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(54) **Ink ribbon cassette**

(57) An ink ribbon cassette (1) including a ribbon storage unit (2) for storing an endless ink ribbon includes material separation means for eliminating overlapping in a longitudinal direction of an ink ribbon (3) when the ink ribbon (3) that has been fed back from a printing unit and has been stored in an accorded state in the ribbon storage unit (2) is fed to a printing unit again, and a plate spring (7) for pushing, at an outlet port side of the ribbon storage unit (2), the ink ribbon (3) onto one of the walls of a path for feeding the ink ribbon (3) to the printing unit, in which the material separation means includes two pins (12-1 and 12-2) provided with an interval between themselves to form a narrow slit for eliminating the overlapping and to make the ink ribbon (3) pass through the slit as a single sheet of ribbon.

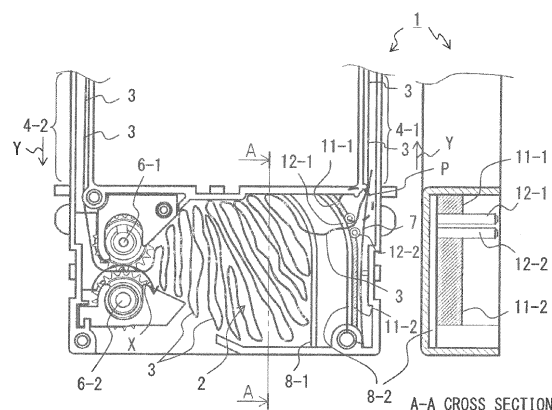


FIG. 1

Description

FIELD

[0001] The present invention relates to an ink ribbon cassette that enables smooth wind-up operations of an ink ribbon while preventing deterioration in the quality of printing performed by a print head using the ink ribbon.

BACKGROUND

[0002] Ink ribbon cassettes are used in PPRs (Passbook Printer Units) of ATMs (Automated Teller Machines) or the like.

[0003] This ink ribbon cassette 50 is stored with its material 52 accordion folded in a ribbon storage unit 51, a box-shaped part located at the bottom, as shown in the cross-sectional view in Fig. 4. The upper side of the box-shaped part at the bottom is a C-shaped part having an opening upward, and a first ribbon path 54-1 and a second ribbon path 54-2 project from the box.

[0004] When the ink ribbon cassette 50 is set to the above passbook printer unit (not shown), an ink ribbon 52 that is crossing over the opening of the C-shaped part is sandwiched by the print head (not shown) of the passbook printer unit and the medium (writing surface of the passbook).

[0005] The ribbon 52 stored in the ribbon storage unit 51 in an accordion folded state is an endless ink ribbon (hereinafter, simply referred to as a "ribbon"), which is in the form of a loop.

[0006] This ribbon 52 is wound in the direction of arrow Y by a feed gear 56-2 rotating in direction of arrow X, is clipped by a plate spring 57 on the outlet port side of the ribbon storage unit 51, is fed onto the first ribbon path 54-1, moves upward and then diagonally upward right on the first ribbon path 54-1, and reaches the position of the print head. The feed gear 56-2 is one of two feed gears 56-1 and 56-2 provided on the inlet port side of the ribbon storage unit 51.

[0007] Thereafter, the ribbon 52 is wound in the direction of arrow Y by the feed gear 56-2 rotating in the direction of arrow X, moves diagonally downward left and then downward from the position of the print head on the second ribbon path 54-2, passes through the position at which the feed gears 56-1 and 56-2 are set, and is stored again in the accordion folded state in the ribbon storage unit 51.

[0008] On the outlet port of the ribbon storage unit 51, a first bank 58-1 and a second bank 58-2 are provided that are projections in which both of their ends in the width direction orthogonal to the winding direction of the material (ribbon) 52 contact the walls.

[0009] Note that this cross-sectional view does not show respective corresponding banks provided on the cover of the opposing side.

[0010] Both edges in the width direction of the banks 58-1 and 58-2 push the ribbon stored in an accorded

state in the ribbon storage unit 51 so that the ribbon 52 is kept in the space further inward (left side in Fig. 4) than the first bank 58-1 of the ribbon storage unit 51, or, when possible, so that the ribbon 52 is kept in the space (left side in Fig. 4) further inward than the second bank 58-2 of the ribbon storage unit 51.

[0011] Thereby an aim is to prevent a situation where the ribbon 52 that has been stored in the accorded state in the ribbon storage unit 51 accumulates in the vicinity of position P at which the ribbon 52 is clipped by the plate spring 57 on the first ribbon path 54-1 on the outlet port side of the ribbon storage unit 51 and the material (ribbon) 52 is fed out doubly. The double feed will be explained later.

[0012] On the cover of the opposite side of the cross-sectional view of Fig. 4, felt (not shown) for supplying ink to the position below the feed gear 56-2 is provided.

[0013] Repeated use of the ribbon 52 increases the number of times that the print head prints on a medium. Accompanying this, the rigidity of the material (ribbon) 52 itself decreases, or the material 52 itself shrinks so as to get on the first and second banks 58-1 and 58-2, as shown in Fig. 5, so that the ribbon 52 accumulates in an accorded manner in the vicinity of position P from which the ribbon 52 is to be fed out and is clipped by the plate spring 57.

[0014] When the wind up (running) operations of the ribbon 52 are continued in the above situation, the double feed of the material (ribbon) occurs. Specifically, a plurality of materials (ribbons) 52 stored in the ribbon storage unit 51 are conveyed simultaneously.

[0015] As a result of this, the running load of the material increases, and the material stops during the conveyance so that multiple printing on the same position, faint printing, omission, or the like occurs when the printing unit performs printing using the ink ribbon 52.

[0016] There is a demand for a mechanism that prevents double feeding when continuous use of the material (ribbon) 52 has caused a decrease in the rigidity or shrinkage of the material, causing a poor storage condition where the material (ribbon) 52 concentrates around the output port in the ribbon storage unit 51.

[0017] In Patent Document 1, as a related art, a plurality of ribs are provided alternately at constant intervals on both walls of the first and second ribbon paths in order to separate the material (eliminate the overlapping). The first path is used for feeding the ink ribbon to the print head, and the second path is used for returning the ribbon from the print head so that material does not overlap.

[0018] However, when the above related art is actually implemented, even though the plurality of ribs alternately provided to both walls of ribbon paths are effective in eliminating the overlapping of the ink ribbon, it has been proven that a single rib does not cause sufficient effects in eliminating the overlapping. In practice, a plurality of ribs 59 are provided alternately to both walls of the ribbon paths in Figs. 4 and 5. In the present application too, the

structure using ribs 59 on both walls of the ribbon paths is employed, although this configuration is not shown.

[0019] Also, in Patent Document 2, a pair of rotatable pins are provided to a position outside of the inlet port of the ribbon storage unit in a stage later than the print head in order to make the ink ribbon travel between the paired pins so that the ink ribbon does not overlap. However, this is performed in a stage later than the print head, and the paired pins are close to the roller for winding up the ribbon. This cannot prevent deterioration in printing quality, although it may increase the possibility of eliminating the overlapping of the ink ribbon.

Patent Document 1: Japanese Laid-open Utility Publication NO.H5-39968

Patent Document 2: Japanese Laid-open Patent Publication No. H9-76610

SUMMARY

[0020] The present invention has been achieved in order to solve the above problem, and aims to provide an ink ribbon cassette that smoothly winds up an ink ribbon while preventing deterioration in the quality of printing performed by an ink head using the ink ribbon.

[0021] A first proposed ink ribbon cassette is an ink ribbon cassette having a ribbon storage unit for storing an endless ink ribbon.

[0022] This first ink ribbon cassette includes material separation means for eliminating overlapping in a longitudinal direction of an ink ribbon when the ink ribbon that has been fed back from a printing unit and has been stored in an accorded state in the ribbon storage unit is fed to a printing unit again, and a plate spring for pushing, at an outlet port side of the ribbon storage unit, the ink ribbon onto one of the walls of a path for feeding the ink ribbon to the printing unit, in which the material separation means includes two pins provided with an interval between themselves to form a narrow slit for eliminating the overlapping and making the ink ribbon pass through the slit as a single sheet of ribbon.

[0023] A second proposed ink ribbon cassette is the first ink ribbon cassette in which the material separation means further includes ribs each having one end provided successively to one of the two pins and having the other end provided to contact a wall of the ribbon storage unit so as to control a movement position of the ink ribbon.

[0024] A third proposed ink ribbon cassette is the second ink ribbon cassette in which a height of the controlling ribs is smaller than half of a width of material of the ink ribbon.

[0025] According to the first proposed ink ribbon cassette, the ribbon storage unit has two pins to form a narrow slit to eliminate overlapping in longitudinal direction of the ink ribbon so as to make the ribbon pass through the slit as a single ribbon, and thereby, the overlapping of the ribbon (material) in the longitudinal direction orthogonal to the width direction is eliminated. This can

prevent a situation where overlapping of the material causes multiple printing on the same position, faint printing, omission, or the like during printing, increasing the printing quality.

[0026] In a second proposed ink ribbon cassette, a rib having one end that continues to one of the above two pins and another end that contacts a wall of the ribbon storage unit is provided to control the movement position of the ink ribbon, so as to make it more difficult for the ink ribbon stored accordedly in the ribbon storage unit to approach the path for feeding the ribbon to the printing unit unless it approaches by passing between the pins. This can separate (eliminate) overlapping of the ink ribbon more surely.

[0027] In a third proposed ink ribbon cassette, the height of the rib is set to be smaller than half of the width of the ink ribbon material used in the second ink ribbon cassette so that loads of the running ribbon are reduced, and it is also possible to prevent ribs from being contaminated by multiple transcriptions of a plurality of colors of ink (red and black) when a red/black ribbon is used.

Brief Description of the Drawings

[0028]

Fig. 1 is a cross-sectional view showing the main part of an ink ribbon cassette according to an embodiment of the present invention;

Fig. 2 shows a black ribbon and a red-black ribbon;

Fig. 3 is a cross-sectional view showing the main part of an ink ribbon cassette according to a variation example of the present embodiment;

Fig. 4 is a cross-sectional view showing a conventional ink ribbon cassette; and

Fig. 5 shows a problem caused in a conventional ink ribbon cassette.

Description of Embodiments

[0029] Hereinafter, embodiments of the present invention will be explained in detail by referring to the drawings.

[0030] Fig. 1 is a cross-sectional view showing the main part of an ink ribbon cassette according to an embodiment of the present invention. This ink ribbon cassette 1 is used for a PPR (Passbook Printer Unit) of an ATM or the like.

[0031] As shown in Fig. 1, the ink ribbon cassette 1 of the present invention has ribbon material 3 stored in an accordion folded state in a ribbon storage unit 2, which is a box-shaped part located at the bottom. On the upper side of the box-shaped part at the bottom is a C-shaped part having an opening facing upward, and a first ribbon patch 4-1 and a second ribbon patch 4-2 project from the box, although the upper part is not shown entirely.

[0032] When the ink ribbon cassette 1 is set in the above passbook printer unit (not shown), the ink ribbon 3 crosses over the C-shaped opening, and is sandwiched

between the print head (not shown) of the passbook printer unit and the medium (writing surface of the passbook).

[0033] The ribbon 3 that is stored in an accordion folded state in the ribbon storage unit 2 is an endless ink ribbon (hereinafter, simply referred to as a "ribbon"), which is in a form of loop.

[0034] This ribbon 3 is wound in the direction of arrow Y by a feed gear 6-2 rotating in direction of arrow X, is clipped by a plate spring 7 on the outlet port side of the ribbon storage unit 2, is fed onto a first ribbon path 4-1, moves upward on the first ribbon path 4 - 1, and reaches the position of the print head. The feed gear 6-2 is one of two feed gears 6-1 and 6-2 provided on the inlet port side of the ribbon storage unit 2.

[0035] Thereafter, the ribbon 3 is wound in the direction of arrow Y by the feed gear 6-2 rotating in direction of arrow X, moves downward on the second ribbon path 4-2 from the position of the print head, passes through the position at which the feed gears are set, and is stored again in an accorded state in the ribbon storage unit 2.

[0036] On the outlet port side of the ribbon storage unit 2, a first bank 8-1 and a second bank 8-2 are provided that are projections in which both ends in the width direction orthogonal to the winding direction of the material (ribbon) 3 abut the walls.

[0037] Note that this cross-sectional view does not show respective corresponding banks provided on the cover of the opposing side.

[0038] In this example, a case is assumed where continuous use of the material (ribbon) 3 has caused a decrease in rigidity of the material or shrinkage, causing an improper storage condition where the material (ribbon) 3 concentrates around the output port in the ribbon storage unit 2.

[0039] In such a case, when a conventional internal configuration is adopted for the ribbon storage unit 2, it is expected that the material (ribbon) 3 stored in the ribbon storage unit 2 will run onto the first and second banks 8 - 1 and 8-2 so that the ribbon 3 in an accordion folded state accumulates in the vicinity of position P from which the ribbon 3 is to be fed out and is clipped by the plate spring 7, or so that part of the ribbon 3 in an accordion folded state reaches position P.

[0040] However, in the present embodiment, ribs 11-1 and 11-2 are provided in the vicinity of the outlet port of the ribbon storage unit 2 in such a manner that these ribs 11-1 and 11-2 lean on the second bank 8-2, which is located further outward than the first bank 8 - 1. Thereby, the ribbon 3 in an accorded state is prevented from approaching the vicinity of position P from which the ribbon 3 is fed out is clipped by the plate spring 7.

[0041] Paired rotatable pins 12-1 and 12-2 are provided to the ribs 11-1 and 11-2 at the side opposite to the side contacting the wall of the ribbon storage unit 2 in order to eliminate the overlapping (double feeding) of the ribbon 3 traveling toward the vicinity of position P from which the ribbon 3 is fed out and is clipped by the plate spring 7 by making the ribbon pass between the paired

pins 12-1 and 12-2.

[0042] In other words, when the material (ribbon) 3 passes between the pins 12-1 and 12-2, the overlapping of the material be eliminated.

[0043] Even when the material passes the pins 12-1 and 12-2 in an overlapped state, the overlapping of the material can be eliminated in space P surrounded by the ribs 11-1, 11-2, pins 12-1, 12-2, and the plate spring 7.

[0044] Further, even after the ribbon 3 has been fed out onto the first ribbon path 4-1 from the plate spring 7, the overlapping of the material 3 can be eliminated by a plurality of ribs (not shown) provided alternately on both walls of the first ribbon path 4-1.

[0045] Note that the height of the ribs 11-1 and 11-2 are smaller than half of the width of the material 3, as shown in the side sectional view in direction A-A in cross-sectional view of Fig. 1.

[0046] As shown in Fig. 2, types of endless ink ribbons include a black ribbon 14, to which black ink has been applied, and a red-black ribbon 16, on which a red side 16-1 and a black side 16-2 are arranged in a striped manner. Red ink has been applied to the red side 16-1 and black has been applied to the black side 16-2.

[0047] When the red-black ribbon 16 is used, a black side 16-2 is used for printing more frequently, and the rigidity of the material of the black side 16-2 decreases earlier than the red side 16-1, causing folding to develop in the black side 16-2 in the direction of the width of the material 3. This makes the red side 16-1 of the material 3 contact the ribs 11-1 and 11-2, and red ink is transferred to the ribs 11-1 and 11-2 so that a plurality of colors (black and red in this case) of ink are multiply transferred, contaminating the ribs 11-1 and 11-2.

[0048] Also, red ink which is primarily meant to be transferred onto the printing surface of the medium, is transferred to the ribs 11-1 and 11-2, reducing the amount of the red ink that is actually applied to the printing surface.

[0049] By making the height of the ribs 11-1 and 11-2 shorter than half of the width of the material 3, ribs 11-1 and 11-2 can be prevented from being stained.

[0050] Also, the running load of the ribbon 3 increases in proportion to the area contacting the ribs 11-1 and 11-2, and accordingly the reduction of the contacting area decreases the running load of the ribbon 3.

[0051] As has been described above, according to the present embodiment, the ribs 11-1 and 11-2 and the pins 12-1 and 12-2 are provided in a stage earlier than the outlet port of the ribbon storage unit 2 so that the overlapping in the direction orthogonal to the width direction of the ribbon (material) 3 is separated (eliminated). This makes it possible to avoid multiple printing onto the same places, faint printing, omission, and the like, thereby increasing the printing quality.

[0052] Also, the pins 12-1 and 12-2 are rotatable, and the height of the ribs 11-1 and 11-2 are designed to be smaller than half of the width of the material 3, taking into consideration the use of, for example, the red-black rib-

bon, and accordingly the running load of the ribbon 3 can be reduced.

[0053] Also, because the height of the ribs 11-1 and 11-2 is made to be smaller than half of the width of the material, stains on ribs 11-1 and 11-2 can be prevented that would otherwise be caused by multiple transfers of a plurality of colors (red and black) of ink when a red-black ribbon is used.

[0054] Repeated use of the ribbon 3 stored in an accorded state in the ribbon storage unit 2 has reduced the rigidity of the material itself and has caused shrinkage so that the ribbon 3 accumulates on the output port side of the ribbon storage unit 2 after running onto the first and second banks 8-1 and 8-2 in an accordion folded state. Because of this, it is possible to prevent the ribbon 3 from approaching the vicinity of the outlet port at a single position when it is taken into consideration that the entire ribbon moves to the outlet side.

[0055] This means that, as shown in the cross-sectional view shown in Fig. 3 and a side-sectional view viewed in direction B-B of the cross-sectional view in Fig. 3, it is also possible to employ only two pins 12-1 and 12-2, omitting the ribs 11-1 and 11-2. Also, even when the pins 12-1 and 12-2 do not rotate, the same effect can be achieved.

[0056] It is also possible to employ a variation form in which only one of the ribs 11-1 and 11-2 is provided, or like.

Claims

1. An ink ribbon cassette (1) including a ribbon storage unit (2) for storing an endless ink ribbon (3), comprising:

material separation means for eliminating overlapping in a longitudinal direction of the ink ribbon (3) when the ink ribbon (3) that has been fed back from a printing unit and has been stored in an accorded state in the ribbon storage unit (2) is fed to a printing unit again; and a plate spring (7) for pushing, at an outlet port side of the ribbon storage unit (2), the ink ribbon (3) onto one side wall of a path for feeding the ink ribbon (3) to the printing unit, wherein:

the material separation means includes two pins (12-1 and 12-2) provided with an interval between themselves to form a narrow slit for eliminating the overlapping and making the ink ribbon (3) pass through the slit as a single sheet of ribbon.

2. The ink ribbon cassette (1) according to claim 1, wherein:

the material separation means further includes

ribs (11-1 and 11-2) each having one end provided successively to one of the two pins (12-1 and 12-2) and having the other end provided to contact a wall of the ribbon storage unit (2) so as to control a movement position of the ink ribbon (3).

3. The ink ribbon cassette (1) according to claim 2, wherein:

a height of the controlling ribs (11-1 and 11-2) is smaller than half of a width of material of the ink ribbon (3).

4. The ink ribbon cassette (1) according to one of claims 1 through 3, wherein:

a plurality of ribs are arranged alternately with intervals on a path for feeding the ink ribbon (3) to the printing unit and on both sides of a side wall (4-1) of a path for feeding back the ink ribbon (3) from the printing unit in order to eliminate overlapping of the ink ribbon (3).

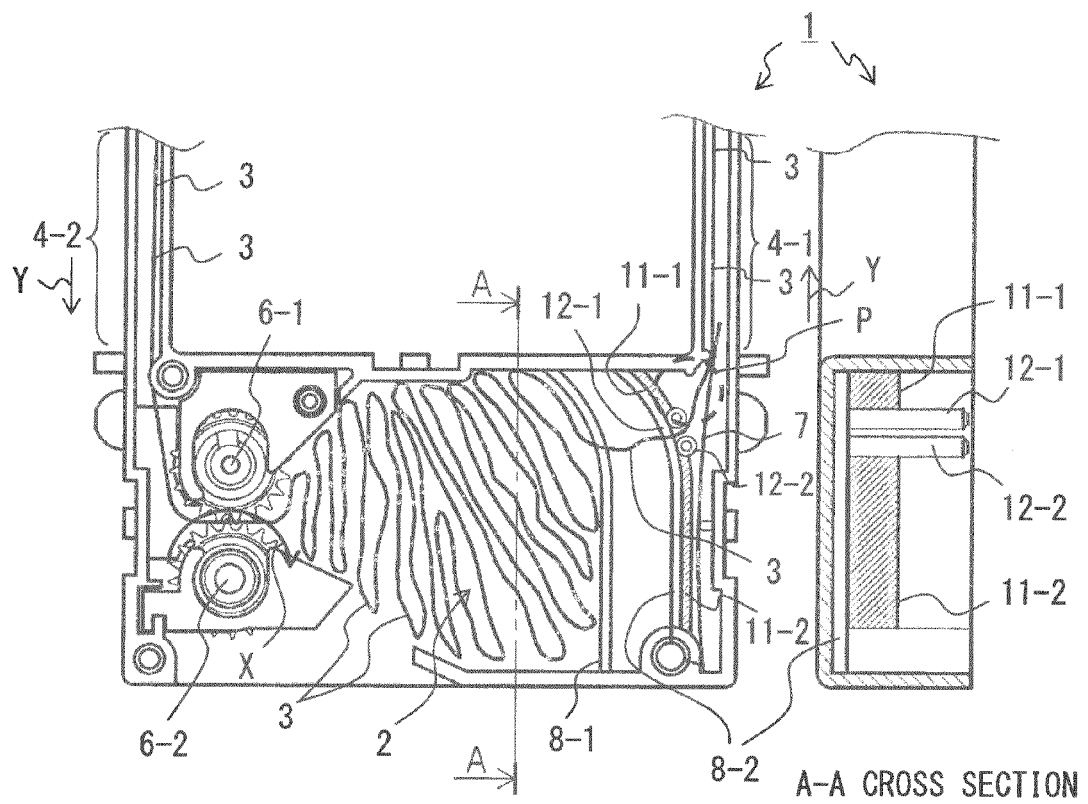
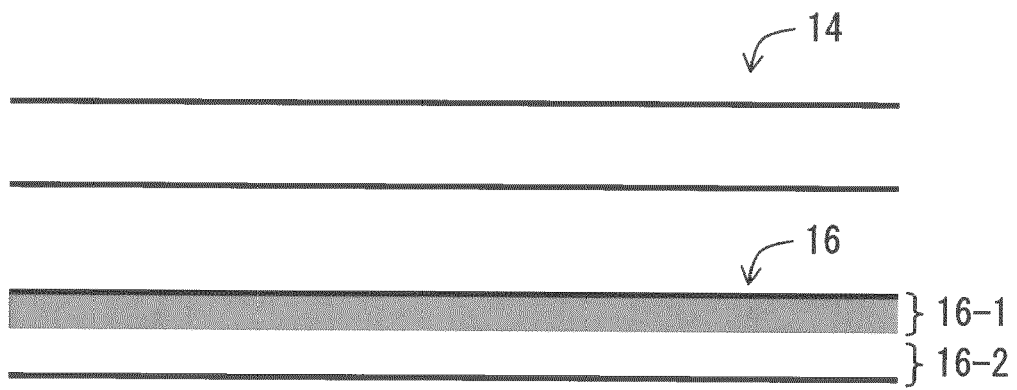


FIG. 1



F I G. 2

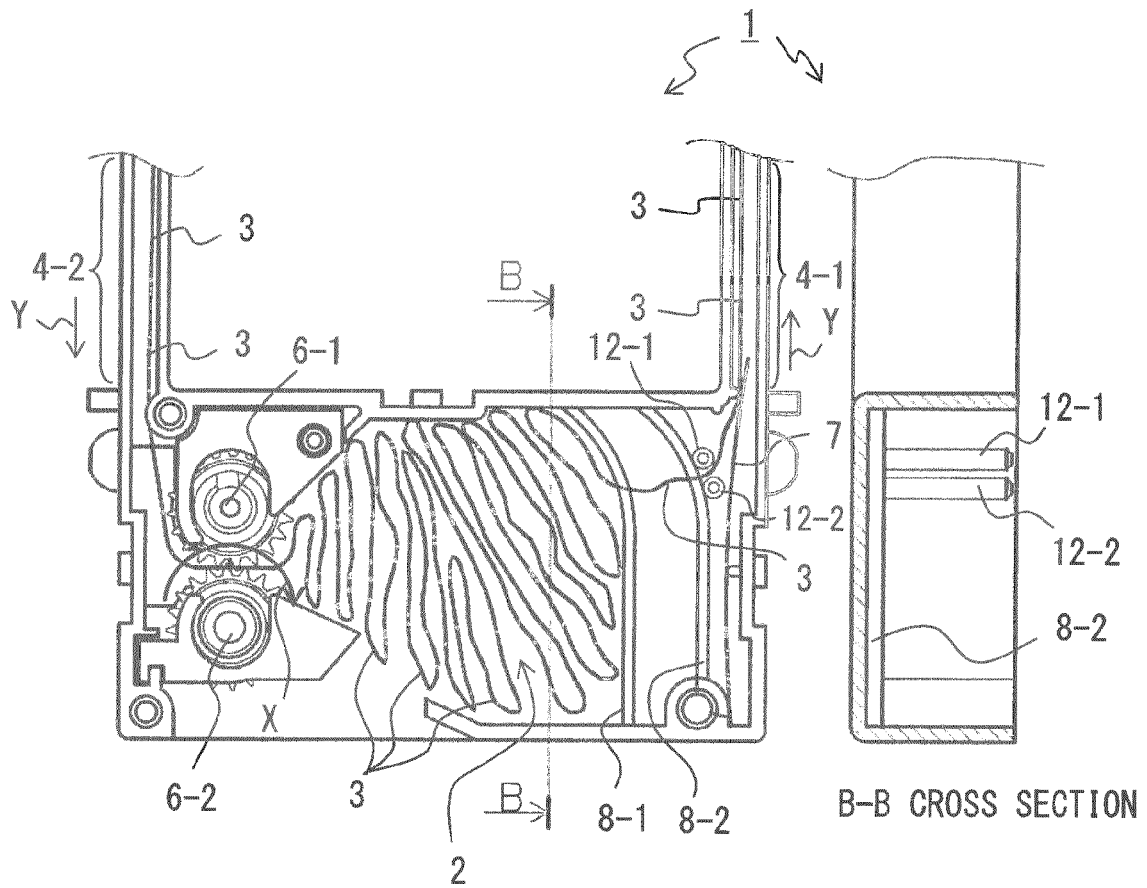


FIG. 3

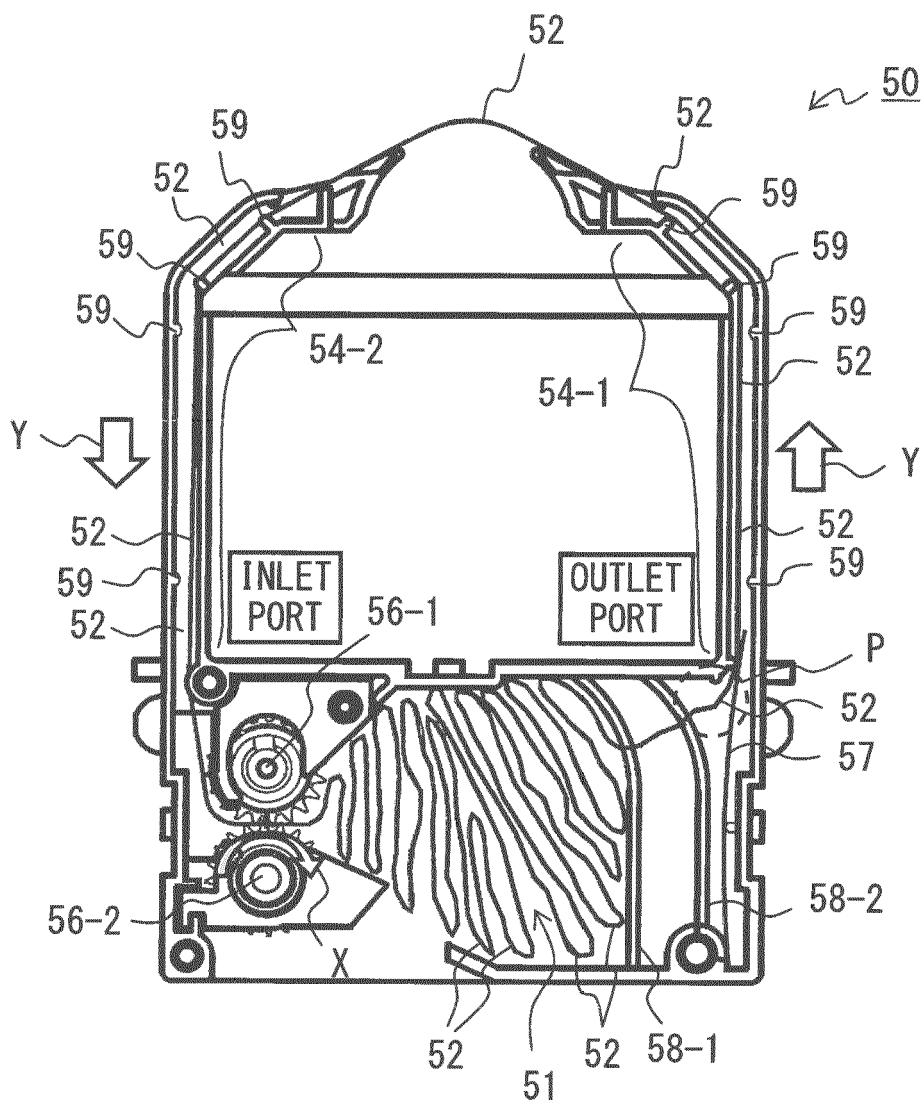


FIG. 4

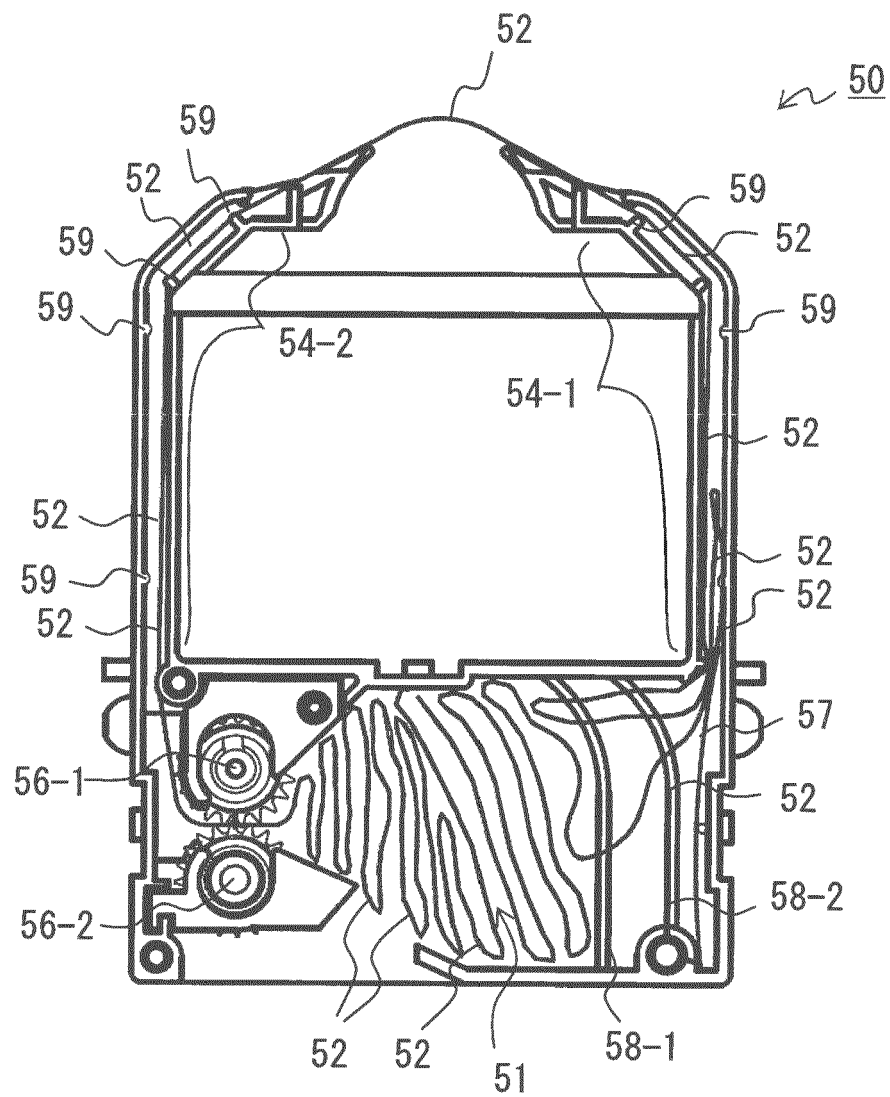


FIG. 5



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Application Number
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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