US00RE35388E

United States Patent [19]

Kimura et al.

[11] E **Patent Number: Re. 35,388**

[45] **Reissued Date of Patent: Dec. 3, 1996**

[54] **MULTIPLE COLOR INK RIBBON CASSETTE**

[75] Inventors: **Koichi Kimura**; **Yasushi Ishikawa**, both of Tokyo, Japan

[73] Assignee: **Seiko Precision Inc.**, Tokyo, Japan

[21] Appl. No.: **535,838**

[22] Filed: **Sep. 29, 1995**

Related U.S. Patent Documents

Reissue of:

[64] Patent No.: **5,382,103**
Issued: **Jan. 17, 1995**
Appl. No.: **99,033**
Filed: **Jul. 28, 1993**

[30] **Foreign Application Priority Data**

Jul. 30, 1992 [JP] Japan ..... 4-053631 U

[51] **Int. Cl.**[6] **B41J 33/32**

[52] **U.S. Cl.** **400/248**; 400/207

[58] **Field of Search** 400/248, 207, 400/247, 248.1, 243

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,492,484	1/1985	Akazawa et al.	400/248
4,650,355	3/1987	Cassiano et al.	400/248
4,712,931	12/1987	Oshima	400/248
4,874,262	10/1989	Yokoi et al.	400/248

FOREIGN PATENT DOCUMENTS

0010480	1/1986	Japan	400/248
0080074	4/1987	Japan	400/248
63-37248	3/1988	Japan .	
214443	4/1990	Japan .	

Primary Examiner—Edgar S. Burr
Assistant Examiner—Anthony H. Nguyen
Attorney, Agent, or Firm—Amster, Rothstein & Ebenstein

[57] **ABSTRACT**

To reduce the cost of a cassette case by simplifying the design, a cassette case **10** is made up of a case body **26** and a case cover **27** fitted to the upper surface of the case body **26**, a ribbon guide **28** is fitted to the outside of the cassette case **10** in such a way that it is free to slide in the longitudinal direction, and at times of printing color changeover the required color band of the multiple color ink ribbon **11** is guided over the end of the printing head by this ribbon guide **28**. The ribbon guide **28** is provided with guide portions **36**, **37** facing both of the side surfaces of the case cover **27**, and the movement of the ribbon guide **28** in the direction of the length of the cassette case **10** is guided by these guide portions **36**, **37** sliding along the side surfaces of the case cover **27**.

1 Claim, 5 Drawing Sheets

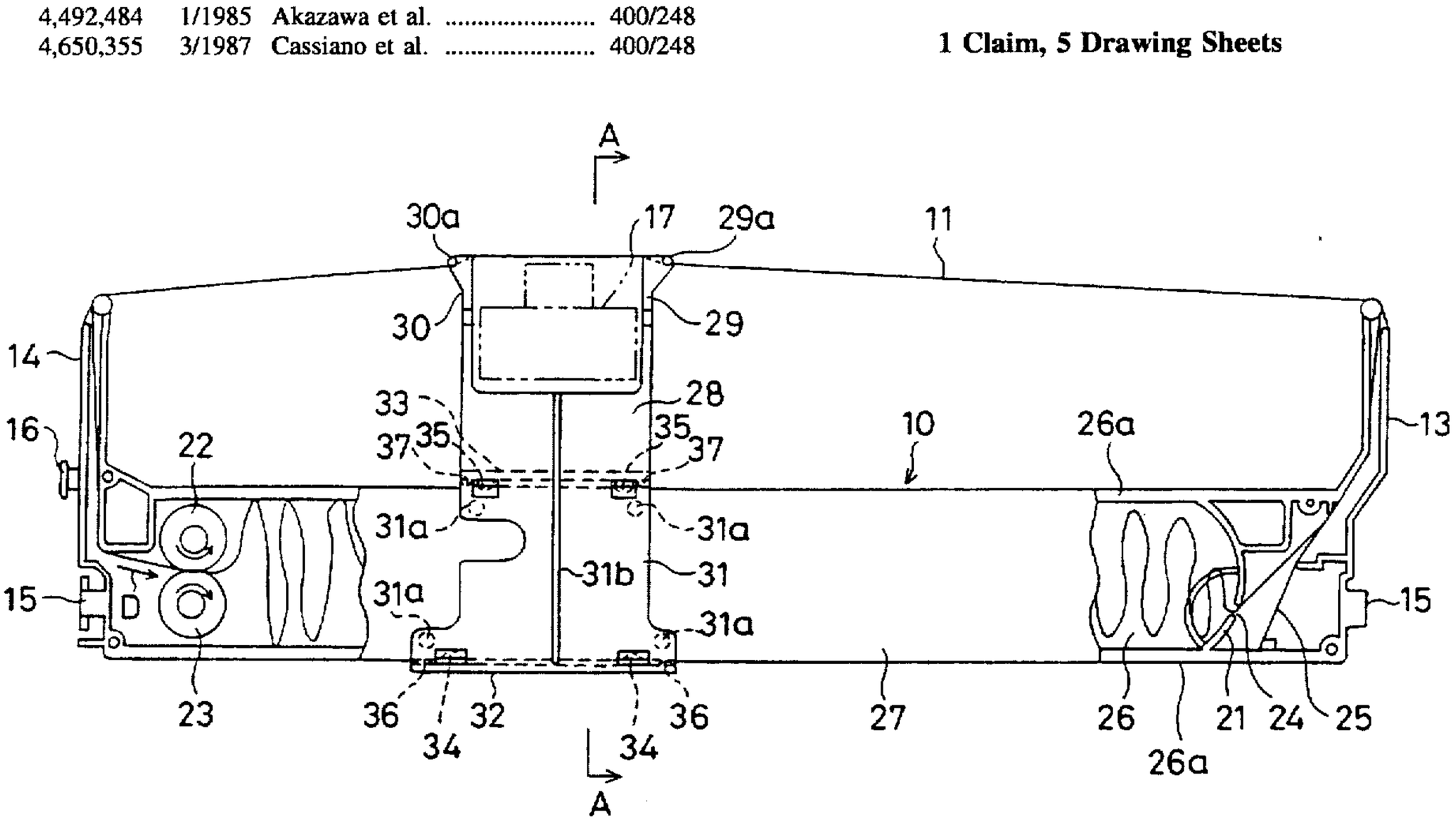


FIG. 1

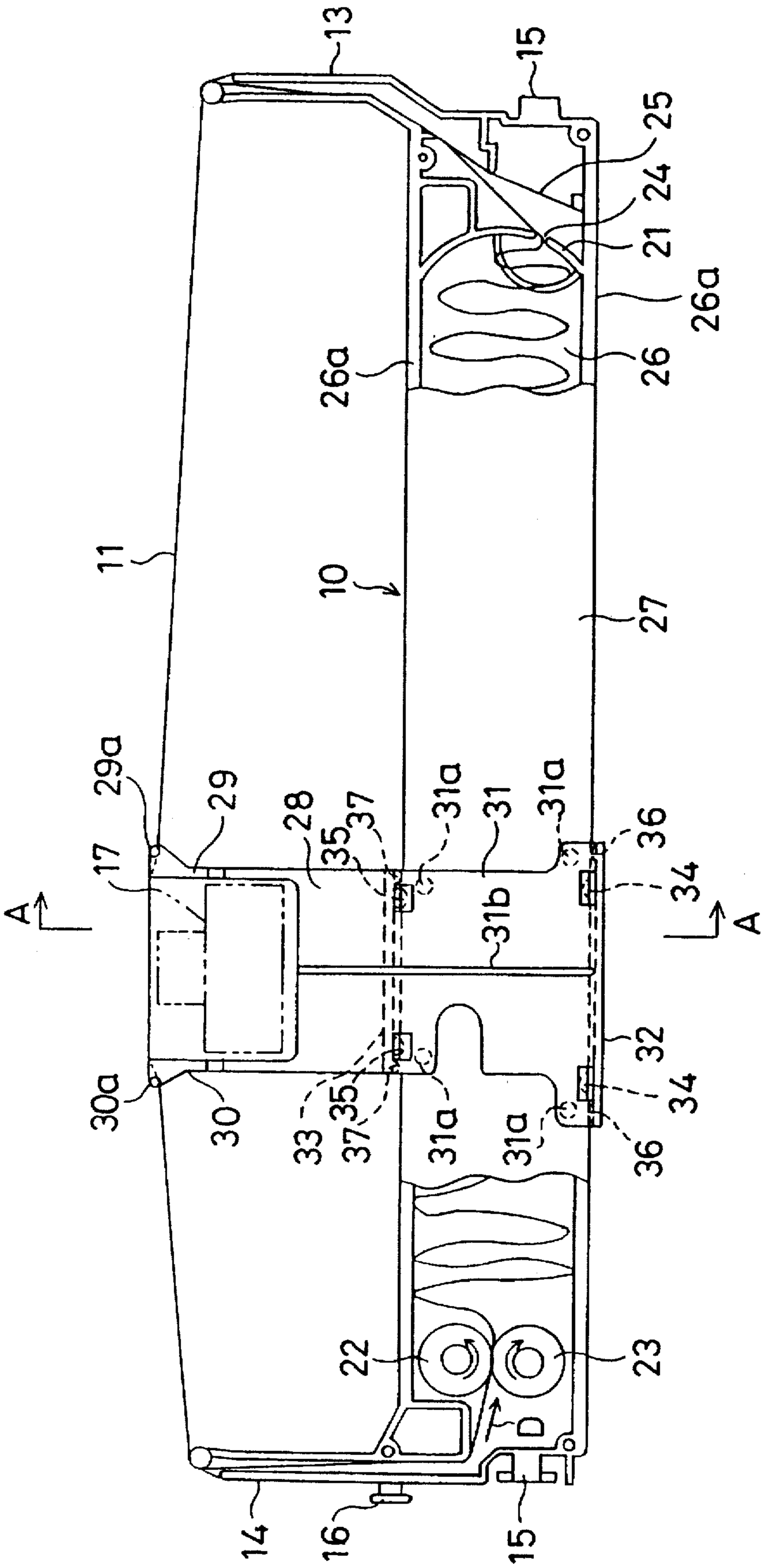

13
15
25
24
21
26a
26a
26
10
11
27
29a
29
28
35
37
31a
31
31a
36
34
17
31b
A
A
30a
30
33
35
37
31a
31a
32
34
36
22
23
14
16
15

FIG. 2

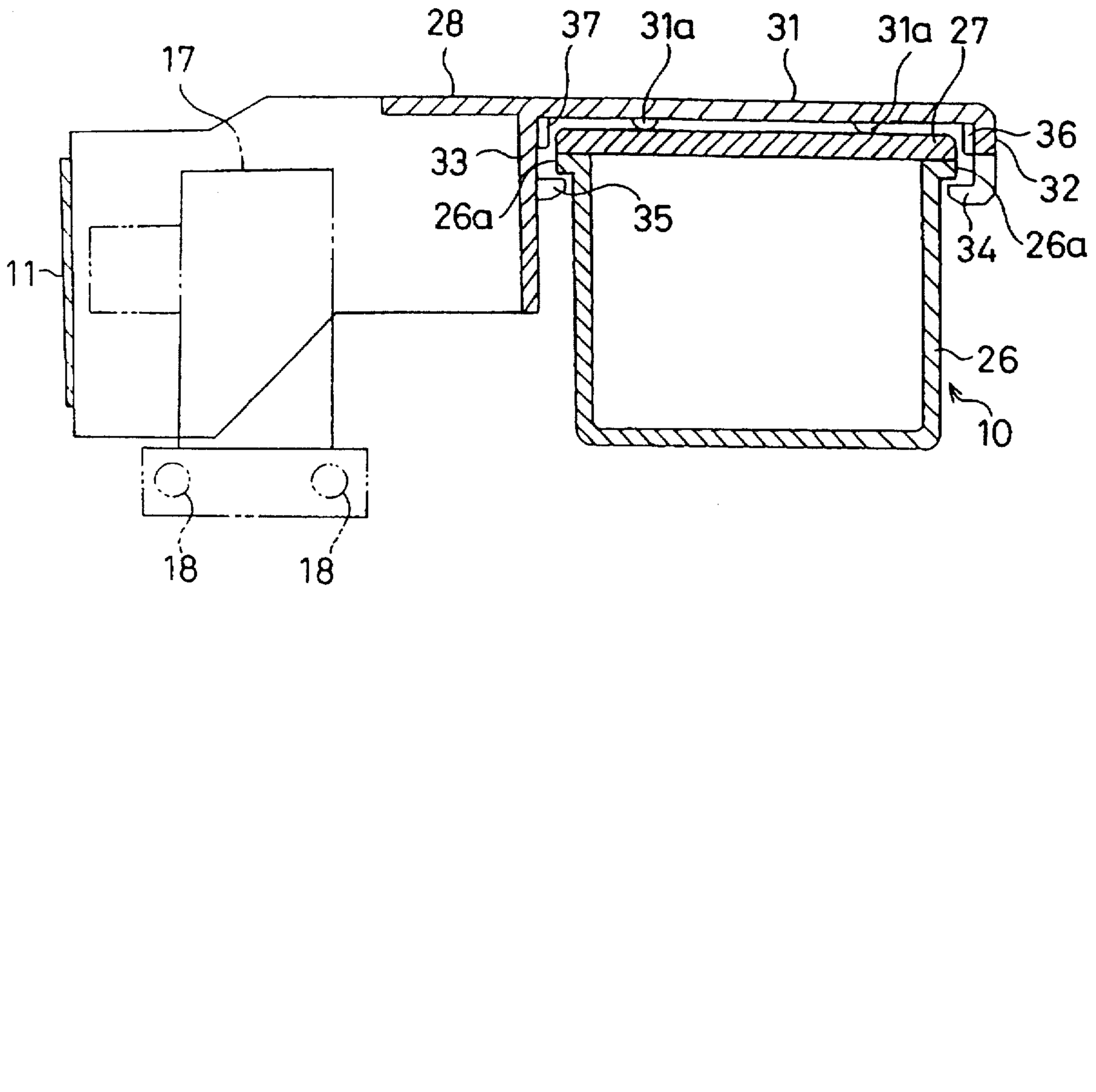


FIG. 3

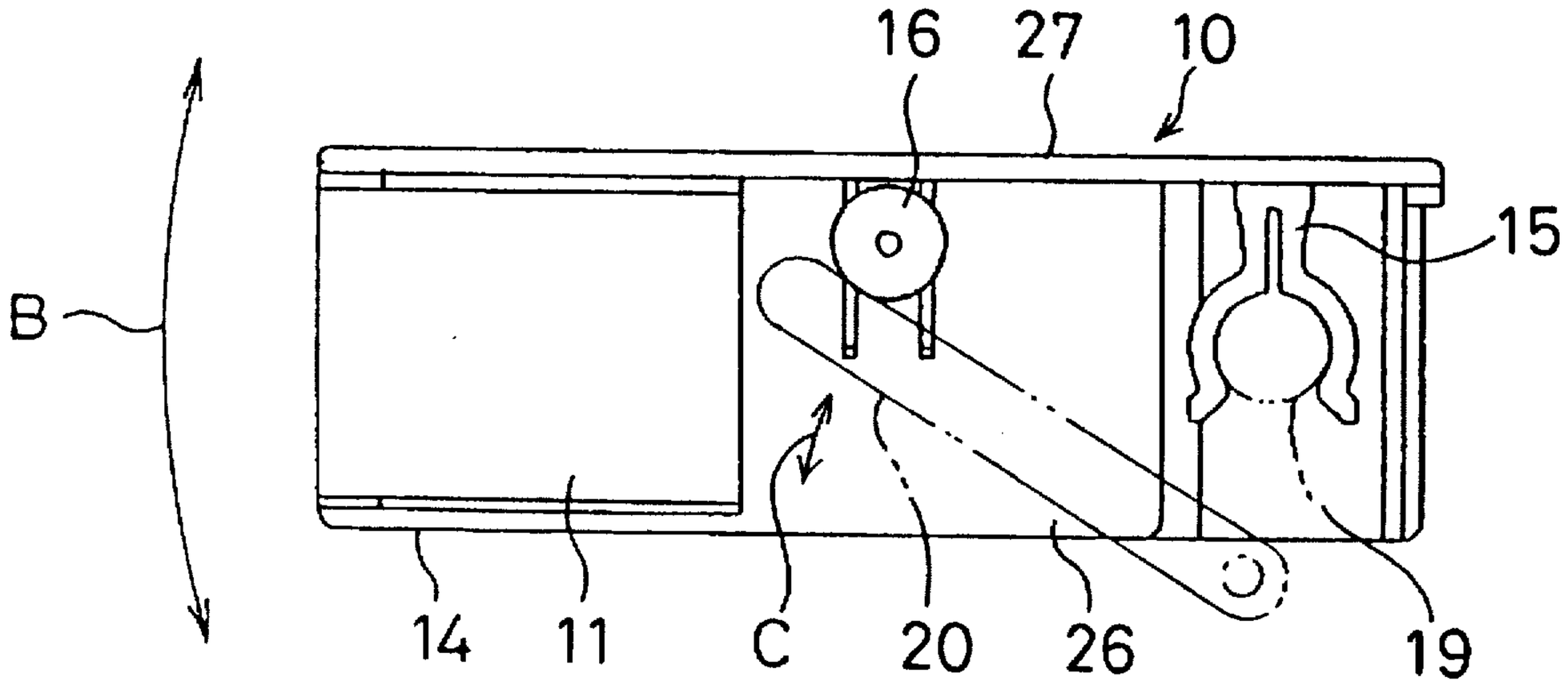


FIG. 4

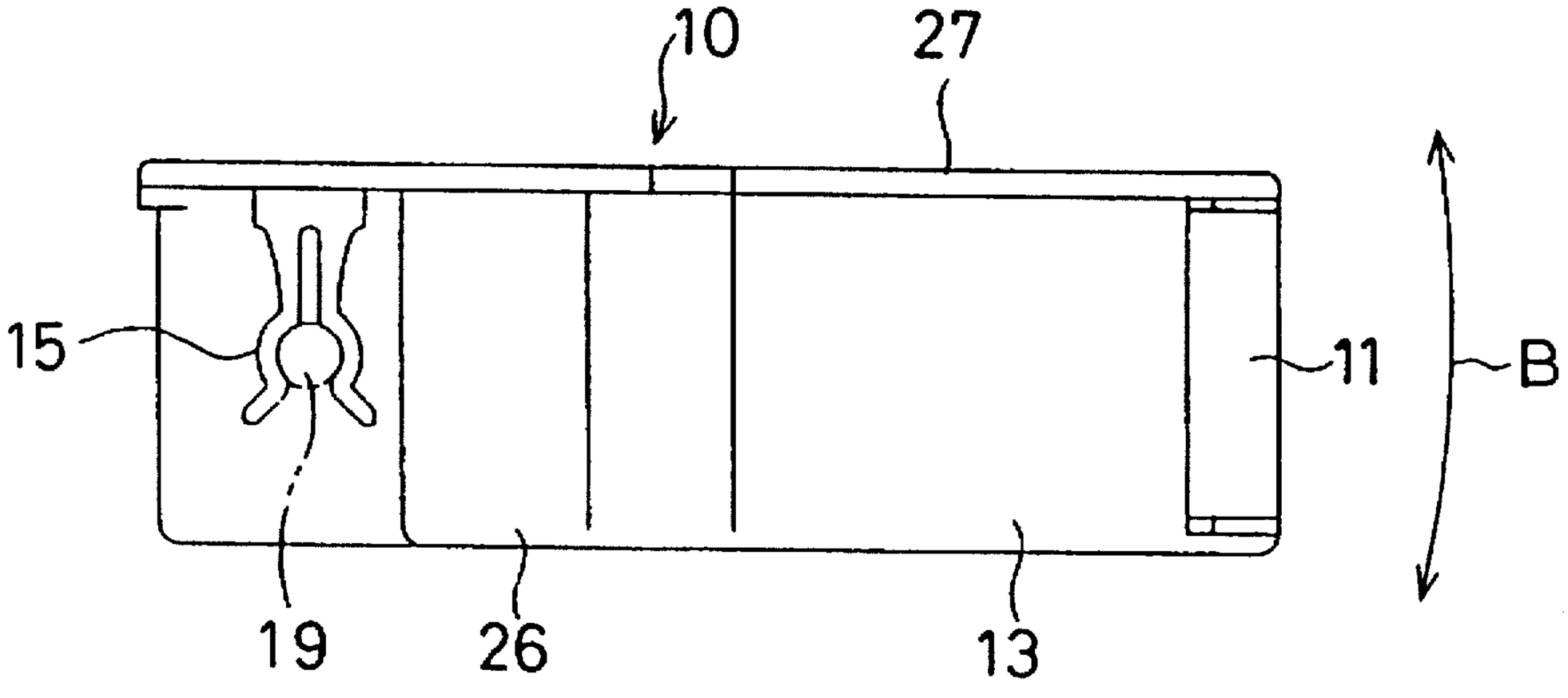
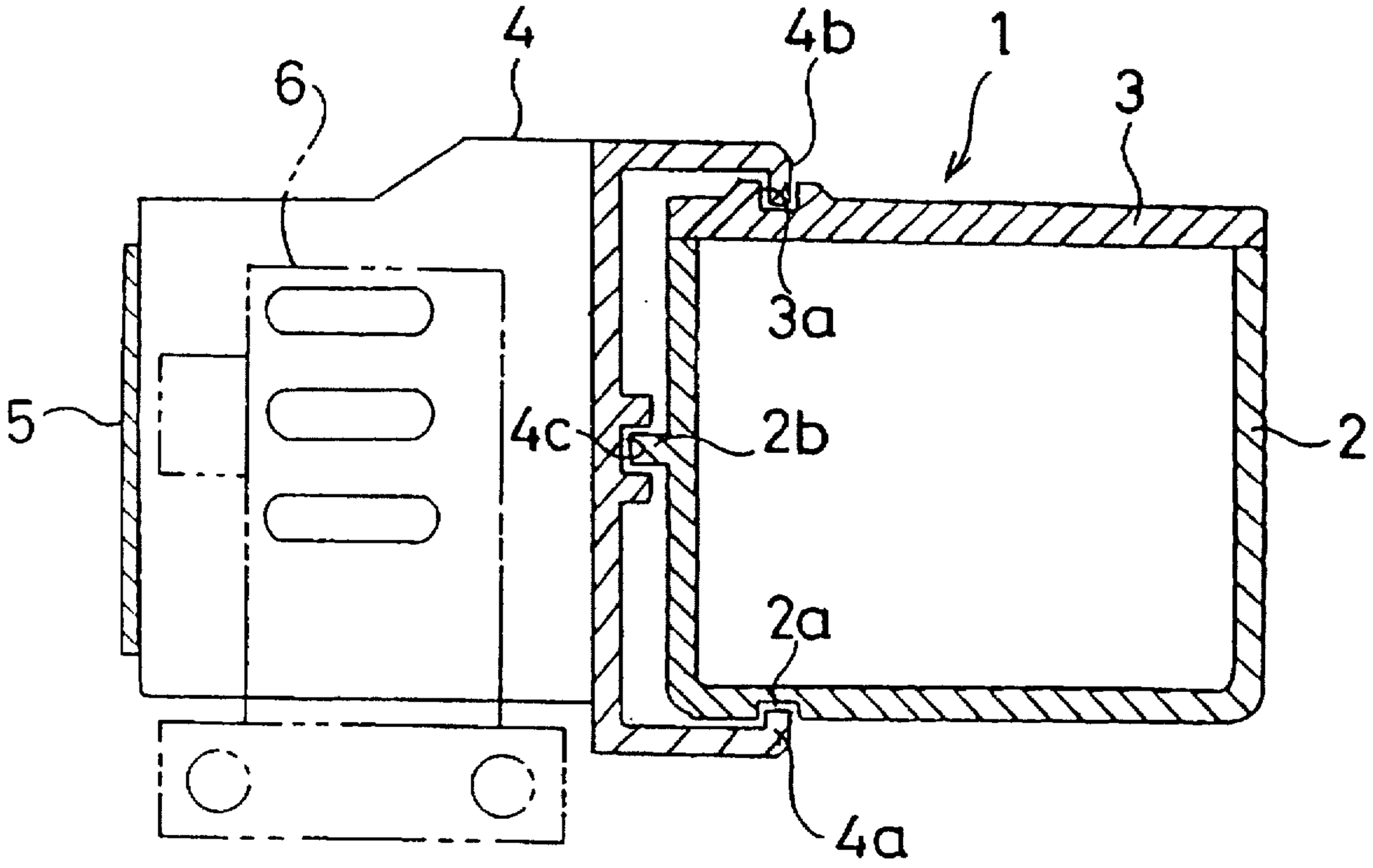


FIG. 5
PRIOR ART



MULTIPLE COLOR INK RIBBON 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.

FIELD OF INDUSTRIAL USE

This invention relates to a multiple color ink ribbon cassette for use in a printer.

PRIOR ART

In an existing multiple color ink ribbon cassette of this type (Japanese Laid-Open Utility Model Publication Patent No. S.63-37248), a ribbon guide is mounted on a cassette case fitted with a multiple color ink ribbon in such a way that the ribbon guide is free to slide along the length of the cassette case, and the required color band of the multiple color ink ribbon is firmly guided by this ribbon guide into position over the printing head.

The conventional construction of this kind of multiple color ink ribbon cassette is shown in FIG. **5**. In this construction, a cassette case **1** is of boxlike shape and is made up of a case body **2** and a case cover **3**; a longitudinal groove **2**a is provided in the underside of the case body **2**, and a longitudinal tongue projection **2**b is provided on one side of the case body **2**, and a further longitudinal groove **3**a is provided in the top surface of the case cover **3**. A ribbon guide **4** is provided with a projection **4**a that slidably mates with the groove **2**a in the case body **2** and another projection **4**b that slidably mates with the groove **3**a in the case cover **3**, and the ribbon guide **4** is attached to the cassette case **1** by these projections **4**a and **4**b in such a way that it is free to slide longitudinally along the cassette case **1**. The ribbon guide **4** also has a groove **4**c that slidably mates with the tongue projection **2**b on the case body **2**, and the ribbon guide **4** is guided in the direction of the length of the cassette case **1** by the mating of this groove **4**c with the tongue projection **2**b of the case body **2**. In FIG. **5**, reference numeral **5** denotes a multiple color ink ribbon, and reference numeral **6** denotes a printing head.

However, in the conventional construction described above, because the ribbon guide **4** is fitted to the cassette case by tongue and groove mating, and the movement of the ribbon guide **4** along the length of the cassette case **1** is guided by this mating, the necessary tongue projections and grooves for longitudinally guiding the ribbon guide **4** have to be provided in the case body **2** and the case cover **3** of the cassette case **1**, and as a result of this the cassette is of complicated design and is costly.

This invention aims to provide a multiple color ink ribbon cassette with a simplified cassette case that can be produced at reduced cost.

SUMMARY OF THE INVENTION

The multiple color ink ribbon cassette of this invention is made up of a cassette case fitted with a multiple color ink ribbon; a ribbon guide, mounted on the cassette case in such a way that it is free to slide in the direction of the length of the cassette case, which guides the multiple color ink ribbon over the end of a printing head; a case cover mounted on the cassette case; and guide portions mounted on the ribbon guide facing the side surfaces of the case cover in such a way that the movement of the ribbon guide in the direction of the length of the cassette case is guided by the guide portions sliding along the side surfaces of the case cover.

In this invention, because the ribbon guide is guided in the direction of the length of the cassette case by guide portions sliding along the side surfaces of the case cover, it is not necessary to provide tongue projections or grooves in the case body or the case cover of the cassette case for guiding the ribbon guide in the longitudinal direction.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a plan view of a multiple color ink ribbon cassette according to a preferred embodiment of the present invention;

FIG. **2** is a cross-section view along the line A—A;

FIG. **3** is a left side elevation view of the multiple color ink ribbon cassette of FIG. **1**;

FIG. **4** is a right side elevation view of the multiple color ink ribbon cassette of FIG. **1**; and

FIG. **5** is a cross-section view showing the construction of a prior art multiple color ink ribbon cassette.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

A preferred embodiment of a multiple color ink ribbon cassette according to the present invention will now be described, with reference to the accompanying drawings.

As shown in FIG. **1**, the multiple color ink ribbon cassette of this preferred embodiment has a box-shaped cassette case **10**, and this cassette case **10** is fitted with an endless multiple color ink ribbon **11** divided up across its width into several parallel bands of different colors such as yellow, magenta, cyan, and black.

The cassette case **10** is provided with two arms **13** and **14** projecting from opposite ends of the cassette case horizontally and in the same direction as each other, and also has a bearing portion **15** formed at each end and a driving shaft portion **16** projecting from one end.

A multiple color ink ribbon **11** passes through the inside of the cassette case **10** and is strung across between the ends of the arms **13** and **14**, where it is exposed to the outside. When the cassette is in position in a printer, the printing head **17** of the printer, shown by broken lines in FIG. **1**, is in some position between the arms **13** and **14**, and, as shown in FIG. **2**, faces the multiple color ink ribbon **11**. The printing head **17** is mounted on a pair of guide shafts **18**, shown in FIG. **2** by broken lines, in such a way that it is free to move perpendicular to the direction of the paper feed, and during printing it moves guided by the guide shafts **18** from side to side along the length of the cassette case **10** between the arms **13** and **14**.

When the cassette is in position in a printer, the bearing portions **15** mate removably with the stationary shafts **19**, shown by broken lines in FIGS. **3** and **4**, and serve to pivotally support the cassette case **10**. The cassette case **10** is mounted in such a way that during printing the printing color can be changed by the cassette case **10** being pivoted about the stationary shafts **19** in the direction indicated by the arrow B so that the printing head **17** faces each of the color bands of the multiple color ink ribbon selectively.

When the cassette is in position in a printer, the shaft portion **16** engages with a driving lever **20** of the printer, as shown by broken lines in FIG. **3**. At times of printing color changeover the driving lever **20** is caused to pivot in the direction indicate by the arrow C, and this pivoting action

causes the cassette case **10** to pivot about the stationary shafts **19** and the required color band of the multiple color ink ribbon is brought into position in front of the printing head **17**.

Inside the cassette case **10** a partition wall is mounted at one end and a pressure roller **22** and a ribbon driving roller **23** are mounted at the other end, and the multiple color ink ribbon **11** is snaked up between the partition wall **21** and the pressure roller **22** and the ribbon driving roller **23**. A narrow slit **24** is provided in the partition wall **24**, and the multiple color ink ribbon **11** passes through this slit **24** and is pulled out from between the partition wall **21** and the pressure roller **22** and the ribbon driving roller **23** into the inside of the arm **13**, passes through the arm **13**, and extends between the ends of the arms **13** and **14**.

The pressure roller **22** is held in sprung contact through the multiple color ink ribbon **11** with the ribbon driving roller **23** by a holding means not shown in the drawings. The multiple color ink ribbon passes out from between the rollers **22** and **23** and the partition wall **21** between the pressure roller **22** and the ribbon driving roller **23**, passes through the inside of the arm **14**, and extends between the ends of the arms **13** and **14**.

When the cassette is in position in a printer, the ribbon driving roller **23** mates with a drive shaft of the printer not shown in the drawings and during printing is rotated by this drive shaft and together with the pressure roller **22** it conveys the multiple color ink ribbon in the direction indicated by the arrow D. Under this conveying force the used part of the multiple color ink ribbon is drawn in from between the arms **13** and **14**, passes through the inside of the arm **14**, passes between the ribbon driving roller **23** and the pressure roller **22**, and enters the space between the partition wall and the ribbon driving roller **23** and the pressure roller **22**, and at the same time the unused part of the multiple color ink ribbon **11** is drawn out through the slit **24** from between the partition wall **21** and the ribbon driving roller **23** and the pressure roller **22**, passes through the inside of the arm **13**, and passes out to between the arms **13** and **14**. A resilient plate **25** which presses the multiple color ink ribbon **11** against the inner wall of the cassette case **10** is mounted between the arm **13** and the partition wall **21**, and when the multiple color ink ribbon **11** is in motion it is put in tension by this pressing force.

The cassette case **10** is made up of a case body **26** and a case cover **27** fitted to the top of the case body **26**, a ribbon guide **28** is mounted on the cassette case **10** in such a way that it is free to slide longitudinally between the arms **13** and **14**, and this ribbon guide **28** firmly guides the required color band of the multiple color ink ribbon **11** over the end of the printing head **17** at times of printing color changeover. As shown in FIG. **2** also, the case body **26** is provided with longitudinal flange portions **26**a along each side of the upper part of the case body **26**, and the case cover **27** is fixed to these flange portions **26**a.

The ribbon guide **28** is provided with a pair of arms **29** and **30**, and when the cassette is in position in a printer the printing head **17** is positioned between these arms **29** and **30**, and during printing the arms **29** and **30** are moved along together with the printing head **17**. Two guide rollers **29**a and **30**a are rotatably mounted on the ends of the arms **29** and **30** respectively, and the multiple color ink ribbon **11** passes over the guide rollers **29**a and **30**a and is strung across between them. The guide rollers **29**a and **30**a guide the required color band over the end of the printing head **17** at times of printing color changeover.

As shown in detail in FIG. **2**, this ribbon guide **28** is provided with a base board portion **31** facing and in slidable contact with the top surface of the case cover **27**, and leg portions **32** and **33** project in the same direction as each other from the base board portion **31** such that the inner surface of one leg portion faces each side of the cassette case **10**.

A number of hemispherical projections **31**a are mounted on the part of the base board portion **31** that faces the case cover **27**, and the base board portion **31** is slidably connected to the top surface of the case cover **27** through these projections **31**. A strengthening rib **31**b is provided on the upper surface of the base board portion **31**.

The leg portions **32** and **33** are respectively provided with engaging projections **34** and **35**, which face the undersides of the flange portions **26**a of the case body **26**, and guide portions **36** and **37**, which face the side surfaces of the case cover **27**, and the ribbon guide **28** is held onto the cassette case **10** by the engaging projections **34** and **35**, securely and such that it can slide in the longitudinal direction, and the ribbon guide is also guided longitudinally along the cassette case by the guide portions **36** and **37** sliding along the side surfaces of the case cover **27**. In other words, the flange portions **26**a and the case cover **27** of the case body **26** are positioned between the engaging portions **34**, **35** and the base board portion **31**, and the ribbon guide **28** is attached to the cassette case **10** securely and in such a way that it is free to slide in the longitudinal direction, and the ribbon guide **28** is also guided, through the guide portions **36** and **37**, by the side surfaces of the case cover **27** such that it slides in the longitudinal direction of the cassette case **10**. The leg portions **32** and **33** are provided with elasticity so that some increase in the distance between the engaging projections **34** and **35** is allowed by elastic change of shape of the leg portions, and this elastic change of shape makes it possible for the ribbon guide **28** to be easily fitted onto the cassette case **10**. Specifically, when the ribbon guide **28** is pressed down from above onto the cassette case **10**, the engaging projections **34** and **35** abut with the edges of the top of the case cover **27**, the legs **32** and **33** spread elastically so that the gap between the engaging projections **34** and **35** widens, this elastic shade change allows the case cover **27** and the flange portions **26**a of the case body **26** to get in between the legs **32** and **33**, the side surfaces of the case cover **27** are brought face-to-face with the guide portions **36** and **37**, and as the top surface of the case cover **27** makes contact with the base board portion **31**, the leg portions **32** and **33** return to their original shape and the engaging projections **34** and **35** clip into position facing the undersides of the flange portions **26**a of the case body **26**.

Because, according to this construction, the ribbon guide **28** is fitted with the guide portions **36** and **37** facing the side surfaces of the case cover **27**, and the ribbon guide **28** is guided in the direction of the length of the cassette case **10** by these guide portions sliding along the side surfaces of the case cover **27**, the kind of projections and grooves that up to now have had to be provided in such places as the case body **26** and the case cover **27** of the cassette case **10** are rendered unnecessary, and the design of the cassette case **10** can be simplified and its cost reduced.

In this preferred embodiment, the case body **26** is provided with the flange portions **26**a, the case cover is fixed to these flange portions **26**a, and the engaging projections **34** and **35** are positioned facing the undersides of these flange portions **26**a, but this invention is not limited to this arrangement and, for example, a construction such as one in which the case cover **27** is wider than the case body **26** and projects

at either side of the case body **26**, and the engaging portions **34** and **35** are positioned facing the undersides of the case cover **27**, could alternatively be used.

As explained above, in a multiple color ink ribbon cassette according to this invention, because the ribbon guide is provided with guide portions facing the side surfaces of the case cover and the ribbon guide is guided along the length of the cassette case by the guide portions sliding along the side surfaces of the case cover, the benefit that the kind of projections and grooves that up to now have had to be provided in such places as the case body and the case cover of the cassette case are rendered unnecessary, and the design of the cassette case can be simplified and its cost can be reduced, has been achieved.

We claim:

1. A multiple color ink ribbon cassette, comprising:

a cassettes case fitted with a multiple color ink ribbon and comprising a case body and a case cover with a pair of opposed side surfaces;

a ribbon guide, mounted on the cassette case in such a way that it is free to slide in the direction of the length of the cassette case, for guiding the multiple color ink ribbon over the end of a printing head;

a pair of longitudinal flange portions provided in the case body extending outwardly, along each side of the upper part of the case body, and which are mounted on the case cover;

a base board portion provided in the ribbon guide, and facing and in slidable contact with the top surface of the case cover; and

a pair of leg portions provided in the ribbon guide, and projecting in the same direction from the base board portion such that an inner surface of each leg portion faces a respective side of the cassette case, and which are provided with guide portions facing the side surfaces of the case cover, and with engaging projections facing the undersides of the flange portions;

wherein the movement of the ribbon guide in the direction of the length of the cassette case is guided by the guide portions sliding along the side surfaces of the case cover, and the ribbon guide is held onto the cassette case by the engagement between the engaging projections and the flange portions and by the contact of the base board portion and the top surface of the case cover, securely and such that it can slide in the longitudinal direction.

* * * * *