

I. Outline of the Case

Pony Corp. (the Plaintiff) filed patent applications for an invention titled "Roll Paper" ("**Invention**") in Country A on April 1, 2005 and in Country B on March 14, 2006, respectively, and was granted respective patents in Country A and Country B by March 31, 2008 ("**Patent Right**" for the patent right obtained in Country A, "**Patent**" for the patent concerning the Patent Right, "**Corresponding Patent Right**" for the patent right obtained in Country B, and "**Corresponding Patent**" for the patent concerning the Corresponding Patent Right.)

Pony Corp. sells an article packaging device ("**Plaintiff's Device**") and a roll paper for Plaintiff's Device ("**Plaintiff's Roll Paper**") in Country A. Pony also grants a license on the Corresponding Patent Right to Collie Corp., a corporation in Country B which is a wholly owned subsidiary of Pony Corp., and Collie Corp. imports the Plaintiff's Device from Pony Corp. and sells it in Country B. Collie Corp. also, as acts of working licensed invention, manufactures and sells the Plaintiff's Roll Paper to users who use the Plaintiff's Device in Country B.

Turtle Corp. collects core tubes of used the Plaintiff's Roll Papers from users in Country B and manufactures 'roll papers for packaging,' which can be used in place of the Plaintiff's Roll Paper, by means of winding a packaging sheet around the collected core tube ("**Defendant's Product**").

Since October 11, 2022, Donkey Corp. (the Defendant) has been importing the Defendant's Product from Turtle Corp., a corporation in Country B which is a wholly owned subsidiary of Donkey Corp., and has been selling them to users who use the Plaintiff's Device in Country A.

On April 1, 2023, Pony Corp. filed a patent infringement lawsuit against Donkey Corp. seeking injunction to enjoin the importation and sale of the Defendant's Product on the basis of infringement of the Patent Right.

II. Scope of Claims

[Claim 1]

- A A roll paper used for an article packaging device,
B wherein the article packaging device,
comprising:
B1 a rotatable roll holder to which the roll paper is detachably attached;
B2 a feed roller drawing out a heat-sealable packaging sheet from the roll paper;
B3 a rotation angle sensor detecting a rotation angle of the roll paper;
B4 a sheet length sensor measuring sheet feed length drawn out from the roll paper; and
B5 a brake applying a braking force to the roll holder,
B6 is configured to adjust the braking force applying to the roll holder based on the outer diameter of the roll paper calculated from the detected signals of the rotation angle sensor and the sheet length sensor, and
C wherein the roll paper,
comprising:
C1 a core tube, having magnets, attachable to the roll holder;
C2 the packaging sheet wound around the core tube; and
C3 the magnets are disposed at respective positions detectable by the rotation angle sensor when the core tube is attached to the roll holder.

III. Description

[Detailed Description of the Invention]

[Technical Field]

[0001]

The present invention relates to a roll paper which is made of a heat-sealable packaging sheet wound around a core tube.

[Background art]

[0002]

A known article packaging device draws out a heat-sealable packaging sheet from a roll paper attached to a rotatable roll holder and wraps an article. In this type of article packaging device, the packaging sheet is folded in two on the upstream side of the sealing device provided in the sheet feed path of the packaging sheet, the article is inserted, and then the packaging sheet is heated and fused by the sealing device.

[Outline of the Invention]

[Problems to be solved by the invention]

[0003]

When the roll paper is rotated by coasting due to the drawing out of the packaging sheet, sagging occurs in the packaging sheet, and poor fusing of the packaging sheet is likely to occur. For this reason, it is preferable to give a braking force to the rotation of the roll holder so that the packaging sheet is drawn out with an appropriate tension. When the tension of the packaging sheet is constant, as the outer diameter of the roll paper decreases by the drawing out of the packaging sheet, the torque by the tension acting on the outer periphery of the roll paper decreases. For this reason, in a configuration where the braking force is constant, as the outer diameter of the roll paper decreases, the braking force becomes excessive relative to the torque by the tension, and it may cause the roll paper to stop and the sheet to be cut.

[0004]

In order to solve such problems, a configuration is proposed, in which a sensor for detecting the outer diameter of the roll paper is disposed on the side of the roll paper and the braking force for rotation of the roll paper is adjusted according to the detected signal of the sensor. However, in such a configuration, it is conceivable that the outer diameter cannot be accurately detected due to the factors such as distortion of the outer shape of the roll paper, and the braking force is not properly adjusted.

[0005]

In addition, another configuration is proposed, in which a sensor for detecting the rotation angle of the roll holder, to which the roll paper is attached, is provided in the vicinity of the roll holder, and another sensor for measuring the sheet feed length drawn out from the roll paper is provided in the sheet feed path of the packaging sheet, and then the braking force is adjusted by calculating the outer diameter of the roll paper based on the rotation angle and the sheet feed length. However, since a rotation deviation may occur between the roll holder and the core tube of the roll paper, the rotation angle of the roll paper cannot be accurately detected. In order to accurately detect the rotation angle of the roll paper, it is necessary to directly detect the rotation angle of the roll paper itself, however, the method using a sensor for detecting the rotation angle of the roll holder on which the roll paper is attached is not necessarily appropriate.

[0006]

The present invention provides a technique for accurately detecting the rotation angle of the roll paper in order to appropriately adjust the braking force applying to the roll holder on which the roll paper is attached based on the outer diameter of the roll paper.

[Means to solve the problems]

[0007]

The roll paper of the present invention is for an article packaging device which includes a rotatable roll holder to which the roll paper is detachably attached, a supply roller that draws out a heat-sealable packaging sheet from the roll paper, a rotation angle sensor that detects a rotation angle of the roll paper, a sheet length sensor that measures sheet feed length drawn out from the roll paper, and a brake that applies a braking force to the roll holder, and the article packaging device configured to adjust the braking force applying to the roll holder according to the outer diameter of the roll paper calculated from the detected signals of the rotation angle sensor and the sheet length sensor. The roll paper of the present invention includes a core tube that can be attached to the roll holder and the packaging sheet wound around the core tube. The core tube has some magnets. The magnets are disposed at respective positions detectable by the rotation angle sensor when the core tube is attached to the roll holder.

[Effect of the invention]

[0008]

The article packaging device, to which the roll paper of the present invention is attached, can directly detect the rotation angle of the roll paper itself with a rotation angle sensor, by detecting the magnets disposed at respective positions of the core tube of the roll paper. In such a configuration, even if there is a rotational deviation between the roll holder, to which the roll paper is attached, and the core tube of the roll paper, the rotation angle of the roll paper is accurately detected, and the braking force applying to the roll holder is adjusted, according to the accurately calculated outer diameter of the roll paper. Therefore, according to the present invention, it is possible to cause the packaging sheet to be drawn out with appropriate tension even if the outer diameter of the roll paper changes.

[Brief description of the drawings]

[0009]

FIG. 1 Configuration diagram showing a paper feed unit and a packaging unit of the article packaging device.

FIG. 2 Cross-sectional diagram of the paper feed unit to which a roll paper was attached.

FIG. 3: Block diagram of a circuit that controls the main components of the article packaging device.

FIG. 4: Configuration diagram of rotation angle sensor.

[Mode for carrying out the invention]

[0010]

As shown in FIG. 1, the article packaging device 1 includes a paper feed unit 10 and a packaging unit 20.

[0011]

As shown in FIG. 2, the paper feed unit 10 is a component that draws out the packaging sheet S from a roll paper R and sends it to the packaging unit 20. As shown in FIGS. 2 and 3, the paper feed unit 10 includes a support board 11, a support shaft 121, a roll holder 122, feed rollers 13 and 14, and a motor brake 15.

[0012]

As shown in FIG. 2, the support shaft 121 is supported non-rotationally in a direction where the axial direction is horizontal by the support board 11. The roll holder 122, which is a cylindrical member, is provided around the support shaft 121 and is rotatable. Specifically, the roll holder 122 is rotatably attached to the support shaft 121 via bearings 123 and 123. The bearings 123 and 123 are provided at positions near both ends in the axial direction on the outer peripheral surface of the support shaft 121.

[0013]

The roll paper R is detachably attached to the roll holder 122. The roll paper R includes a hollow core tube P that can be attached to the roll holder 122 and a heat-sealable packaging sheet S wound around the core tube P. Magnets M are provided in the core tube P. The magnets M are disposed at respective positions that can be detected by a rotation angle sensor described later when the core tube P is attached to the roll holder 122. Details of the arrangement of the magnets M will be described later.

[0014]

The roll paper R is attached to the article packaging device 1 by attaching the core tube P to the roll holder 122. The core tube P is held on the outer peripheral surface of the roll holder 122 and rotates integrally with the roll holder 122. For this reason, the roll paper R is supported by the article packaging device 1 in a rotatable state.

[0015]

The motor brake 15 is provided on the support board 11 and provides an appropriate tension to the packaging sheet S drawn out from the roll paper R. Specifically, the motor brake 15 includes a motor 151, a gear unit 152, and a pinion 153. The motor 151 rotates the gear unit 152. The pinion 153 is provided on the output shaft of the gear unit 152 and meshes with the brake gear 122a formed at the axial end of the roll holder 122 to provide a variable braking force to the roll holder 122.

[0016]

As shown in FIG. 1 or 3, the supply rollers 13 and 14 draw out the packaging sheet S from the roll paper R and supply it to the packaging unit 20.

[0017]

The packaging unit 20 is a component for packaging an article in the packaging sheet S. The packaging unit 20 includes a triangular board 21, a hopper 22, and a heating roller 23.

[0018]

The triangular board 21 folds the packaging sheet S supplied from the paper feed unit 10 in two. The hopper 22 inputs a predetermined amount of articles into the packaging sheet S folded in two by the triangular board 21. The heating roller 23 heats and fuses the packaging sheet S, into which the articles are loaded, and packages the articles.

[0019]

Next, the electrical configuration of the article packaging device 1 will be described.

As shown in FIG. 3, the article packaging device 1 includes some Hall element sensors 124, a rotary encoder 16, the motor brake 15 described above, and a control circuit 30 as a configuration for ensuring that the packaging sheet S of the roll paper R is drawn out with appropriate tension.

[0020]

As shown in FIGS. 2 and 4, the Hall element sensors 124 are provided on the support shaft 121. Specifically, at the end of the support shaft 121 adjacent to the inner peripheral surface of the core tube P of the roll paper R, the four Hall element sensors 124 are evenly spaced along the circumferential direction.

[0021]

On the other hand, on the inner peripheral surface of the core tube P of the roll paper R, the four magnets M are evenly spaced in a predetermined angle range in the circumferential direction. In the present embodiment, the four magnets M are disposed so that the distance between magnets in close proximity to each other is 67.5° . When the roll paper R is attached to the roll holder 122, the four Hall element sensors 124 and the four magnets M are designed to be positioned in the axial direction so that they can have a position relationship that faces each other in the radial direction.

[0022]

The detected signals of the Hall element sensors 124 change due to the approach and separation of the magnets M accompanying the rotation of the roll paper R. Therefore, the Hall element sensors 124 functions as a rotation angle sensor that detects the rotation angle of the roll paper R. As shown in FIG. 3, the detected signal of the Hall element sensors 124 are input to the control circuit 30.

[0023]

The rotary encoder 16 detects the rotational amount of the feed roller 14. The rotational amount of the feed roller 14 corresponds to the feed length of the packaging sheet S sent to the packaging unit 20. Therefore, the rotary encoder 16 functions as a sheet length sensor that measures the sheet feed length drawn out. The detected signals of the rotary encoder 16 are input to the control circuit 30.

[0024]

The control circuit 30 calculates an outer diameter of the roll paper R based on the detected signals of the Hall element sensors 124 as a rotation angle sensor and the detected signals of the rotary encoder 16 as a sheet length sensor. Since the sheet feed length measured by the sheet length sensor is equal to the circumference length of the outer circumference of the roll paper R, during the control circuit 30 determines that the roll paper R has rotated one turn based on the detection signal of the rotation angle sensor. So that the sheet feed length divided by the circumference ratio is the diameter (outer diameter) of the roll paper R at the time of measurement. For this reason, the outer diameter of the roll paper R can be calculated based on the rotation angle of the roll paper R with respect to the drawing amount of the packaging sheet S from the roll paper R.

[0025]

The control circuit 30 adjusts the braking force by the motor brake 15 according to the calculated outer diameter of the roll paper R. Specifically, the control circuit 30 reduces the braking force by the motor brake 15 as the calculated outer diameter of the roll paper R decreases.

[0026]

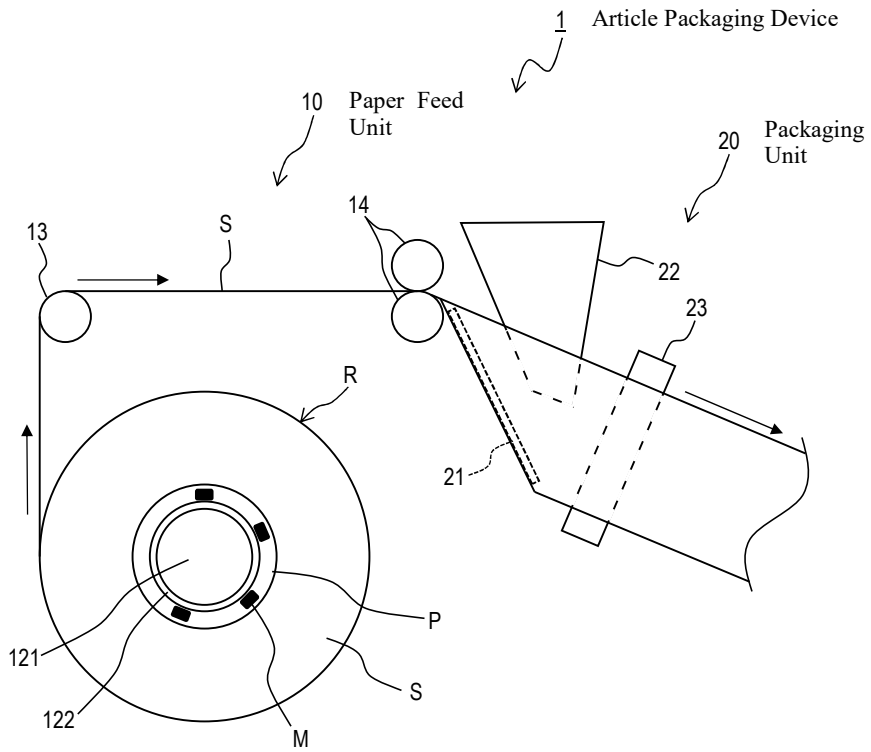
Thus, the control circuit 30 performs control to adjust the braking force applying to the roll holder 122 based on the rotation angle of the roll paper R and the drawing amount of the packaging sheet S from the roll paper R. Therefore, even if the outer diameter of the roll paper R changes, the packaging sheet S can be drawn out with appropriate tension.

[Explanation of Letters or Numerals]

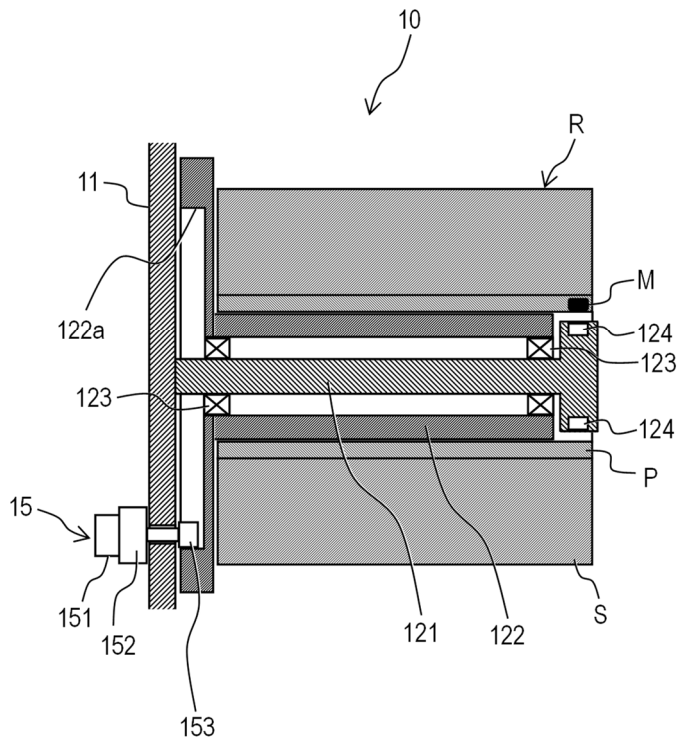
[0027]

1... Article packaging device, 10 ... Paper feed unit, 11 ... Support board, 121... Support shaft, 122 ... Roll holder, 122a... Brake gear, 123 ... Roller bearing, 124... Hall element sensor, 13, 14 ... Feed roller, 15 ... Motor brake, 151... Motor, 152... Gear unit, 153 ... Pinion, 16 ... Rotary encoder, 20... Packaging unit, 21 ... Triangular board, 22... hopper, 23 ... Heating roller, 30 ... Control circuit, R... Roll paper, P... Core tube, M... Magnets, S... Packaging sheet.

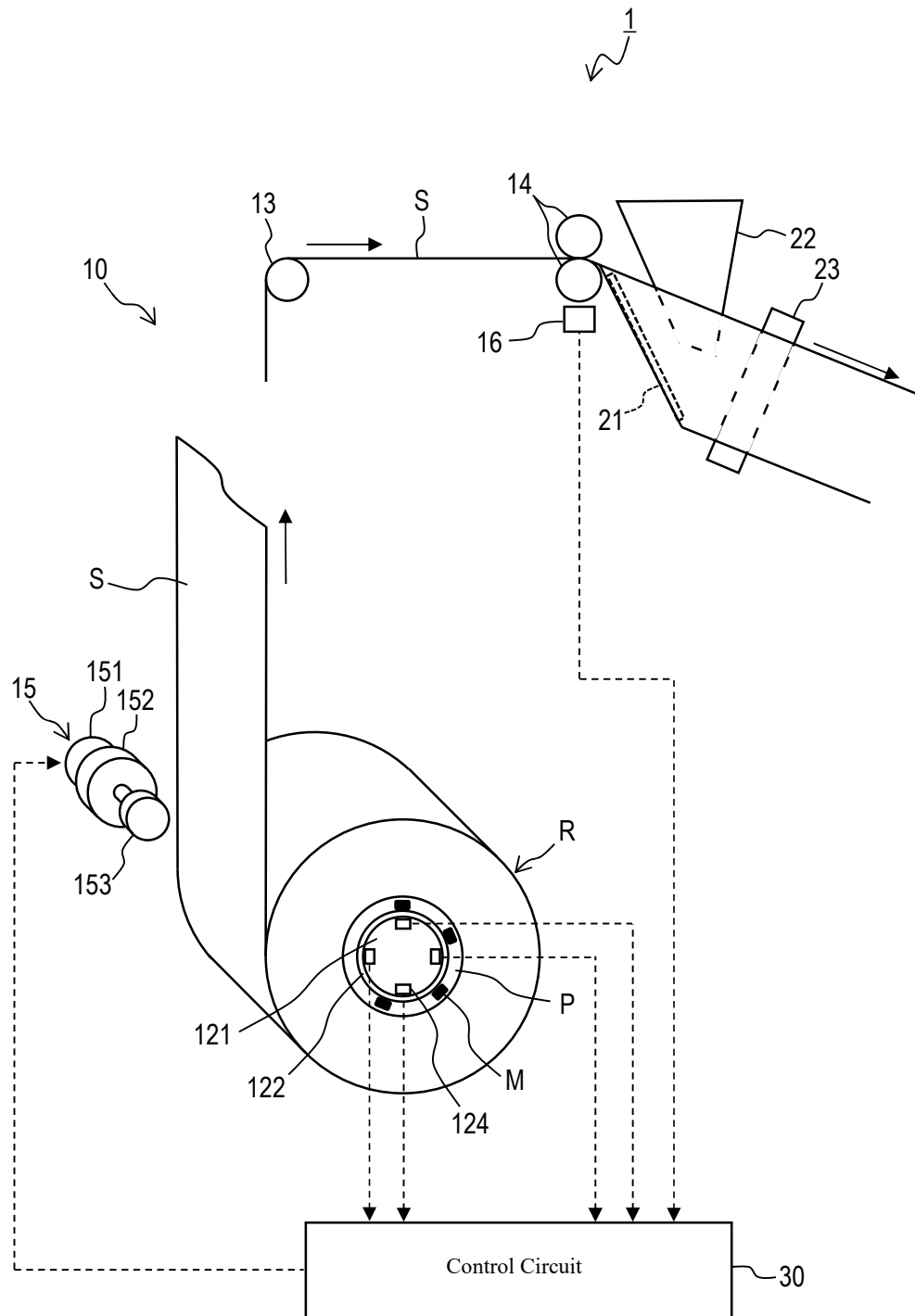
[FIG.1]



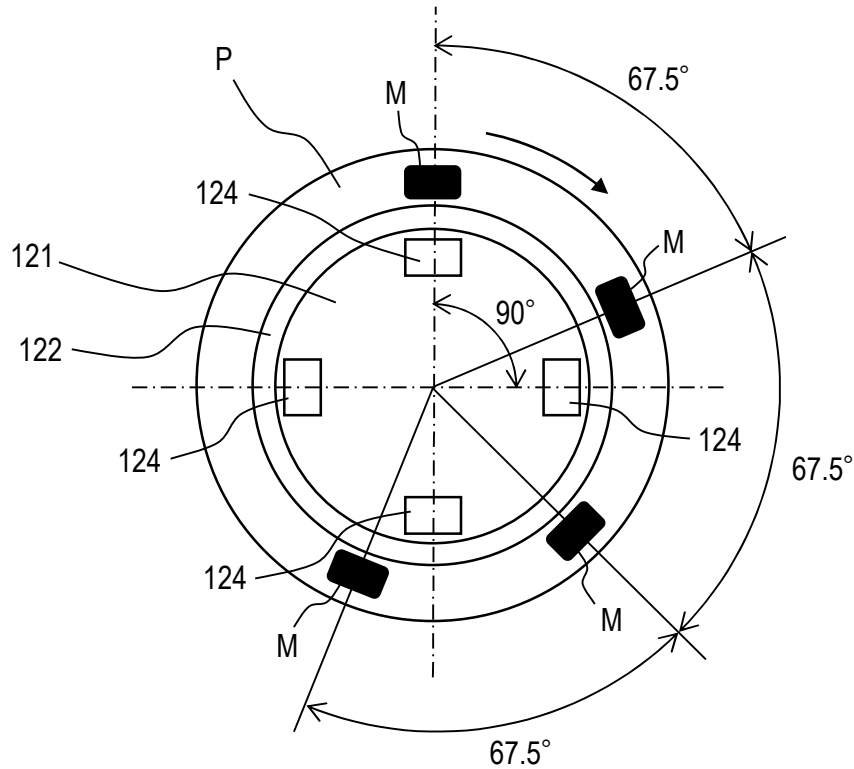
[FIG.2]



[FIG.3]



[FIG.4]



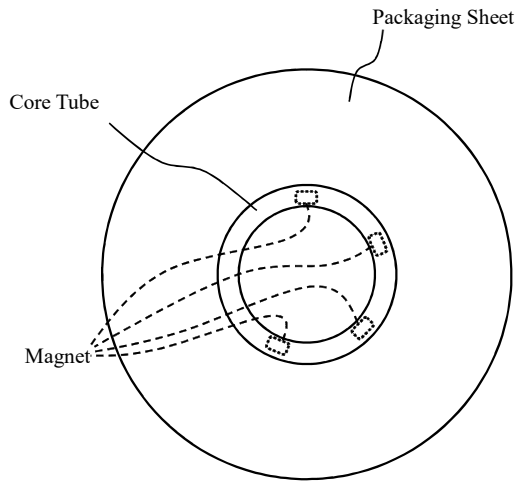
IV. The Structure of the Defendant's Product

- a the Defendant's Product is a roll paper used for the Plaintiff's Device,
- b wherein the Plaintiff's Device, is an article packaging device,
- b1 having a cylindrical roll holder rotatably provided around a non-rotational support shaft, and a core tube of a roll paper is detachably attached to the roll holder;
- b2 having a feed roller drawing out heat-sealable packaging sheet from the roll paper attached to the roll holder;
- b3 having Hall element sensors provided at one end side along axial direction of a support shaft;
- b4 having a rotary encoder measuring sheet feed length of packaging sheet drawn out from the roll paper having the wounded packaging sheet;
- b5 having a motor brake applying a braking force to the roll holder; and

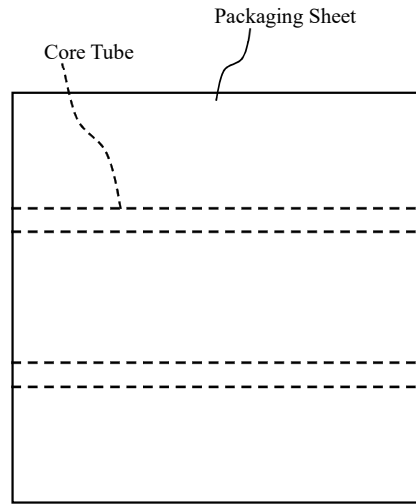
b6 is configured to adjust the braking force of the motor brake applying to the roll
holder based on the diameter of the roll paper calculated from the detected
signals of the Hall element sensors and the rotary encoder, and
c wherein the Defendant's Product is,
c1 configured in a way that, a plurality of magnets is spaced inside of a core tube
with each other along the circumferential direction at one end side along axial
direction of a cylindrical core tube made of plastic, and, wherein the core tube is
configured to be detachably attached to the roll holder of the Plaintiff's Device,
c2 wherein the packaging sheet is rolled up onto the core tube,
c3 wherein the magnets provided to the core tube disposed at respective positions
detectable by the Hall element sensors provided at one end side along axial
direction of the support shaft of the Plaintiff's Device when the core tube is
attached to the roll holder of the Plaintiff's Device.

【 The Defendant's Product 】

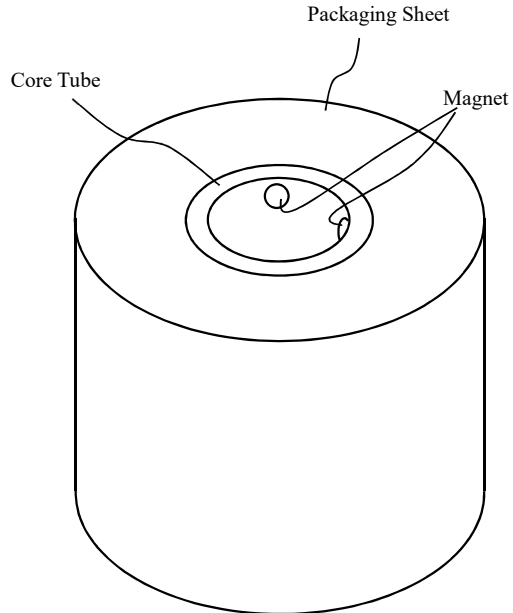
Front View



Side View

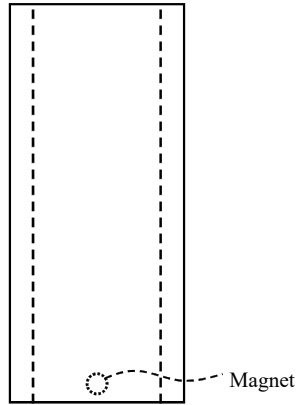


Perspective View

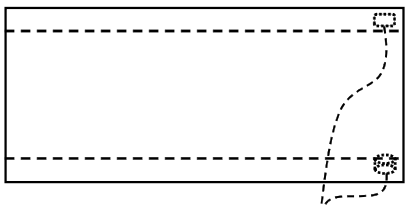


【The part of core tube of the Defendant's Product】 (The core tube of the Plaintiff's Roll Paper)

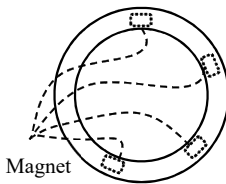
Plain View



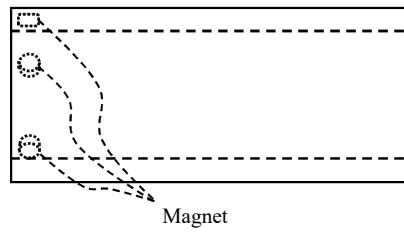
Left Side View



Front View

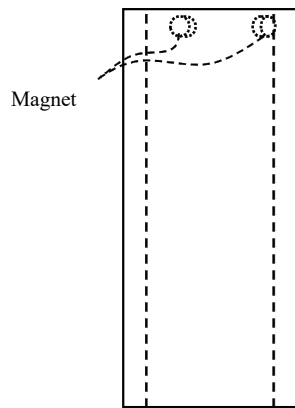


Right Side View

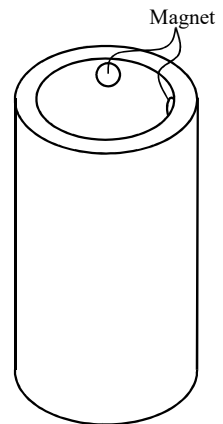


Magnet

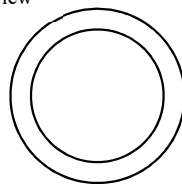
Bottom view



Perspective View



Rear View



V. Whether the Defendant's Device falls into the technical scope of the Patent

The Defendant's Product satisfies with all elements of the Patent and falls into the technical scope of the Patent.

VI. Summary of the Arguments by Donkey Corp. (Defendant)

1 International Exhaustion

In the case where a patentee in this country or a person equivalent thereto has assigned a patented product to a third party outside this country, the patentee shall not exercise the patent rights in this country for said product against the assignee, unless the patentee agreed with the assignee to exclude this country from the areas of sale or use of said patented product, or against a third party who has acquired the patented product from the assignee and its subsequent assignees, unless said agreement with the assignee has been made and further it has been explicitly indicated on the patented product.

Since it is not indicated on the Plaintiff's Roll Paper that Country A is excluded from the areas of sale or use of the product, Pony Corp. shall not exercise the Patent Right against Pony Corp. for the Defendant's Product.

2 Modification or replacement of components, etc.

The Defendant's Product is manufactured by means of winding a packaging sheet on the used core tube of the Plaintiff's Roll Paper after the original packaging sheet have been used up. Because the core tube of the Plaintiff's Roll Paper is reused as it is and the original packaging sheet of the Plaintiff's Roll Paper has been used up through normal use and no longer exists, either of the core tube or the original packaging sheet of the Plaintiff's Roll Paper has not been modified or replaced.

Since the core tube which is made of hard plastic cannot be damaged or deteriorated before the original packaging sheet is used up, the recycle of the core tube cannot be assessed that the patented product is reused after it has finished its service along with the lapse of its ordinary life as a product.

Further, the distinctive portion of the Invention is to dispose magnets on the core tube of the roll paper so that a rotation angle of the roll paper can be detected by the rotation angle sensor ([0005] and [0008] of the Specification) whereas the packaging

sheet can be made by using widely distributed materials.

Accordingly, winding the packaging sheet on the used core tube of the Plaintiff's Roll Paper is only an act of replacement of a consumable component under the normal use, and does not change the component that constitutes an essential portion of the Invention. Thus, the identity of the patented product has not been lost.

VII. Summary of the Arguments by Pony Corp. (Plaintiff)

1 International Exhaustion

Since the Patent Right that Pony Corp. owns in Country A and the Corresponding Patent Right that Pony Corp. owns in Country B are different, it cannot be regarded as profiting twice from the same patent even if Pony Corp. exercises the Patent Right in Country A against the Defendant's Product. Thus, international exhaustion is not necessarily constituted.

2 Modification or replacement of components, etc.

The rationale that the subject matter for which exercise of the patent right is restricted based on exhaustion is limited to the original patented product itself which a patentee in this country or a person equivalent thereto sold outside this country is not different from the case of domestic exhaustion which a patentee in this country or a person equivalent thereto sold in this country. Thus, if a patented product, which was sold outside this country by a patentee in this country or a person equivalent thereto, has been modified or its components have been replaced, and as a result, the product can be regarded as a novel production which is not identical to the original patented product, the patentee is entitled to exercise the patent right for this patented product in this country.

The Plaintiff's Roll Paper is exclusively used for packaging article, the part of packaging sheet is a major part of the Plaintiff's Roll Paper, economic value of the Plaintiff's Roll Paper is concentrated on the part of packaging sheet, and it cannot be assumed that users wind again a packaging sheet onto the used core tube by themselves. Considering these factors, the core tube is worthless for users. Thus, it should be evaluated that utility as product of the Plaintiff's Roll Paper is completely lost after using up the packaging sheet. It should not be evaluated that the act of winding the packaging sheet on the used core tube of the Plaintiff's Roll Paper is replacement.

Reuse of the core tube is not impossible physically. However, the part of the core tube of the Plaintiff's Roll Paper does not have structure and strength suitable for removal and it is difficult to secure a quality of the part of the core tube of the Plaintiff's Roll Paper when it is used after recycling, because the Plaintiff's Roll Paper needs to be adapted to the Plaintiff's Device with a high precision and it is principally assumed that the packaging sheet should be used up after it is attached to the Plaintiff's Device.

Thus, the Plaintiff's Roll Paper has lost its utility as product when the packaging sheet is used up, and the act to wind again the packaging sheet on the used core tube of the Plaintiff's Roll Paper has lost the identity of the product.

VIII. Points to note in reviewing the Case

- Each country shall review the issue of exhaustion.
- The fact that the Defendant's Product is the roll paper used for the Plaintiff's Device is undisputed.

[END]