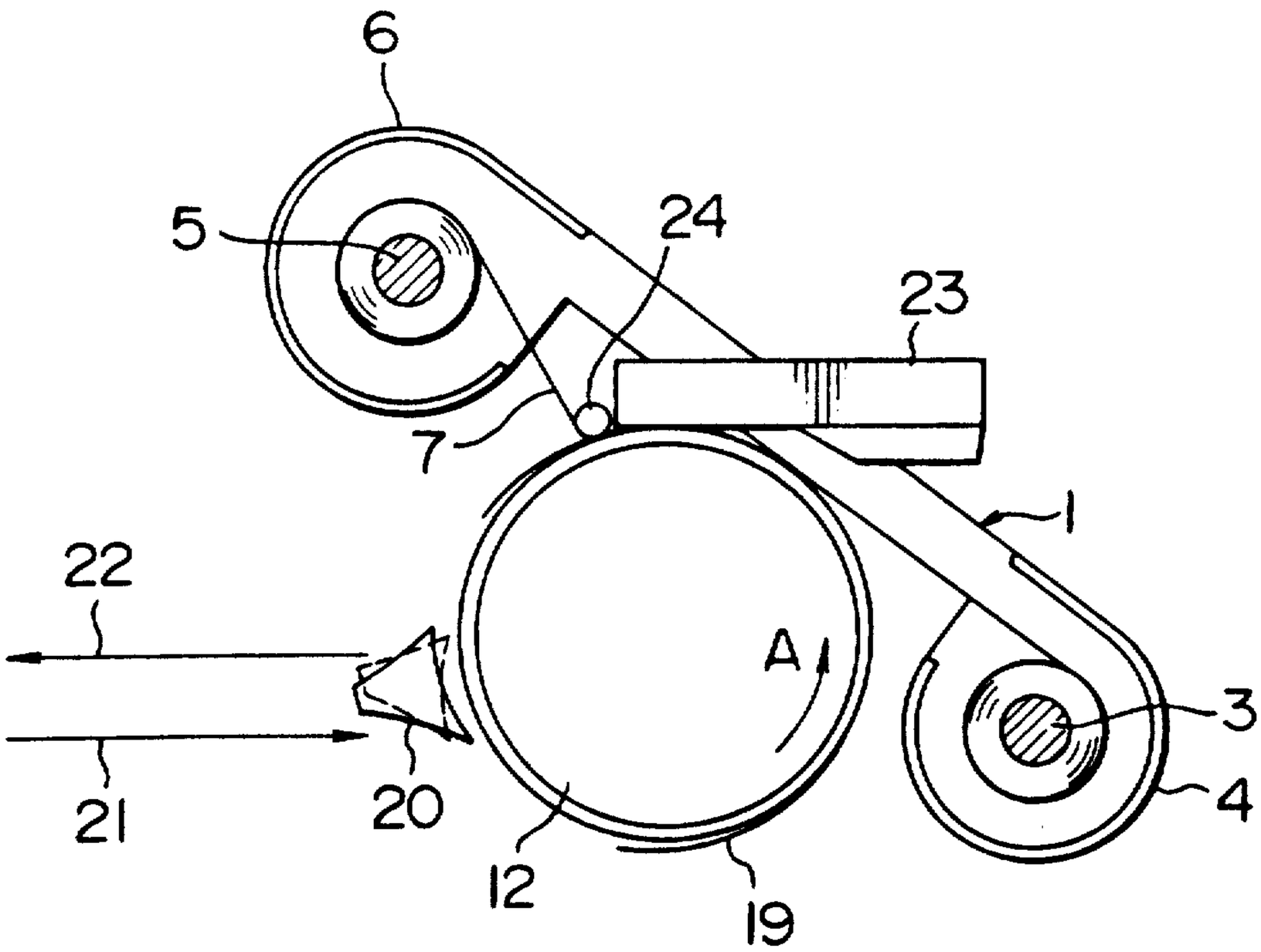


FIG. 3A

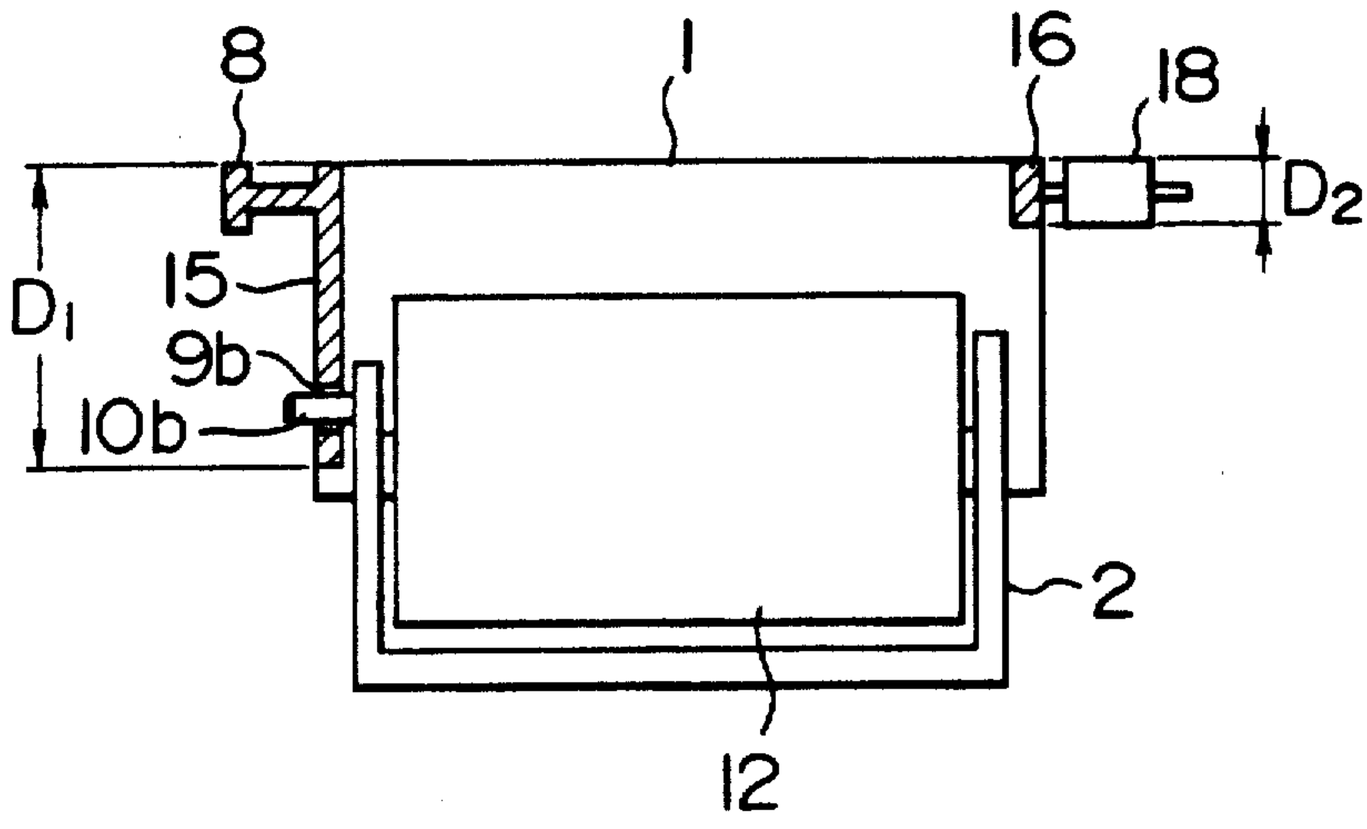


FIG. 3B

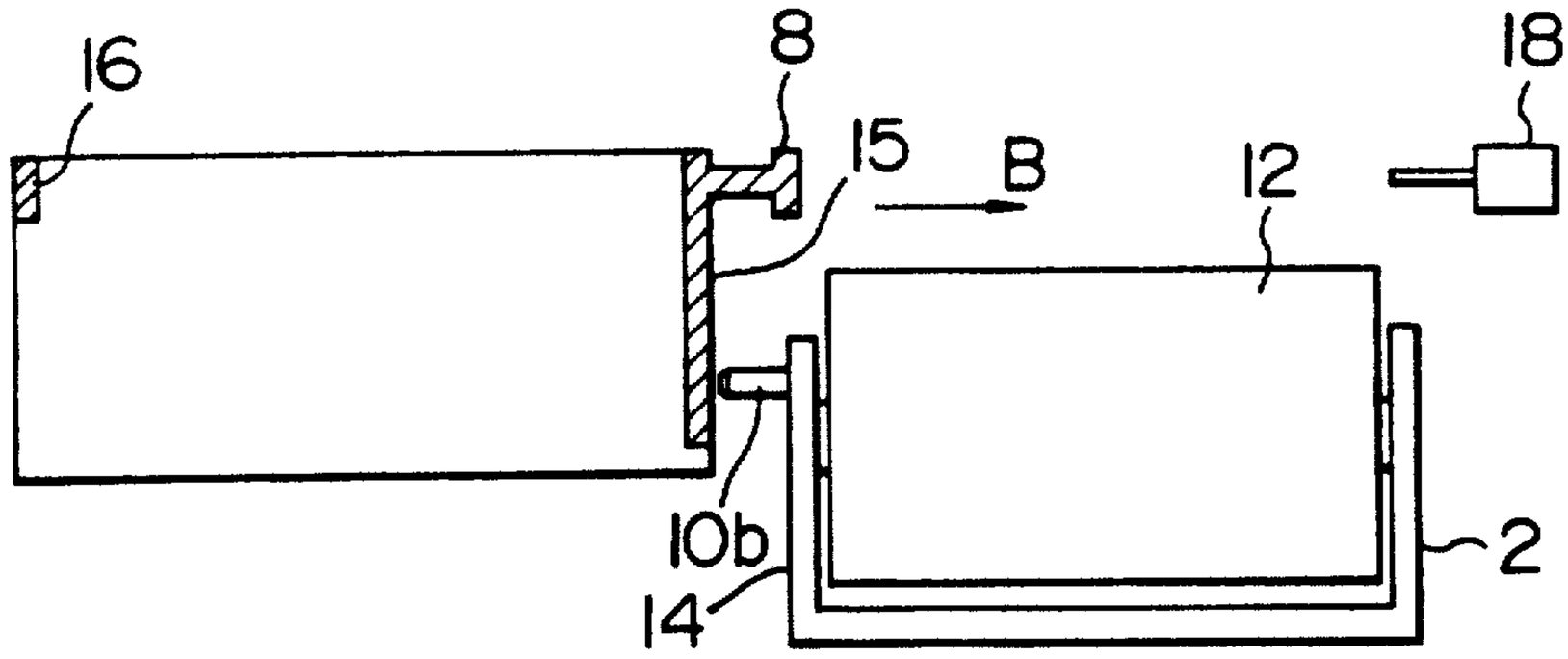


FIG. 4A

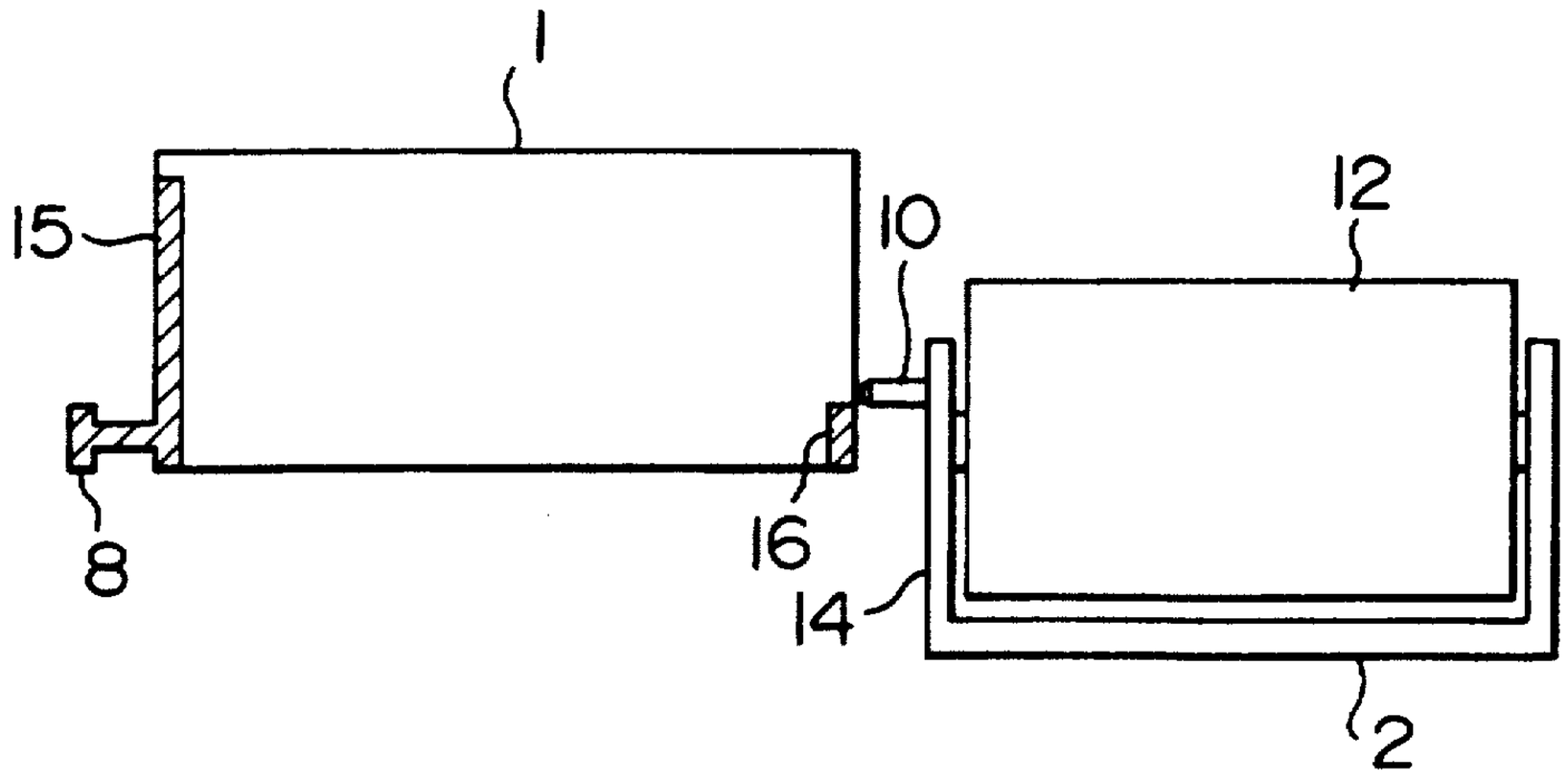


FIG. 4B

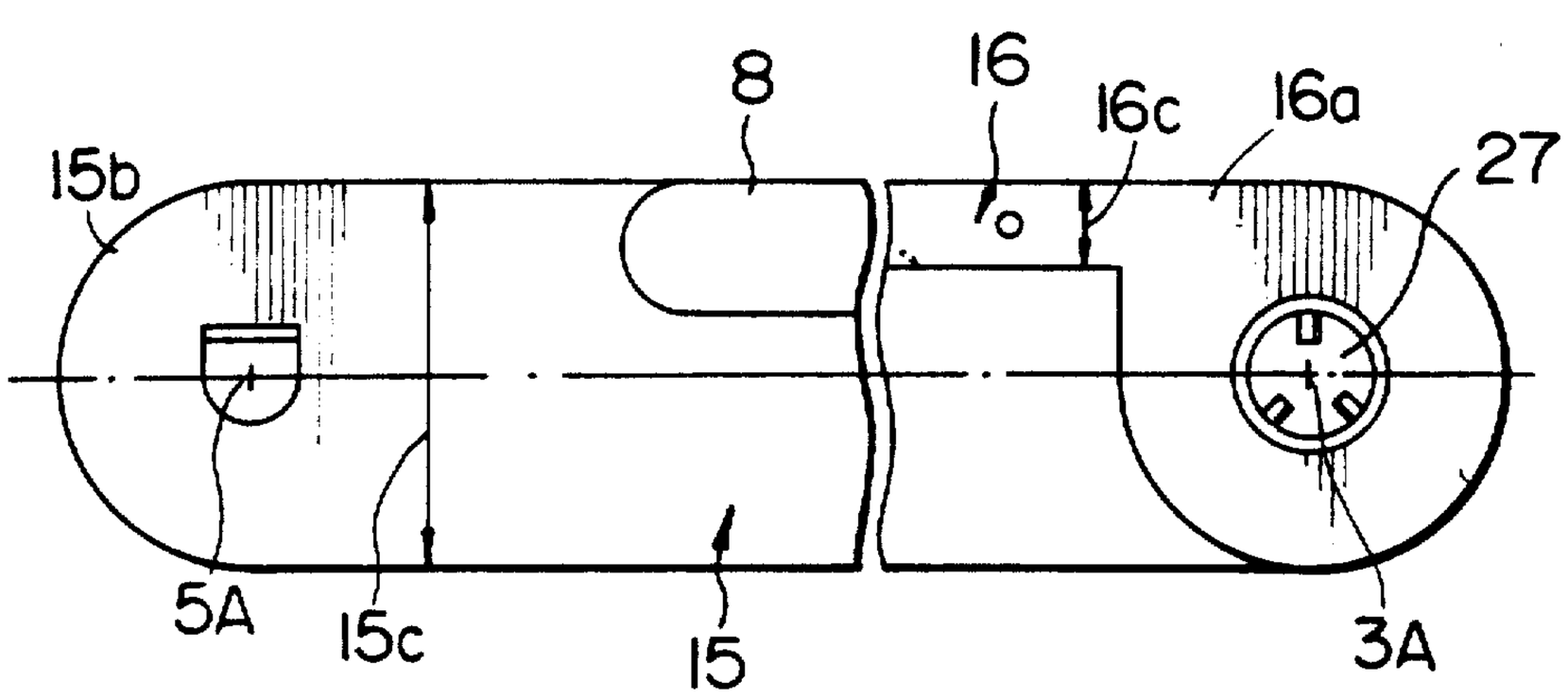


FIG. 4C

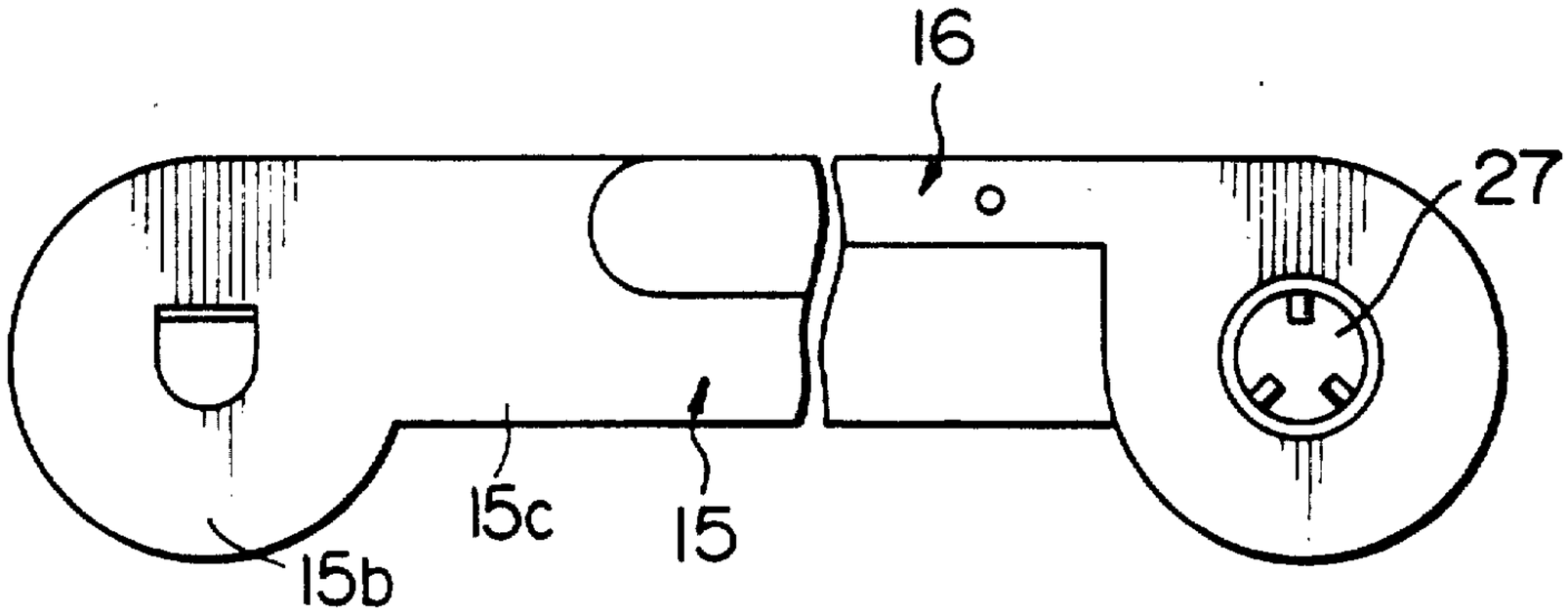


FIG. 5

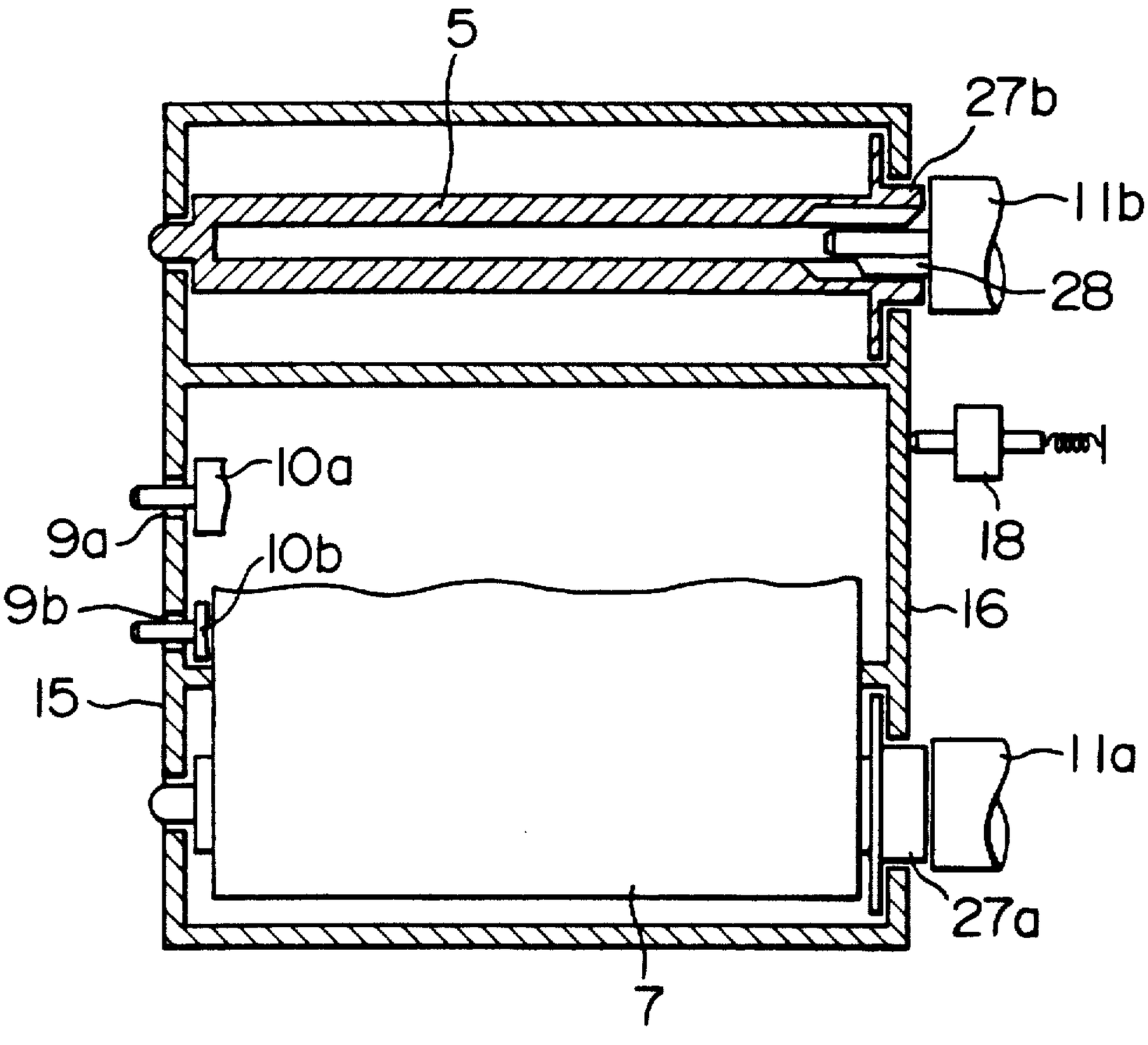


FIG. 6A

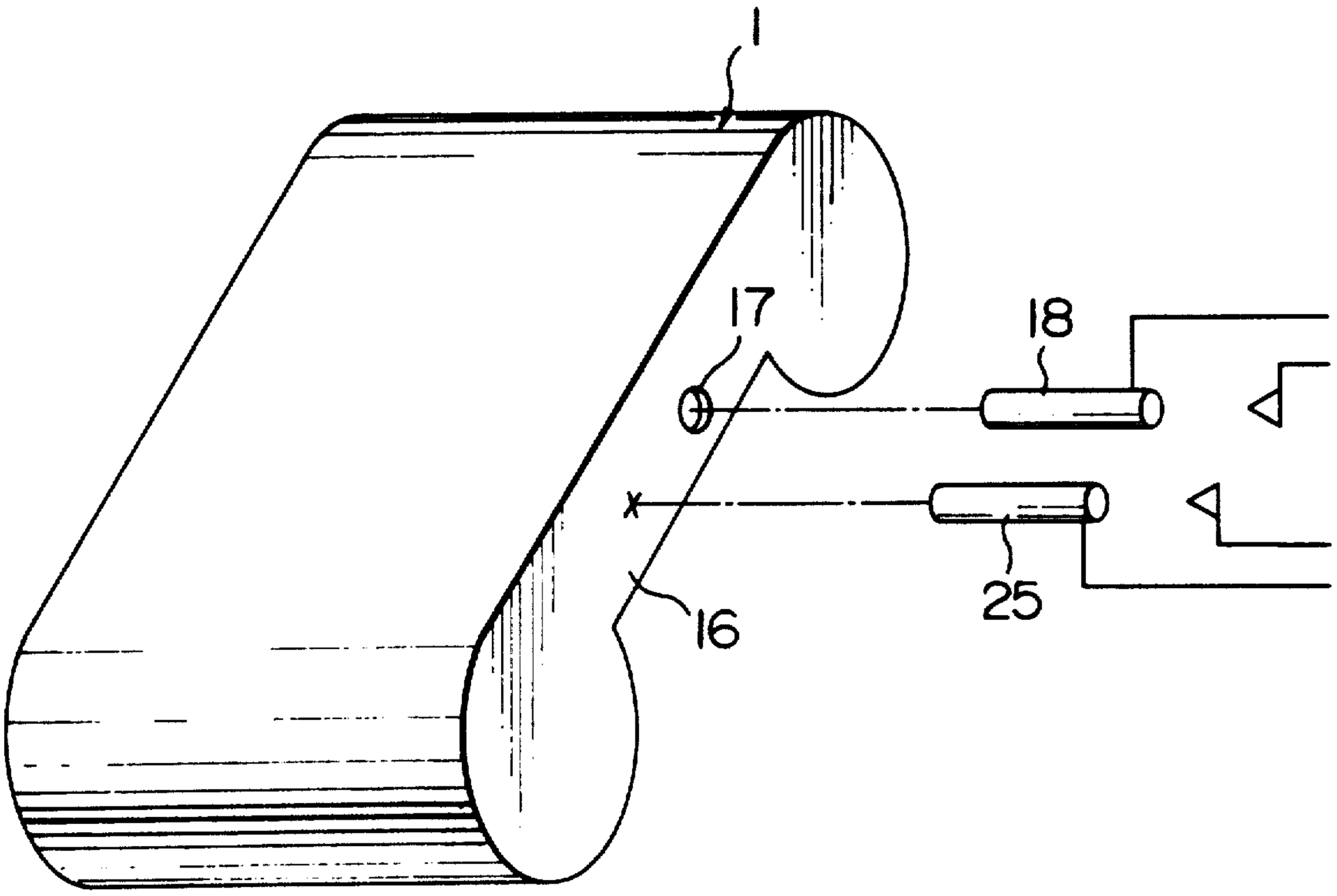


FIG. 6B

CASSETTE	STANDARD	NON-STANDARD	NO CASSETTE
HOLE	NONE	YES	(YES)
SWITCH 18	○	×	×
SWITCH 25	○	○	×

FIG. 7A

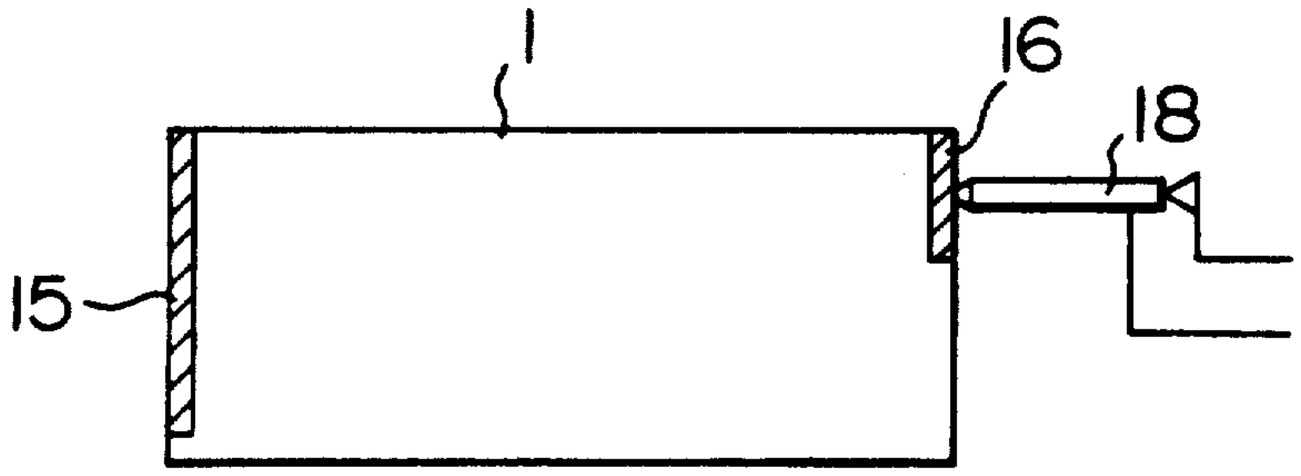


FIG. 7B

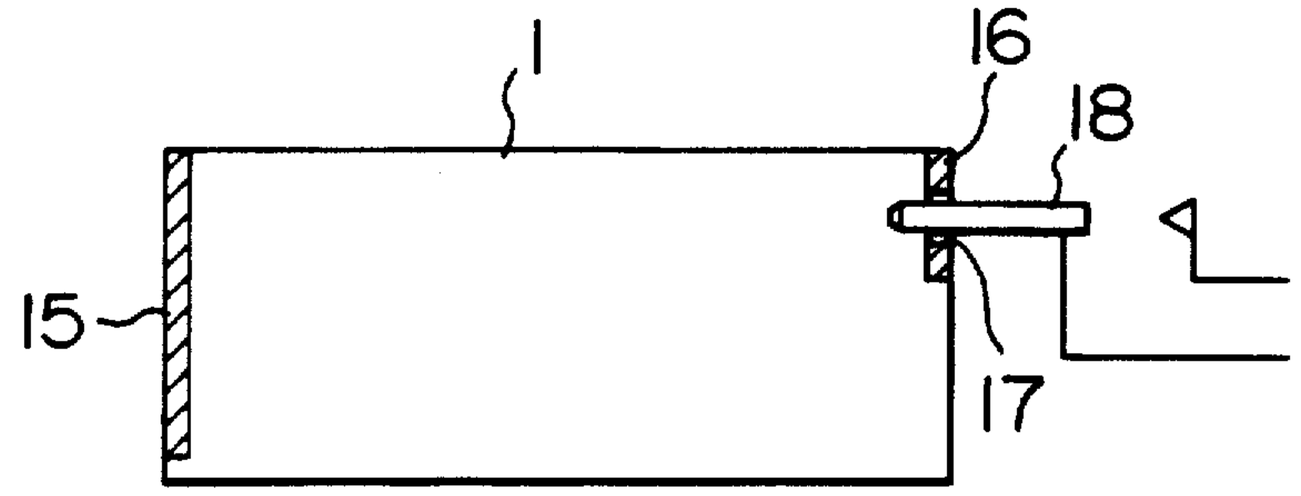


FIG. 7C

CASSETTE	STANDARD	NON-STANDARD	NO CASSETTE
HOLE	NONE	YES	(YES)
ORDINARY PRINTER	○	×	×
HIGH CLASS PRINTER	○	○	×

FIG. 8A

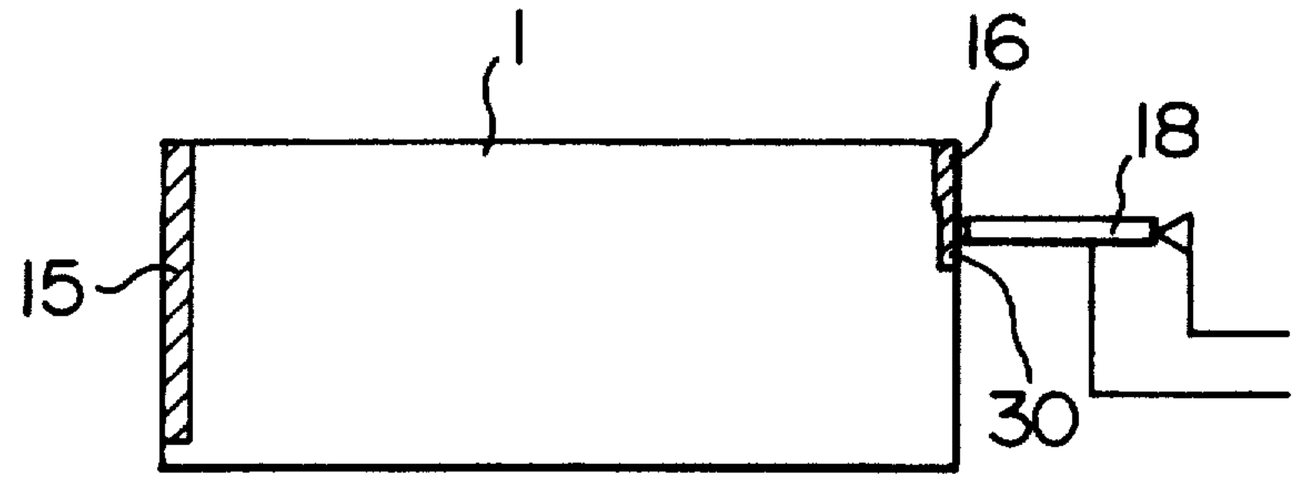


FIG. 8B

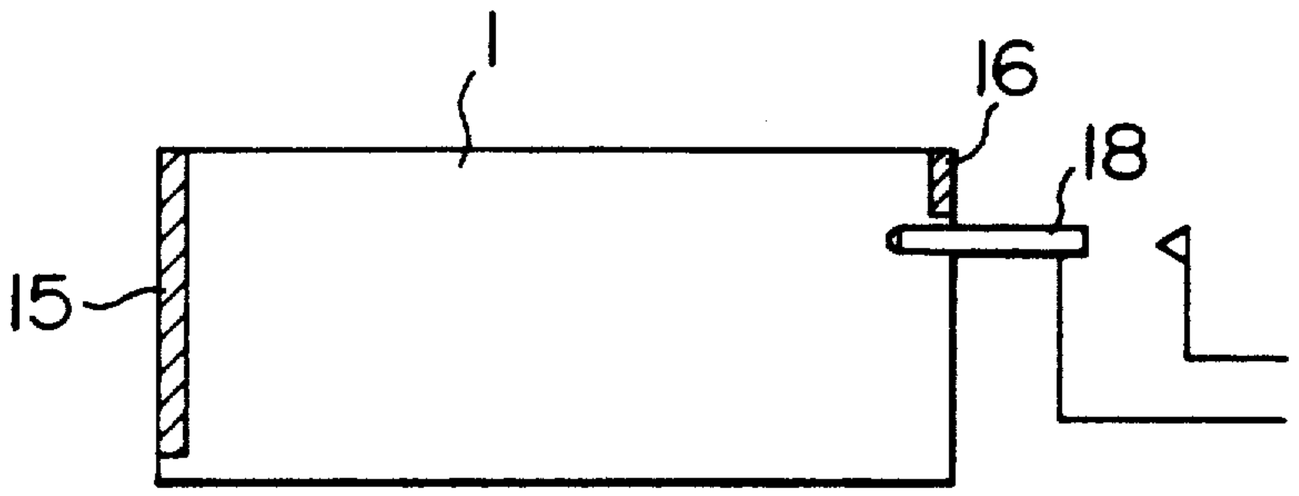


FIG. 8C

CASSETTE	STANDARD	NON-STANDARD	NO CASSETTE
PROJECTION	YES	NONE	(NONE)
ORDINARY PRINTER	○	×	×
HIGH CLASS PRINTER	○	○	×

FIG. 9A

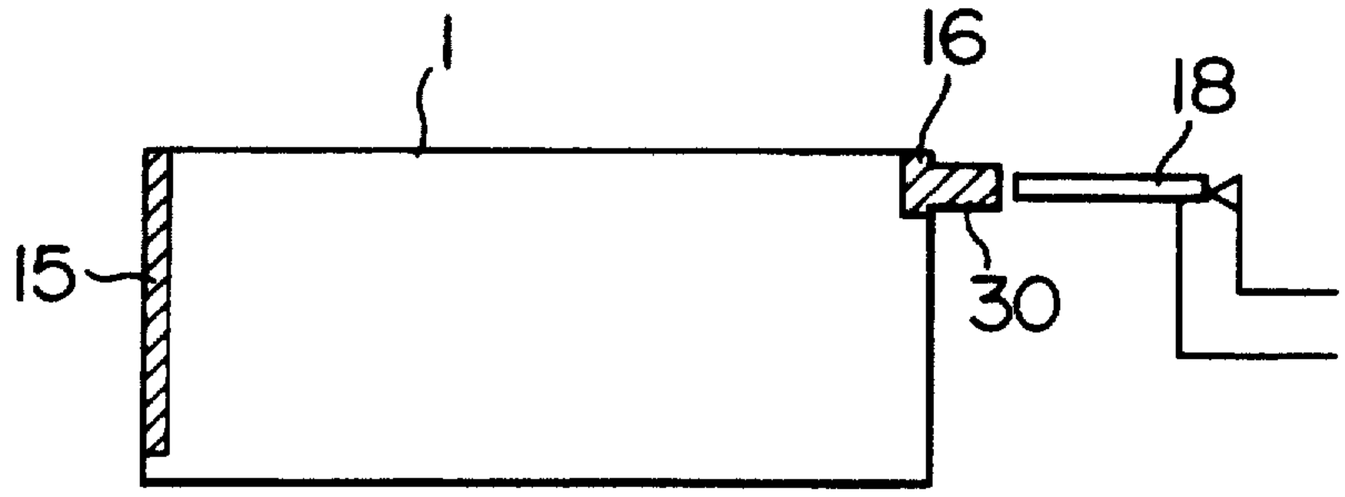


FIG. 9B

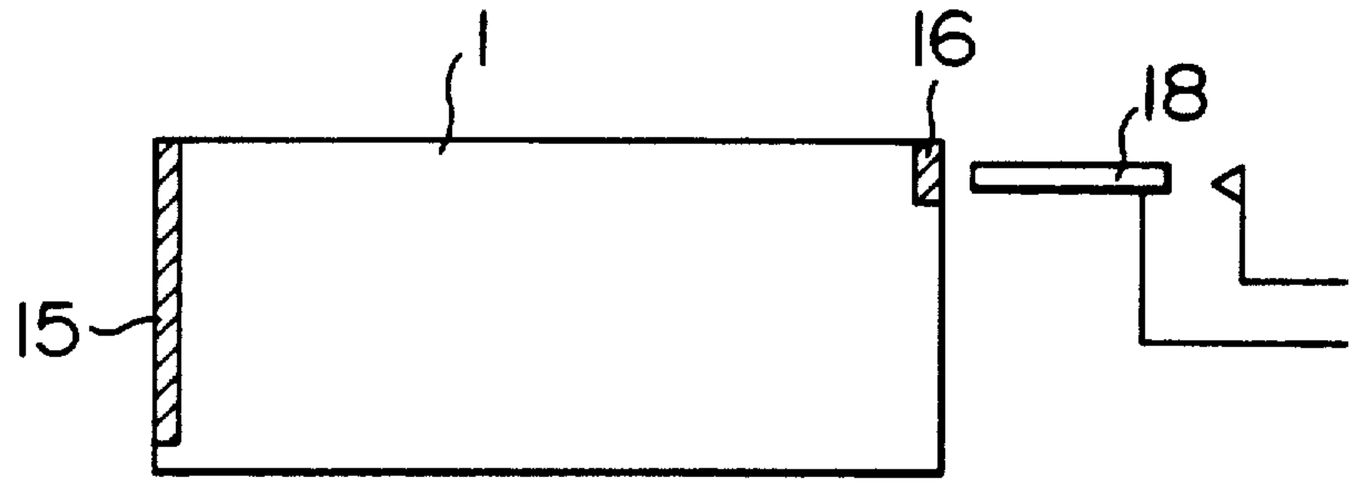


FIG. 9C

CASSETTE	STANDARD	NON-STANDARD	NO CASSETTE
PROJECTION	YES	NONE	(NONE)
ORDINARY PRINTER	○	×	×
HIGH CLASS PRINTER	○	○	×

FIG. 10

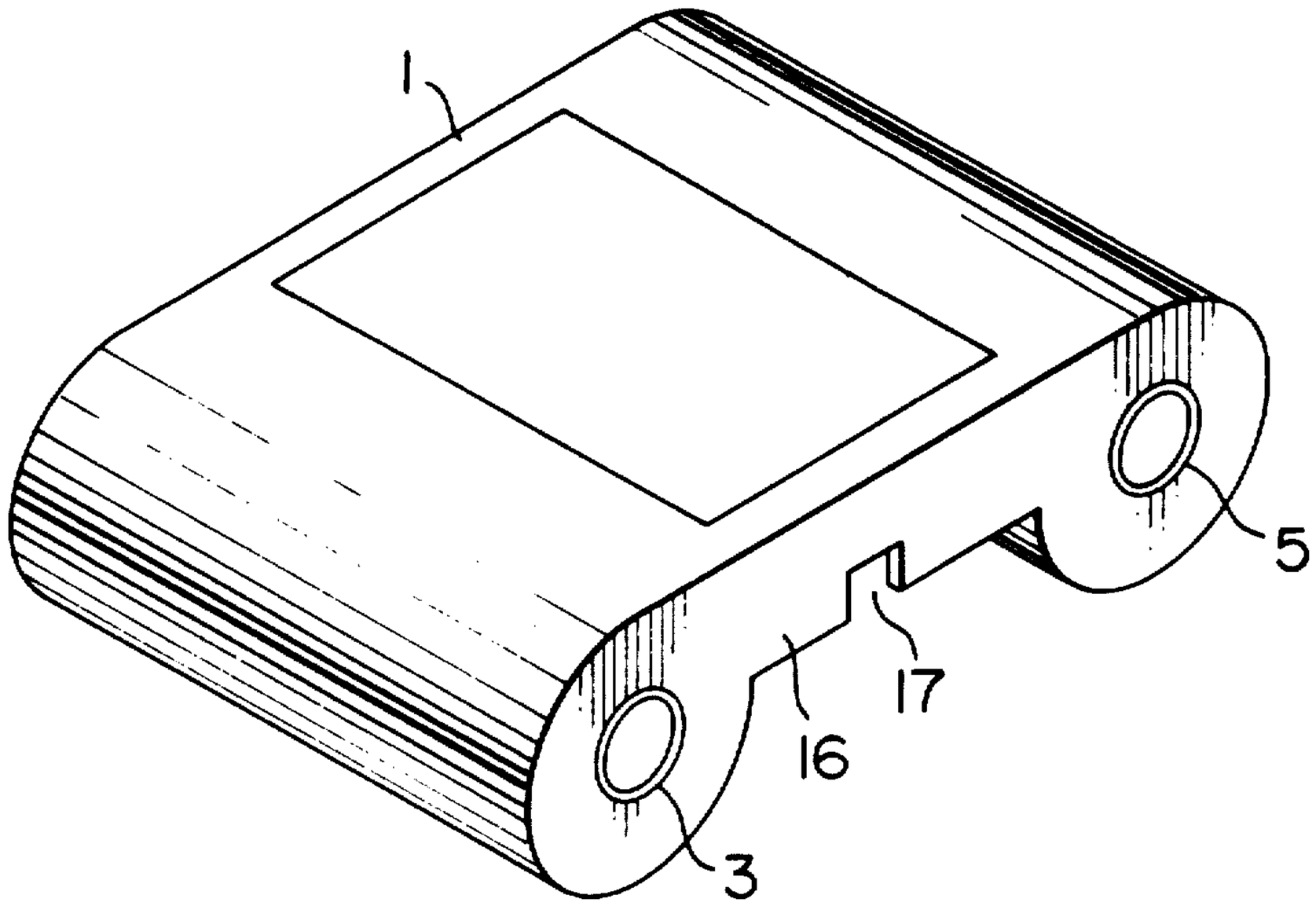


FIG. 11

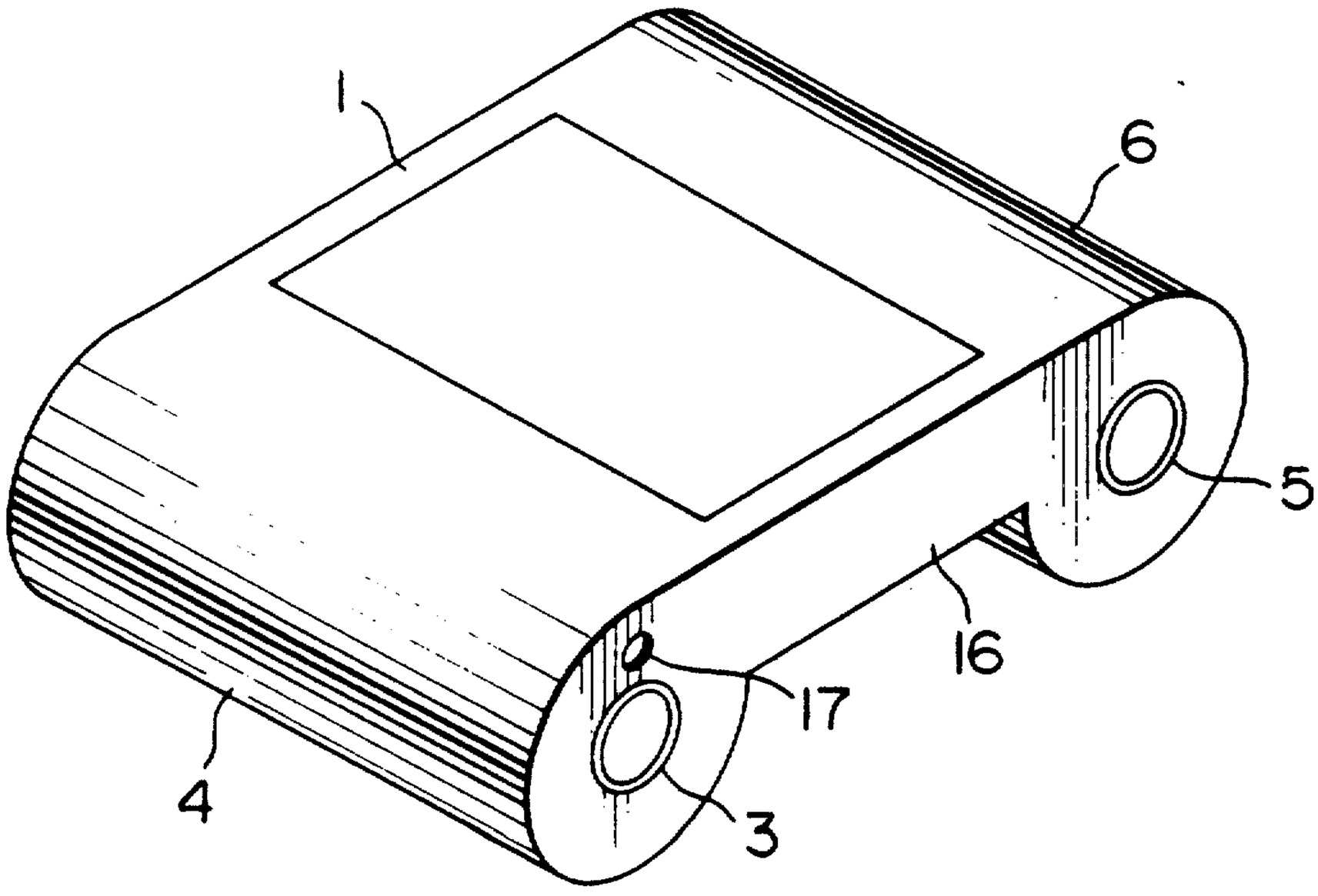


FIG. 12

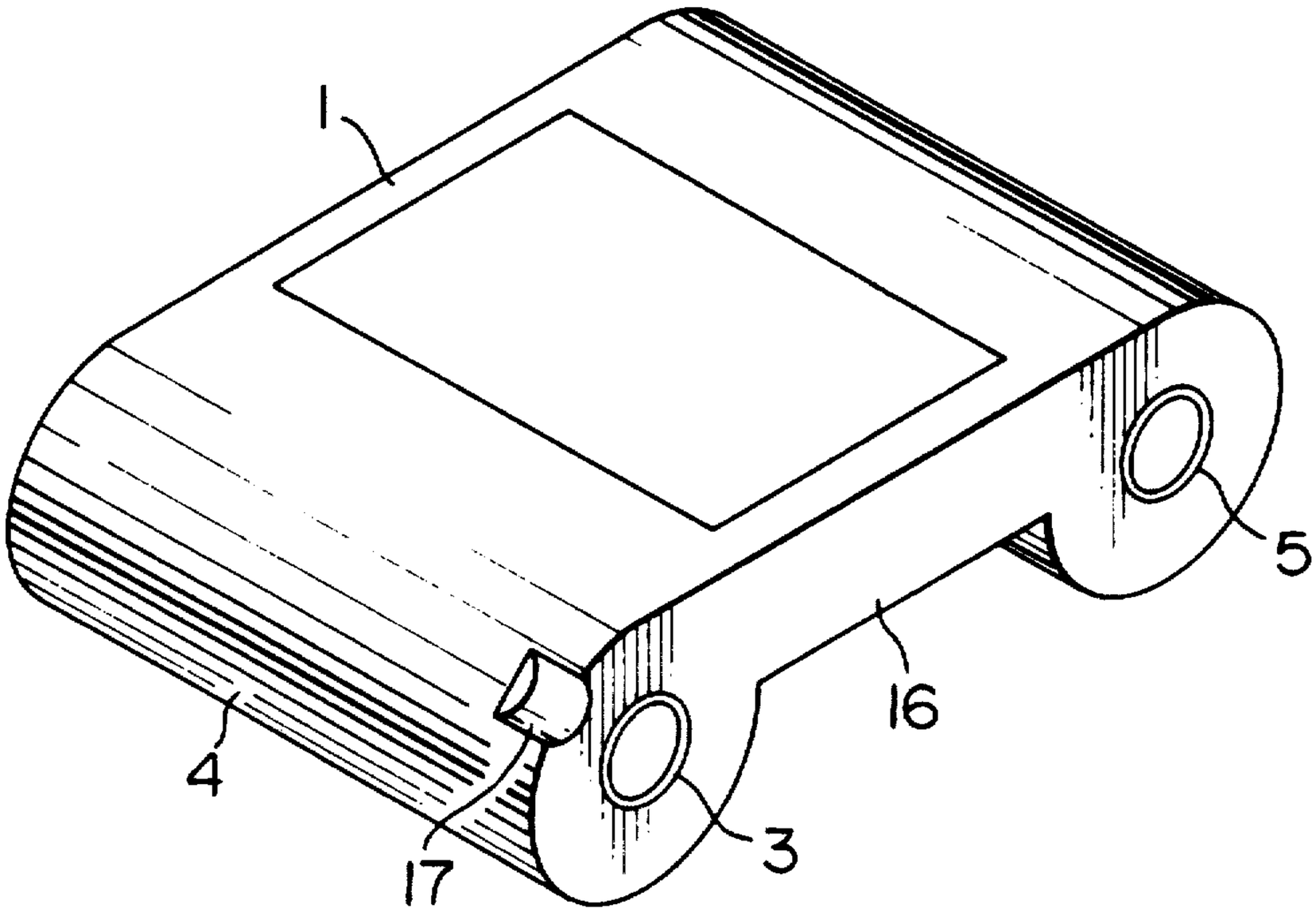


FIG. 13

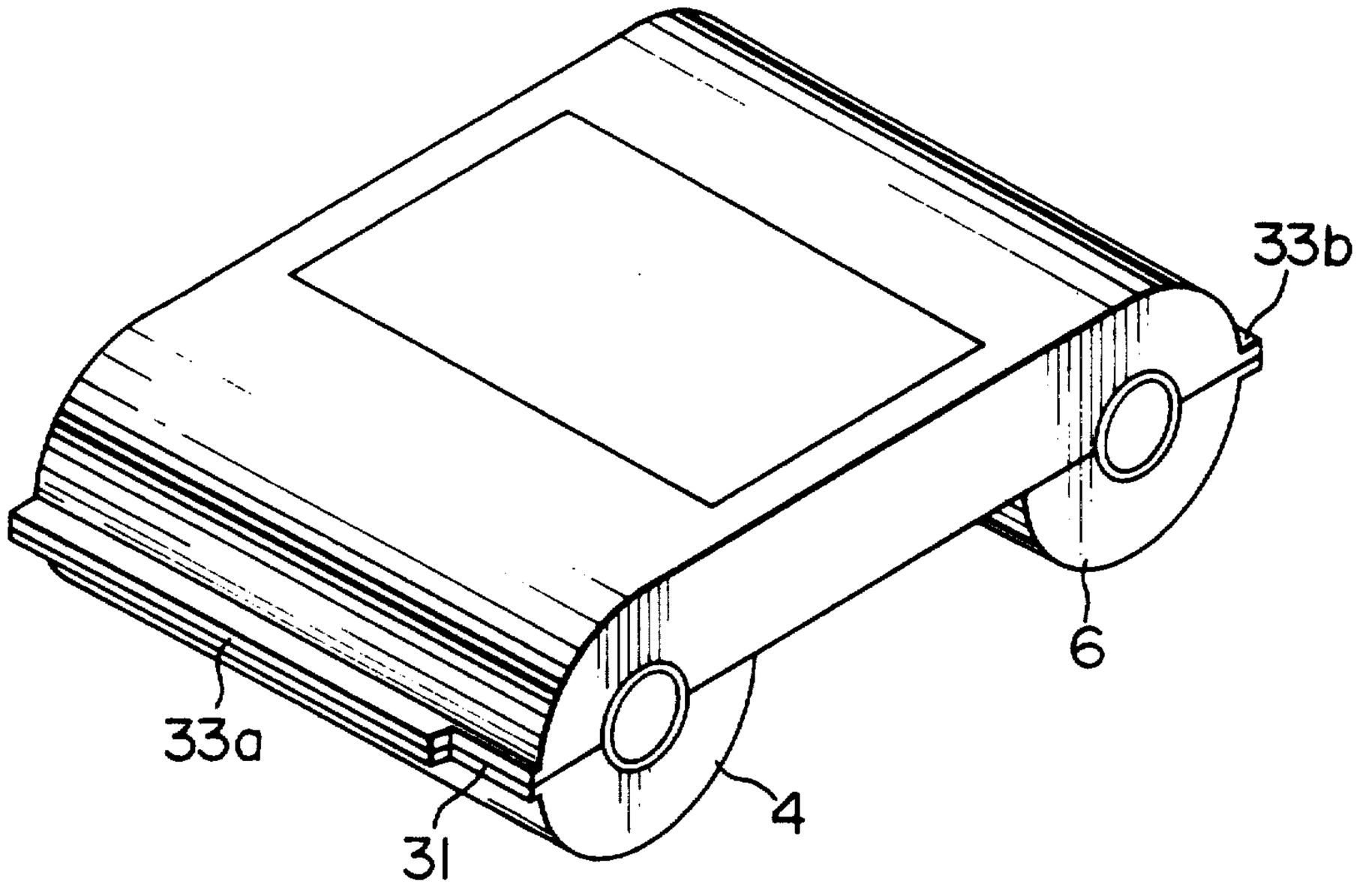


FIG. 14

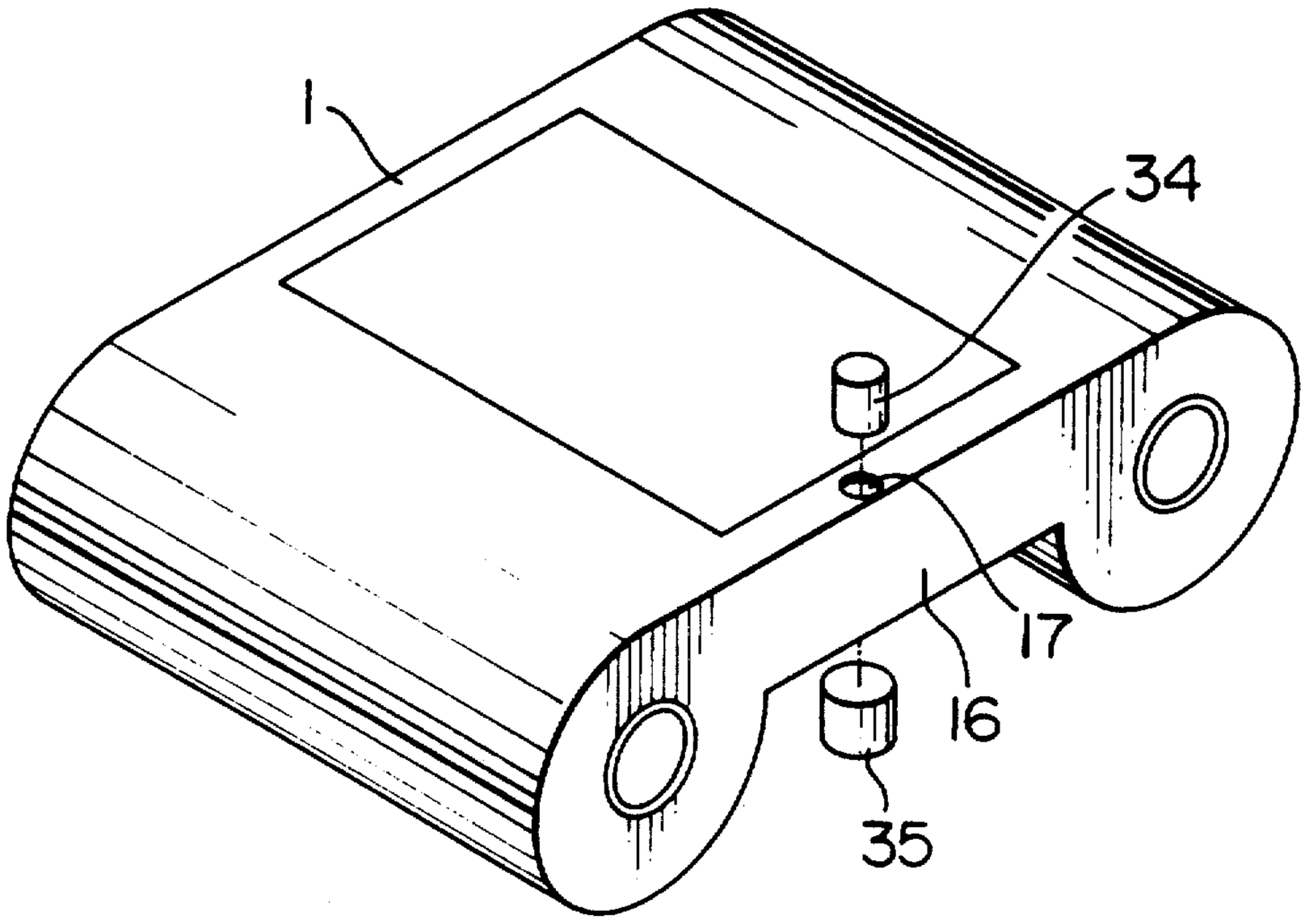


FIG. 15

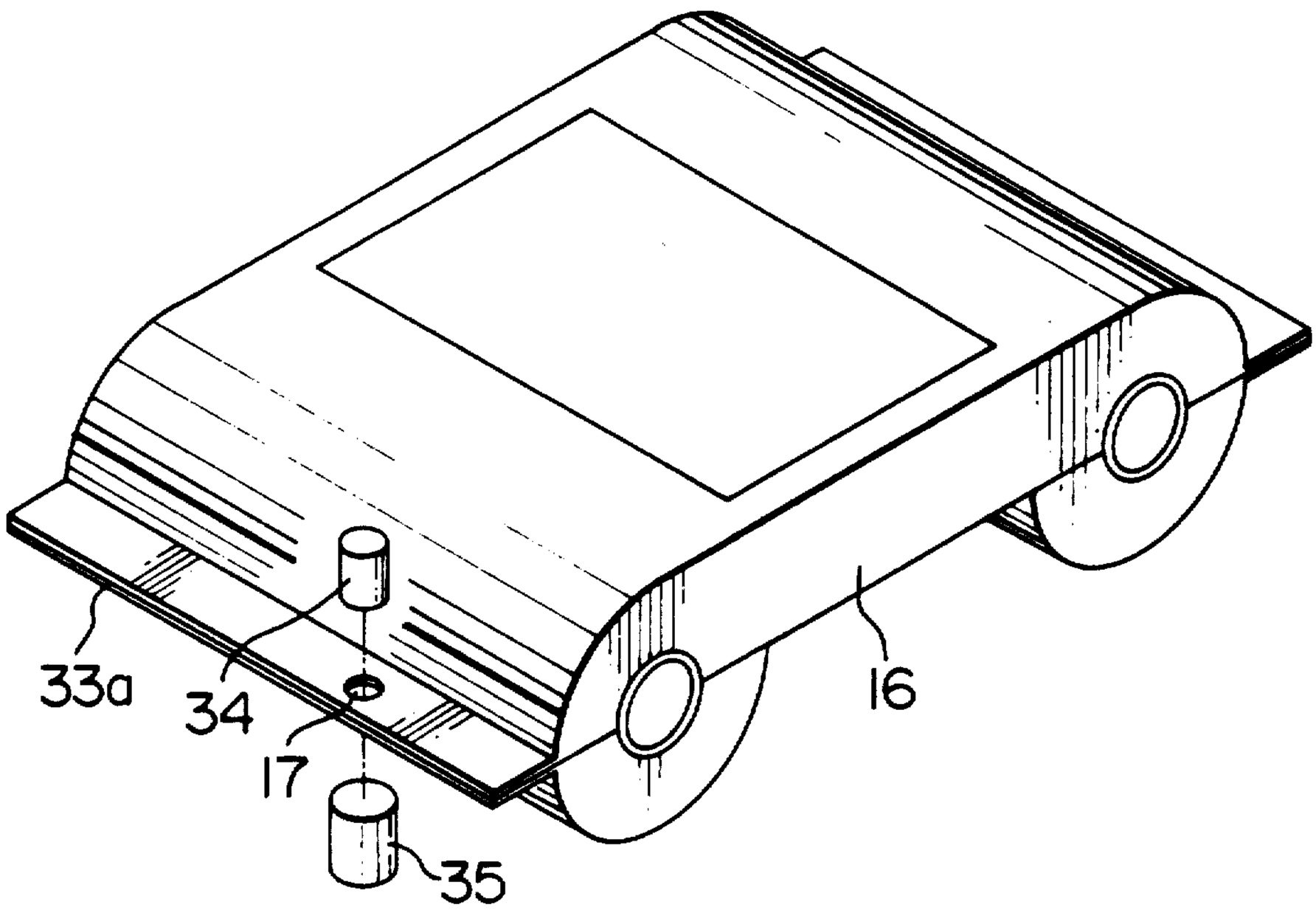


FIG. 16

	STANDARD CASSETTE A	STANDARD CASSETTE B	NON-STANDARD CASSETTE C	NO CASSETTE
	0	1	1	2
NUMBER OF HOLES	○	○	×	×
SWITCH 18	○	×	○	×
SWITCH 25	○	○	×	×
ORDINARY PRINTER	○	○	×	×
HIGH CLASS PRINTER	○	○	○	×

FIG. 17A

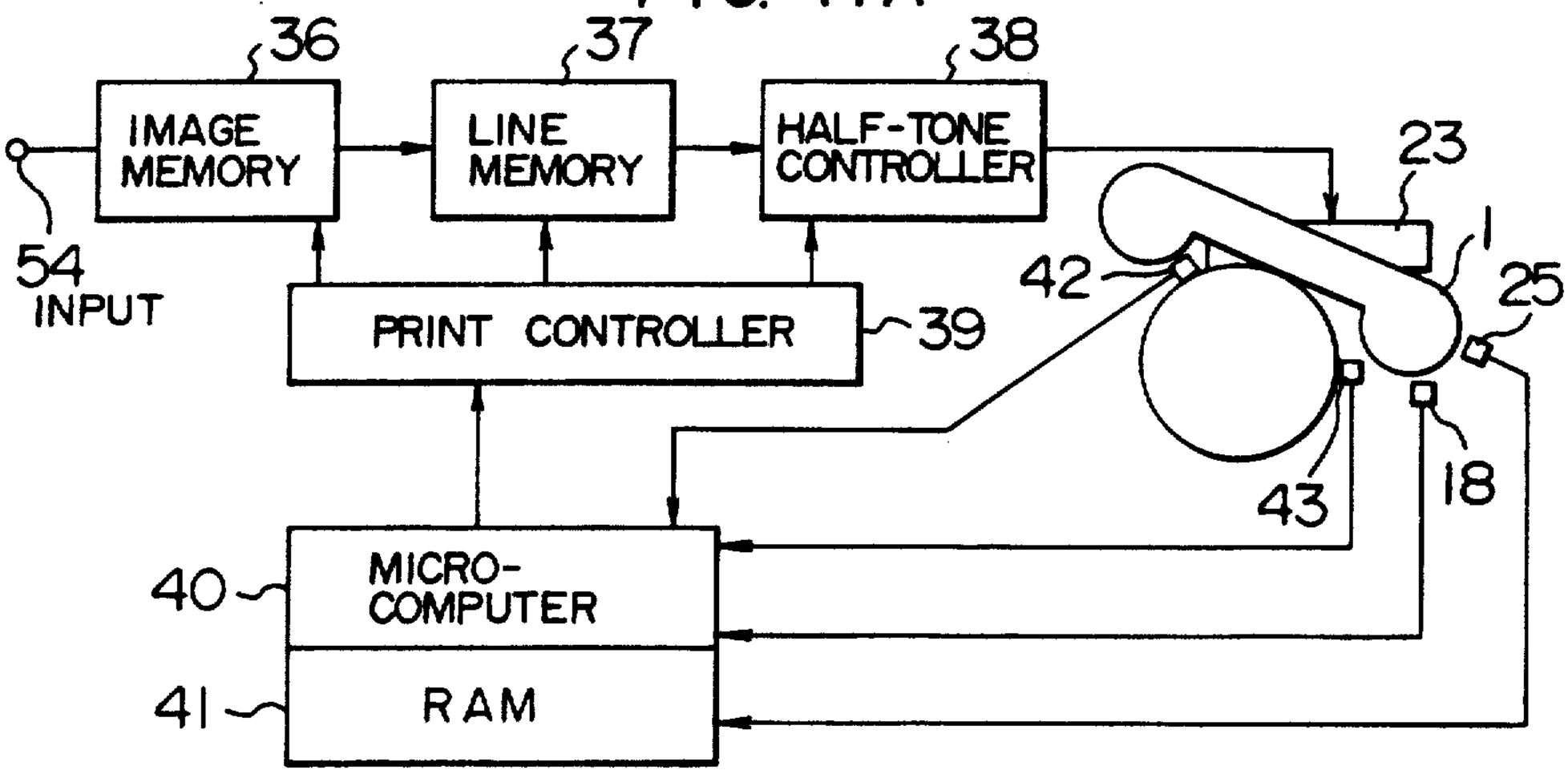
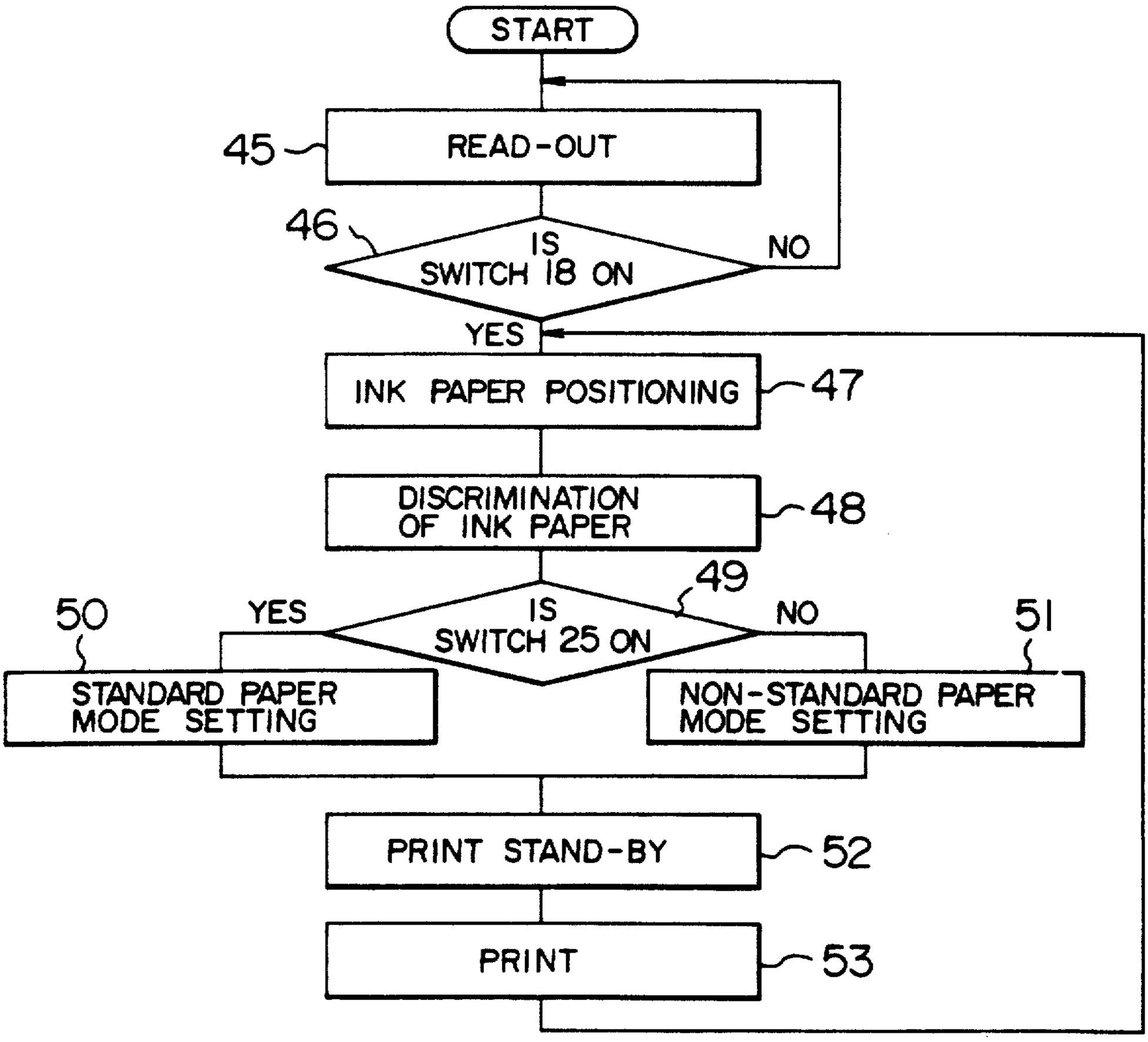


FIG. 17B



THERMAL TRANSFER RECORDING APPARATUS WITH INK PAPER CASSETTE

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

BACKGROUND OF THE INVENTION

The present invention relates to a thermal transfer recording apparatus with a cartridge or cassette incorporating strip medium such as ink paper.

A method for loading ink paper onto a printer in which characters or images are to be printed with an ink applied paper has been well known in, for example, various printers or typewriters. In particular, a method for readily loading a wide ink paper onto a printer is known in JP-A-56/67278 in which a supply shaft for supplying the ink paper and a take-up shaft for winding up the ink paper are mounted on the cassette. During the printing operation, a pressure roller for superposing printing paper and the ink paper is connected to the supply shaft and take-up shaft within the cassette by a rotary connection means, thereby performing the feed of ink paper in response to the printing operation.

In accordance with the above-described prior art technique, if the cassette is inversely inserted into the thermal transfer recording apparatus, the cassette is inserted deeply into the apparatus so that a normal printing operation would not result. Also, if a cassette contains the particular ink paper such as super high sensitive ink paper that cannot be usually used in the ordinary thermal transfer recording apparatus, an improper printing would be carried out with an improper ink, resulting in an printing failure or a breakdown of the thermal transfer printing apparatus.

SUMMARY OF THE INVENTION

Accordingly, an object of the present invention is to provide a thermal transfer recording apparatus in which a failure or malfunction caused by an reverse or backward loading of the cassette into the apparatus or by using improper ink paper is prevented.

To this end, according to the present invention, a depth of a connecting portion for connecting two shafts of the cassette on the front side in a cassette insertion direction (hereinafter referred to as "front face") is greater than that on the rear side in the cassette insertion direction (hereinafter referred to as "rear face") so that the front face connecting portion abuts a part of the thermal transfer recording apparatus.

With such a structure, if the cassette is normally inserted into the thermal transfer recording apparatus by the user, the cassette may be smoothly inserted into the recording apparatus without any hindrance. However, if the cassette is to be inserted backward into the recording apparatus by the user, the front face connecting portion of the cassette having a greater depth will abut a part of the thermal transfer recording apparatus, whereby the insertion of the cassette is prevented at a cassette inlet of the recording apparatus. Thus, the erroneous insertion of the cassette may be avoided without fail.

Also, according to the present invention, a cassette within which a special ink paper is loaded is provided with a hole or a projection, and a detector for detecting such hole or projection is provided within the recording apparatus.

Thus, a cassette within which the special ink paper is loaded is different in structure from a normal cassette within which the normal ink paper is loaded. The detector may detect this difference, whereby malfunctioning of the recording apparatus may be prevented.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

FIG. **1** is a schematic view showing a thermal transfer recording apparatus in accordance with one embodiment of the invention;

FIG. **2** is a side elevational view showing the operation of the thermal transfer recording apparatus shown in FIG. **1**;

FIGS. **3A** and **3B** are schematic views showing a mechanism for preventing the inverse insertion of the cassette in accordance with the embodiment;

FIGS. **4A** to **4C** are schematic views showing a mechanism for preventing the erroneous insertion of the cassette in accordance with another embodiment;

FIG. **5** is a view showing an engagement of the cassette and the printer;

FIG. **6A** is an illustration of a hole, for indicating a kind of ink paper, formed in the cassette according to the embodiment; FIG. **6B** is a chart showing the operation of the cassette of FIG. **6A**;

FIGS. **7A** and **7B** are illustrations of a hole, for indicating a kind of an ink paper, formed in the cassette according to another embodiment;

FIG. **7C** is a chart showing the operation of the cassette of FIGS. **7A** and **7B**;

FIGS. **8A** and **8B** are illustrations of a discriminating portion formed in a cassette according to still another embodiment;

FIG. **8C** is a chart showing the operation of the cassette of FIGS. **8A** and **8B**;

FIGS. **9A** and **9B** are illustrations of a discriminating portion formed in a cassette according to still another embodiment;

FIG. **9C** is a chart showing the operation of the cassette of FIGS. **9A** and **9B**;

FIGS. **10** to **15** are views showing other examples of an ink paper kind indicating hole according to the present invention;

FIG. **16** is a chart for the detecting operation in case of two kinds of ink paper indicating holes; and

FIGS. **17A** and **17B** are a diagram and a flowchart, respectively showing an example of the system operation of the thermal transfer recording apparatus.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to FIG. **1**, a cassette **1** includes therein a supply shaft **3** for supplying new ink paper and a take-up shaft **5** for winding up the used ink paper. Ink paper **7** is laid between the shafts **3** and **5**. The two shafts **3** and **5** are received in supply shaft housing portion **4** and a take-up shaft housing portion **6**, respectively. The two shaft housing portions **4** and **6** are supported by a front face connecting portion **15** and a rear face connecting portion **16**. The front face connecting portion **15** is provided with a grip **8** for holding by a person using the cassette and with positionship holes **9a** and **9b**. A depth D_1 of the front face connecting portion **15** is greater than that D_2 of the rear face connecting portion **16**. The depth D_1 is determined so that the front face connecting

portion **15** abuts a front face **14** of a printer mechanism **2** when the cassette is inserted backwards. Also, a hole **17** for indicating a special kind of ink paper in the cassette is formed on the rear face connecting portion **16** of a cassette within which special ink paper is loaded. This indicating hole **17** is not formed in a standard cassette within which standard ink paper is loaded. A loading detection switch **18** is located in a part of the printer mechanism **2** corresponding to the hole **17**. When the cassette **1** is inserted into the printer mechanism **2**, the loading detection switch **18** is depressed, thereby detecting the insertion of the cassette **1** into the printer mechanism **2**. Within the printer mechanism **2**, there is provided a drum **12** around which a transfer paper (not shown) is wound and delivered the ink on the ink paper is to be transferred on the transfer paper. The cassette **1** is located on the drum **12** (FIG. **2**). The operation of the thermal transfer recording apparatus will be described later.

When the cassette **1** is loaded in the printer mechanism **2**, torque transmission shafts **11**a and **11**b of the printer mechanism **2** are engaged with bearing portions (FIG. **5**) of the shafts **3** and **5**, respectively, in the cassette **1**, so that rotational torque is transmitted from the printer mechanism **2** to the take-up shaft **5** and the supply shaft **3**. Also, positioning pins **10**a and **10**b of the printer mechanism **2** are inserted into the positioning holes **9**a and **9**b, thereby performing the alignment of the cassette **1** in the printer mechanism **2**. In case of the special cassette **1**, having the indicating hole **17** on the rear face connecting portion **16**, in which the special ink paper is loaded, since the loading detection switch **18** is not depressed even though the cassette has been inserted, the thermal transfer recording apparatus does not recognise where the cassette **1** is loaded. Therefore, the printing operation is not performed. Thus, it is possible to avoid a misprint with the special ink paper.

FIG. **2** shows a basic mechanism of the thermal transfer recording apparatus. A sheet of transfer paper **19** supplied from a supply path **21** is wound around the drum **12** and is fed in accordance with the rotation of the drum **12** in the direction indicated by an arrow A. The transfer paper **19** is superposed with the ink paper **7** and depressed by a thermal head **23**. The thermal head **23** has in a lower portion thereof five hundred and twelve thermal elements arranged in a row in an axial direction of the drum **12**. Each of the elements generates heat independently. The heat generated by the thermal head **23** is transferred to the ink paper **7** so that ink on the ink paper **7** will be gasified or melted by such heat, as a result of which the ink is transferred to the transfer paper **19** with a density corresponding to the quantity of the heat generated in the thermal head **23**. Each time the above-described operation is carried out, the drum **12** is rotated gradually in the direction A. The operation is carried out by six hundred and forty times (six hundred and forty image elements) at a constant interval. The ink paper **7** and the transfer paper **19** are separated from each other by a peeling roller **24** behind the thermal head **23**. The ink paper **7** is wound around the take-up shaft **5**. The transfer paper **19** on the drum **12** continues moving, since a paper feed/discharge switching member **20** is switched in a position indicated by the solid line. Accordingly an image having 512×640 image elements and different densities is recorded on the transfer paper **19**. Three colours of ink, Cy, Mg and Ye have been applied, in advance, on the ink paper **7** over a single picture section of the transfer

paper **19**. Therefore, the pint of 512×640 image elements according to the above-described recording operation is carried out three times for different colours so as to perform a color image printing. The paper feed/-discharge switching member **20** is switched to a position indicated by the dotted line after the three time (three color) recording. The paper feed/discharge discharge switching member **20** removes the transfer paper **19** on which the recording has been finished from the drum **12**. The transfer paper **19** is fed to a discharge path **22** and is discharged to the outside of the thermal transfer recording apparatus.

FIGS. **3A** and **3B** schematically illustrate the prevention of the cassette reverse or backwards insertion due to the difference in depth of the front face connecting portion **15** and the rear face connecting portion **16** of the cassette **1**. FIG. **3A** is a schematic view showing the state in which the cassette **1** is loaded in the correct way. The cassette **1** is inserted deeply into the mechanism **2** so that the rear face connecting portion **16** depresses the switch **18**. Thus, the recording apparatus detects the state where the cassette **1** is loaded therein. Also, the positioning pin **10**a and **10**b of the mechanism **2** are inserted into the positioning holes **9**a and **9**b of the front face connecting portion **15**, so that the cassette **1** is fixed in a predetermined position within the printer mechanism **2**. FIG. **3B** is a view showing the state in which the cassette **1** is being inserted into the printer mechanism **2** in the backwards or reverse direction (indicated by the arrow B). In this case, the front connecting portion **15**, having a greater depth, of the cassette **1** is brought into contact with the positioning pin **10**b or the front face of the mechanism **2**, thus preventing the insertion of the cassette **1**. Since the insertion of the cassette **1** is prevented at the inlet portion of the printer mechanism **2**, the user may readily recognize that it is impossible to insert the cassette into the apparatus. Therefore, there is no fear that the user would forcibly insert the cassette **1**. Also, if the front face connecting portion **15** and the rear face connecting portion **16** of the cassette **1** are rather different from each other in shape so that the shaft of the cassette is asymmetric with respect to the fore-and-aft direction, it is further easier for the user to distinguish the front and rear of the cassette.

FIG. **4A** is a view showing the state in which the cassette **1** is being inserted upside down into the thermal transfer recording apparatus by the user. The rear face connecting portion **16** is positioned at a lower part in the drawings since the cassette is held upside down. Thus, the rear face connecting portion **16** is brought into contact with the front surface **14** of the mechanism part or the positioning pins **10**a and **10**b so that the cassette **1** is prevented from being inserted into the thermal transfer recording apparatus. FIG. **4B** shows an example of shapes of the connecting portions **15** and **16**. The left half of the drawings is a front view of the cassette **1**, whereas the right half is a rear view of the cassette **1**. Since the cassette has an asymmetric face connecting portion **16**, it is easy for he user to recognize the top side and the bottom side of the cassette. The rear face connecting portion **16** has two end portions **16**a, **16**b, (only one is shown) and an interconnecting portion **16**c. The portion **16**c is disposed with respect to a line extending through the axes **5**A, **3**A of the respective take-up shaft **5** and supply shaft **3**. The cassette **1** is so constructed that the depth of the front face connecting portions **15** is greater than that of the rear face connect-

ing portion **16**. FIG. **4C** shows still another example of the cassette **1**. In the same manner as in FIG. **4B**, the left half of FIG. **4C** is a front view of the cassette, and the right half of FIG. **4C** is a rear view of the cassette. The front face connecting portion **15** has two end portions **15a**, **15b** (only one is shown) and an interconnecting portion **15c**. The portion **15c** is disposed with respect to a line extending through the axes **5A**, **3A** of the respective take-up shaft **5** and the supply shaft **3**. Also in the cassette shown in FIG. **4C**, the vertical depth of the front face connecting portion **15** is greater than that of the rear face connecting portion **16**. However, the vertical depth of the front connecting portion **15** is lesser than the depth of the front connecting portion **15** of the cassette shown in FIG. **4B**. Since the cassette shown in FIG. **4C** has the asymmetic front face connecting portion **15** with respect to the vertical direction, it is easy for the user to recognize the top side and bottom side of the cassette.

FIG. **5** is a schematic plan view of the printer mechanism **2** in which the cassette **1** is loaded. As described in conjunction with FIG. **1**, the torque transmission shafts **11a** and **11b** of the printer mechanism **2** are engaged with the bearing portions **27a** and **27b** of the cassette **1** so that the rotational torque is transmitted to the take-up shaft **5** through a torque transmission claw **28**. The positioning pins **10a** and **10b** of the printer mechanism **2** are inserted into the positioning holes **9a** and **9b** formed in the cassette **1** so that the cassette **1** is fixed in place. Also, the rear face connecting portion **16** of the cassette **1** depresses the detection switch **18** of the printer mechanism **2**, whereby the thermal transfer recording apparatus detects the insertion of the cassette **1**.

FIGS. **6A** and **6B** illustrate a concept of a discriminating system for discriminating between the cassette in which the special ink paper is loaded and the cassette in which the regular or standard ink paper is loaded. The indicating hole **17** is not formed in the cassette in which the standard ink paper is loaded, whereas the indicating hole **17** is formed in the cassette in which the special ink paper is loaded. Referring to FIG. **6A**, switches **18** and **25** are provided in the printer mechanism **2**. FIG. **6B** shows the states of the switches **18** and **25** in accordance with the kind of the cassette in the embodiment shown in FIG. **6A**. In FIG. **6B**, a sign o represents the state where the switch is depressed or turned on, whereas a sign x represents the state where the switch is not depressed. The switch **18** is depressed only in the case where the cassette having the standard ink paper is loaded in the printer mechanism **2**. The switch **25** is depressed in the case where the cassette is set in the printer mechanism irrespective of the kind of the loaded ink paper. In other words, in the case where the cassette in which the stand ink paper is loaded is set in the printer mechanism, the switch **25** is depressed by the cassette, and since there is no indicating hole **17** is the cassette, the switch **18** is also depressed by the cassette. In the case where the cassette in which the special ink paper is loaded is set in the printer mechanism, the switch **25** is depressed, and since the indicating hole **17** is formed in the cassette, the switch **18** is not depressed. In the case where no cassette is loaded in the printer mechanism, neither switch **18** nor **25** is depressed. In the case where the printer is so constructed that the regular ink paper cassette is usable exclusively, it is sufficient to provide the switch **18** in the printer mechanism and the switch **25** may be dispensed with. In this case, if the special ink paper cassette is loaded into the printer mechanism, the switch **18** is not depressed, so that the detection as to where the cassette has been loaded in the printer mechanism is not performed. Thus, the printer mechanism will not start the printing operation. In other words, only in the case where the standard ink paper cassette is set in the printer mechanism, the switch **18** is depressed so that the printing operation is started. Thus, the printer will not malfunction. Also, in the printer that may use both cassettes, the switch **18** is used for discriminating between a regular and special kind of the cassette **1**, and the switch **25** is used for detecting the insertion of the cassette **1**.

FIGS. **7A** and **7B** show the actual operation of the switches shown in FIG. **5**. FIG. **7A** shows the relationship between the switch **18** and the standard ink paper cassette **1**. In FIG. **7A**, the rear face connecting portion **16** depresses the switch **18** upon the insertion of the standard ink paper cassette **1**, so that the insertion of the cassette **1** is detected as shown in FIG. **7C**. FIG. **7B** shows the relationship between the switch **18** and the rear face connecting portion **16** when non-standard ink paper cassette **1** is loaded. In this case, when the cassette **1** is loaded, the switch **18** is not depressed due to the provision of the indicating hole **17** formed in the rear faces connecting portion **16**. As shown in FIG. **7C**, the loading of the cassette **1** is not detected. Thus, the printing operation will not occur. In a more sophisticated printer, there are two switches as shown in FIG. **6A**, for detection of the kind of cassette, that is, the regular (standard ink paper) cassette and the irregular (non-standard ink paper) cassette to perform the printing operational mode suitable of the characteristics for the responsive ink paper. In FIG. **7C**, a sign o means that the printer is operable, and a sign x means that it is not operable.

FIGS. **8A** and **8B** show an embodiment in which a depthwise projection **30** is provided in the rear face connecting portion **16** instead of the indicating hole, so that the kind of the cassette is detected according to the projection **30**. FIG. **8A** shows the relationship between the switch **18** and the loaded standard ink paper cassette **1**. In FIG. **8A**, if the cassette is set in the printer mechanism, the projection **30** depresses the switch **18** so that the insertion of the cassette **1** is detected as shown in the chart of FIG. **8C**. FIG. **8B** show the relationship between the switch **18** and the loaded non-standard ink paper cassette **1**. In FIG. **8B**, even if the cassette **1** is inserted, since the projection **30** is not formed in the rear face connecting portion **16**, the switch **18** is not depressed. In this case, as shown in the chart of FIG. **8C**, the loading of the cassette **1** is not detected. Therefore, the printing operation will not occur. In case of a high sophisicated printer, the two switches are provided as shown in FIG. **6A**, to distinguished the standard non-standard and paper cassettes from each other to perform the suitable printing operation for the characteristics of the respective ink paper.

FIG. **9A** and **9B** show another embodiment in which a widthwise projection **30** is formed in the rear face connecting portion **16**. In this embodiment, the projection **30** extends from the rear face connecting portion **16** toward the switch **18**. FIG. **9A** shows the relationship between the switch **18** and the standard ink paper cassette **1**. In FIG. **9A**, if the cassette **1** is set in the printer mechanism, the projection **30** depresses the switch **18**. The depression of the switch **18** leads to the detection that the cassette **1** is inserted into the printer mechanism. FIG. **9B** shows the relationship between the

switch **18** and the non-standard ink paper cassette **1** when loaded. In FIG. **9B**, even if the cassette **1** is set in the printer mechanism, the switch **18** is not depressed since the projection **30** is not formed in the rear face connecting portion **16**. Accordingly, the detection of the cassette inserted into the printer mechanism is not performed. The printing operation will not occur.

In case of the printer in which not only the standard but also non-standard ink paper may be used, the switch **18** is used as the cassette loading detecting switch. Thus, the printing operation suitable for the characteristics of the respective ink paper will be performed.

FIG. **10** shows another type of indicating hole **17** formed in the cassette **1**. In FIG. **10**, a cutaway or recess **17** is formed as the indicating hole in the lower portion of the rear face connecting portion of the cassette. This recess **17** may be formed in the upper portion of the rear face connecting portion **16** or in the front face connecting portion **15**. The operation of the switches or the like in the case where the cassette in accordance with this embodiment is inserted into the printer mechanism is substantially the same as that of the embodiments shown in FIGS. **1** through **8**C.

FIG. **11** shows still another type of indicating hole **17** which is formed in the shaft receiving portion **4** of the cassette **1**.

FIG. **12** shows still indicating cutaway portion **17** which is formed in a rear end surface of the shaft receiving portion **4** of the cassette **1**.

FIG. **13** shows still another indicating arrangement formed in the cassette **1**. A cutaway **31** is formed at one rear end of junctions **33**a and **33**b between the cassette halves which are coupled together. In this case, it is possible to detect the kind of the cassette **1** in accordance with whether or not the cutaway **31** is provided in junctions **33**a and **33**b.

In the embodiments shown in FIGS. **11** to **13**, the operation of the switch or the like in case where the cassette is inserted into the printer mechanism is substantially the same as that of the embodiments shown in FIGS. **1** through **8**.

FIG. **14** shows an embodiment in which the detection of the indicating hole **17** is optically carried out. The indicating hole **17** is formed in the top surface of the cassette **1**. The detection of the indicating hole **17** is performed by a light source **34** and an optical sensor **35** provided in alignment in the vertical direction. In this case, the indicating hole **17** may be modified as a cutaway portion of the type shown in FIG. **10**.

FIG. **15** shows another optical readout means for the indicating hole **17**. The kind indicating hole **17** is formed in a junction **33**a of the cassette **1**, and the detection of the kind indicating hole **17** is performed by a light source **34** and an optical sensor **35** provided in alignment in the vertical direction. In this case, the kind indicating hole **17** may be formed as a cutaway portion of the type shown in FIG. **10**.

FIG. **16** shows operations of the two switches **18** and **25** (shown in FIG. **6**A) in the printers in which three kinds of ink paper, that is, regular or standard ink paper A and B and non-standard ink paper C is used. As shown in the lower port of the table of FIG. **16** in the ordinary printer, the standard ink paper A and B may be used and in the high sophistication printer, any kind of ink paper may be used. In this case, as described in conjunction with FIG. **6**A, only the switch **18** is used as the insertion detecting switch in the ordinary printer, whereas two switches **18** and **25** are provided in the more sophisticated printer. Either switch **18** or **25** can function as the cassette insertion detecting switch and the ink paper discriminating switch. In case of the standard ink paper A cassette, both the switches **18** and **25** are depressed, and in both the ordinary printer and the more sophisticated printer, the insertion of the standard ink paper. A cassette is detected. In case of the standard ink paper B cassette, the switch **18** is depressed, whereas the switch **25** is not depressed. Therefore, in the higher sophistication printer, it is possible to distinguish the cassettes of standard ink paper A and B. However, in the ordinary printer, this discrimination is not carried out. In this case, in the ordinary printer, the printing mode corresponding to the respective ink paper may be set manually by adjusting a contrast adjustment knob on the printer, for example. In the case of the non-standard ink paper C cassette, the switch **18** is not depressed, and in the ordinary printer, the presence of the cassette **1** is not detected. Therefore, it is possible to prevent the non-standard ink paper from being used in the ordinary printer. In the more sophisticated printer, the switch **25** is depressed so that the non-standard ink paper C cassette is detected. The printing mode is changed in accordance with the charcteristics of the ink paper, to perform the printing.

FIGS. **17**A and **17**B show the system operation of the thermal transfer recording apparatus. FIG. **17**A is a flowchart of the thermal transfer recording apparatus. In FIG. **17**A, an image data from an input **54** is stored as a static image in an image memory **36**. During the printing operation, under the control of a print controller **39**, the content stored in the image memory **36** is applied to a line memory **37** for each line successively. A half-tone controller **38** converts each image element data to data for current supply period of the thermal head **23** on the basis of the data of the line memory **37**, and generates a strobe signal for driving the thermal head **23**. The thermal head **23** generates heat in accordance with the strobe signal waveform to transfer the ink on the ink paper onto the transfer paper. In this case, if the current supply period for the thermal head **23** is long, the quantity of heat generated by the thermal head **23** is large so that a large amount of ink is transferred to the transfer paper to increase the density of the printed image. Also, if the current supply period is short, the quantity of heat generated by the thermal head **23** is small so that a small amount of ink is transferred to the transfer paper to decrease the density of the printed image. In the mechanism **2**, there are provided an ink paper position sensor **42**, a transfer paper position sensor **43**, the cassette loading detection switch **18** and the paper kind discriminating switch **25**. The signals therefrom are fed to a microcomputer **40** to control the system. In FIG. **17**B, there is shown an example of flowchart of the microcomputer **40**. The operation of the system will be described hereinunder with reference to the flowchart in FIG. **17**A. At first, the thermal transfer recording apparatus performs a readout (step **45**) for detecting the loading of the cassette after the start of the operation. Subsequently, in a step **46**, if the cassette is loaded into the apparatus, the next operation is performed, whereas if the cassette is not loaded thereinto, the step **45** is again performed. After the cassette has been loaded, in case of the ordinary printer, the process proceeds to a print stand-by step **52** later described. In case of the more sophisticated printer, the process proceeds to the step **48** for discriminating the kind of ink paper. In accordance with this result, a standard paper mode setting

(step 50) or a non-standard paper mode setting (step 51) is carried out. More specifically, the setting of the current supply period for the thermal head, the correction of the color balance and the like are performed in response to the characteristics such as sensitivity of the ink paper and tone. Thereafter, the process proceeds to the print stand-by step 52. Then, the print step is performed in accordance with the command made by the user (step 53). Thereafter, the process is returned back to the ink paper positioning step 47 to repeat the same operations.

What is claimed is:

1. A thermal transfer recording apparatus comprising a printer mechanism, and an ink paper cassette having ink paper made of a strip film on which ink is applied, a supply shaft on which said ink paper is wound and a take-up shaft juxtaposed with said supply shaft for winding said ink paper,

said printer mechanism including:

(1) a front face for preventing said printer mechanism from being accessible from the outside, said front face having a loading aperture through which said ink paper cassette is loadable into said printer mechanism in a direction parallel to axes of said take-up and supply shafts;

(2) torque transmission means for transmitting torque to said take-up and said supply shafts;

(3) a drum on which a transfer paper is to be wound, said drum forwarding said transfer paper successively in accordance with image print; and

(4) a thermal head receiving a signal corresponding to a pictorial image to be printed, bringing the ink paper in said ink paper cassette into contact with said transfer paper wound on said drum, and generating heat in accordance with said signal to thermally transfer the ink on said ink paper to said transfer paper, thereby printing a desired pictorial image onto said transfer paper, and said ink paper cassette including:

(1) a rear connecting portion having a first end portion rotatably supporting one end of said take-up shaft, a second end portion rotatably supporting one end of said supply shaft, and an interconnecting portion connecting said first and second end portions with a predetermined space therebetween, said interconnecting portion disposed asymmetrically with respect to a line extending through said axes of said take-up and supply shafts, a depth of said rear connecting portion being smaller than a dimension of said loading aperture of said printer mechanism, permitting said cassette to be loaded from said rear connecting portion thereof into said printer mechanism; and

(2) a front connecting portion juxtaposed with said rear connecting portion, and having a first end portion rotatably supporting the other end of said take-up shaft, a second end portion rotatably supporting the other end of said supply shaft, and an interconnecting portion connecting said first and second end portions with the predetermined space therebetween, said front connecting portion having a depth greater than the dimension of said loading aperture of said printer mechanism, preventing the ink paper cassette from being loaded from said front connecting portion thereof into said printer mechanism.

2. A thermal transfer recording apparatus according to claim 1, wherein said printer mechanism has positioning pin means on said front face thereof, and said ink paper cassette has a positioning hole for receiving said positioning pin means; said positioning hole being provided at a position of the front connecting portion corresponding to said positioning pin means.

3. A thermal transfer recording apparatus according to claim 1, wherein said ink paper cassette has an indicating hole corresponding to a particular type of ink paper loaded in said ink paper cassette, and said printer mechanism has detector means for detecting the presence or absence of said indicating hole.

4. A thermal transfer recording apparatus according to claim 3, wherein said indicating hole is formed in said rear connecting portion of said ink paper cassette, and said detector means includes a switch provided at a position corresponding to said indicating hole.

5. A thermal transfer recording apparatus according to claim 2, wherein said ink paper cassette has an indicating hole corresponding to a type of ink paper loaded in said ink paper cassette, and said printer mechanism has a detector means for detecting the presence or absence of said indicating hole.

6. A thermal transfer recording apparatus according to claim 5, wherein said indicating hole is formed in said rear connecting portion of the ink paper cassette, and said detector means includes a switch provided at a position corresponding to said indicating hole.

7. A thermal transfer recording apparatus according to claim 1, wherein said ink paper cassette has a projection corresponding to a type of ink paper loaded in said ink paper cassette, and said printer mechanism has a detector means for detecting the presence or absence of the projection at a position corresponding to said projection.

8. A thermal transfer recording apparatus according to claim 1, wherein said ink paper cassette is provided with a cutaway corresponding to a type of ink paper loaded in said ink paper cassette, and said printer mechanism is provided with a detector means for detecting the presence or absence of said cutaway at a position corresponding to said cutaway in the printer mechanism.

9. A thermal transfer recording apparatus according to claim 2, wherein said ink paper cassette has a projection corresponding to a type of ink paper loaded in said ink paper cassette, and said printer mechanism has a detector means for detecting the presence or absence of said projection at a position corresponding to said projection.

10. The thermal transfer recording apparatus according to claim 2, wherein said ink paper cassette is provided with a cutaway corresponding to a type of the ink paper loaded in said ink paper cassette, and said printer mechanism is provided with a detector means for detecting the presence or absence of said cutaway at a position corresponding to said cutaway in said printer mechanism.

11. A ink paper cassette comprising:

ink paper made of a strip film on which ink is applied;

a supply shaft on which said ink paper is wound for supplying the ink paper;

a take-up shaft juxtaposed with said supply shaft for winding said ink paper;

a rear connecting portion having a first end portion rotatably supporting one end of the said take-up shaft, a second end portion rotatably supporting

one end of said supply shaft, and an interconnecting portion connecting said first and second end portions with a predetermined space therebetween, said interconnecting portion disposed asymmetrically with respect to a line extending through [said] axes of said take-up and supply shafts; and

a front connecting portion juxtaposed with said rear [face] connecting portion and having a first end portion rotatably supporting the other end of said take-up shaft, a second end portion rotatably supporting the other end of said supply shaft, and an interconnecting portion connecting said first and second end portions with the predetermined space therebetween, said front connecting portion having

a depth greater than that of said rear connecting portion. [second ends of said supply shaft and said take-*up shaft, said front connecting portion having a depth greater than that of said rear connecting portion.*]

12. An ink paper cassette according to claim 11, wherein a positioning hole is formed in the front connecting portion of said ink paper cassette.

13. An ink paper cassette according to claim 11, wherein an indicating hole corresponding to a type of ink paper loaded in the ink paper cassette is formed in said ink paper cassette.

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