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Koyama

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(54) **MEDIUM PLACING DEVICE AND RECORDING APPARATUS**

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B65H 31/06 (2006.01)

(52) **U.S. Cl.**
CPC ***B65H 1/027*** (2013.01); ***B65H 31/06*** (2013.01)

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See application file for complete search history.

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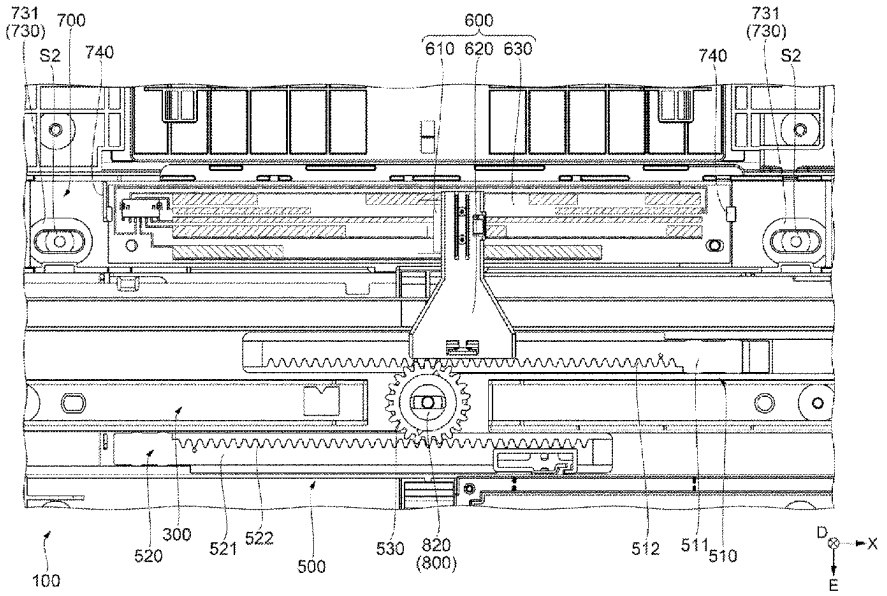
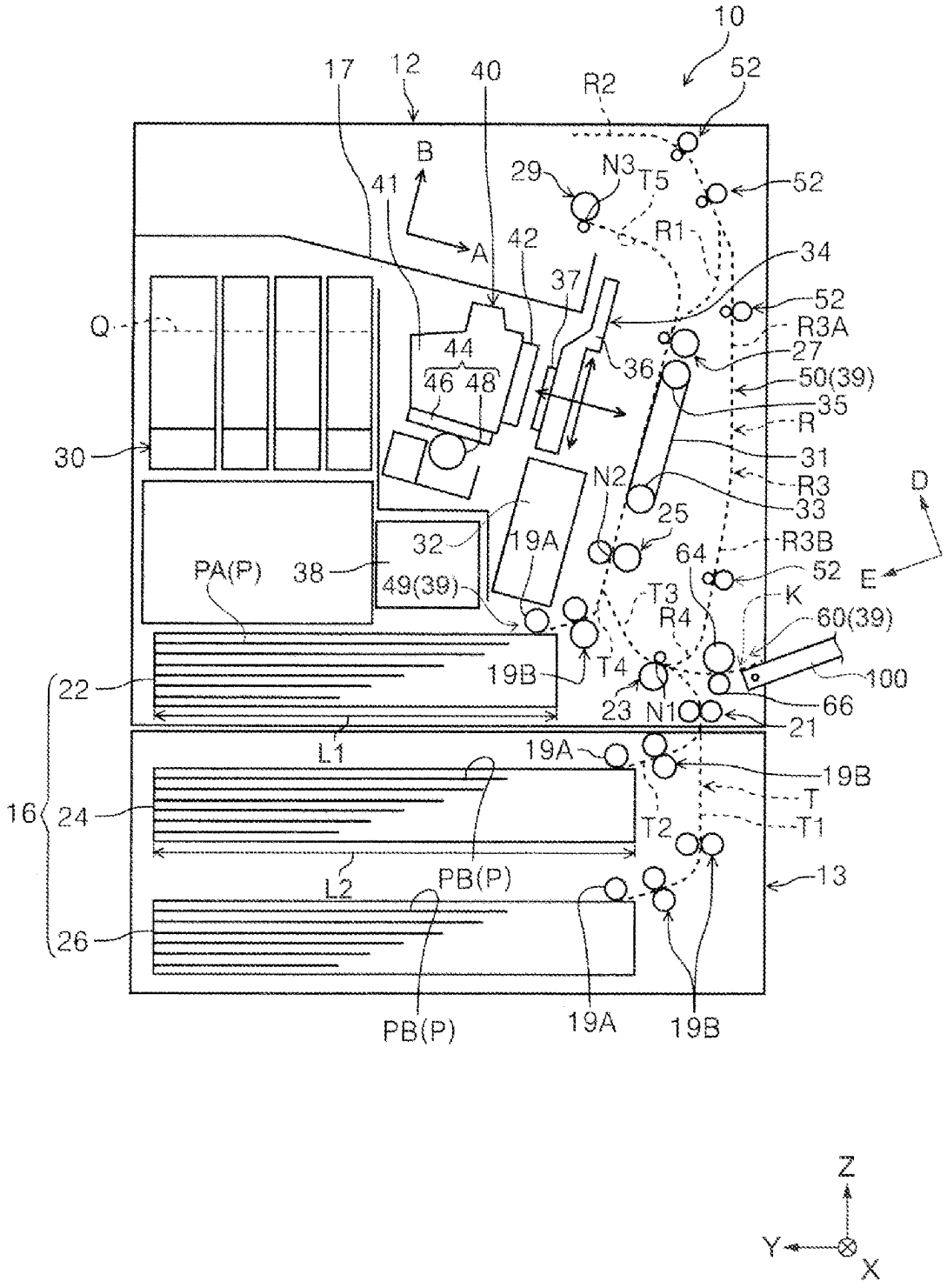
(57) **ABSTRACT**

A medium placing device (feeding tray) includes a placement unit, a regulation unit (edge guide), a displacement unit, a detection unit, and an adjustment unit. The regulation unit (edge guide) includes a first regulation member (first edge guide) and a second regulation member (second edge guide). The displacement unit is capable of moving the first regulation member (first edge guide) and the second regulation member (second edge guide) in directions opposite to each other along a first direction. The detection unit is provided between the placement unit and the adjustment unit.

15 Claims, 12 Drawing Sheets

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46 48
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50(39)
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N2
R3
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D
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R3B
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PA(P)
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49(39)
T3
K
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19B
T4
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23
N1
66
21
L1
19A
19B
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FIG. 1

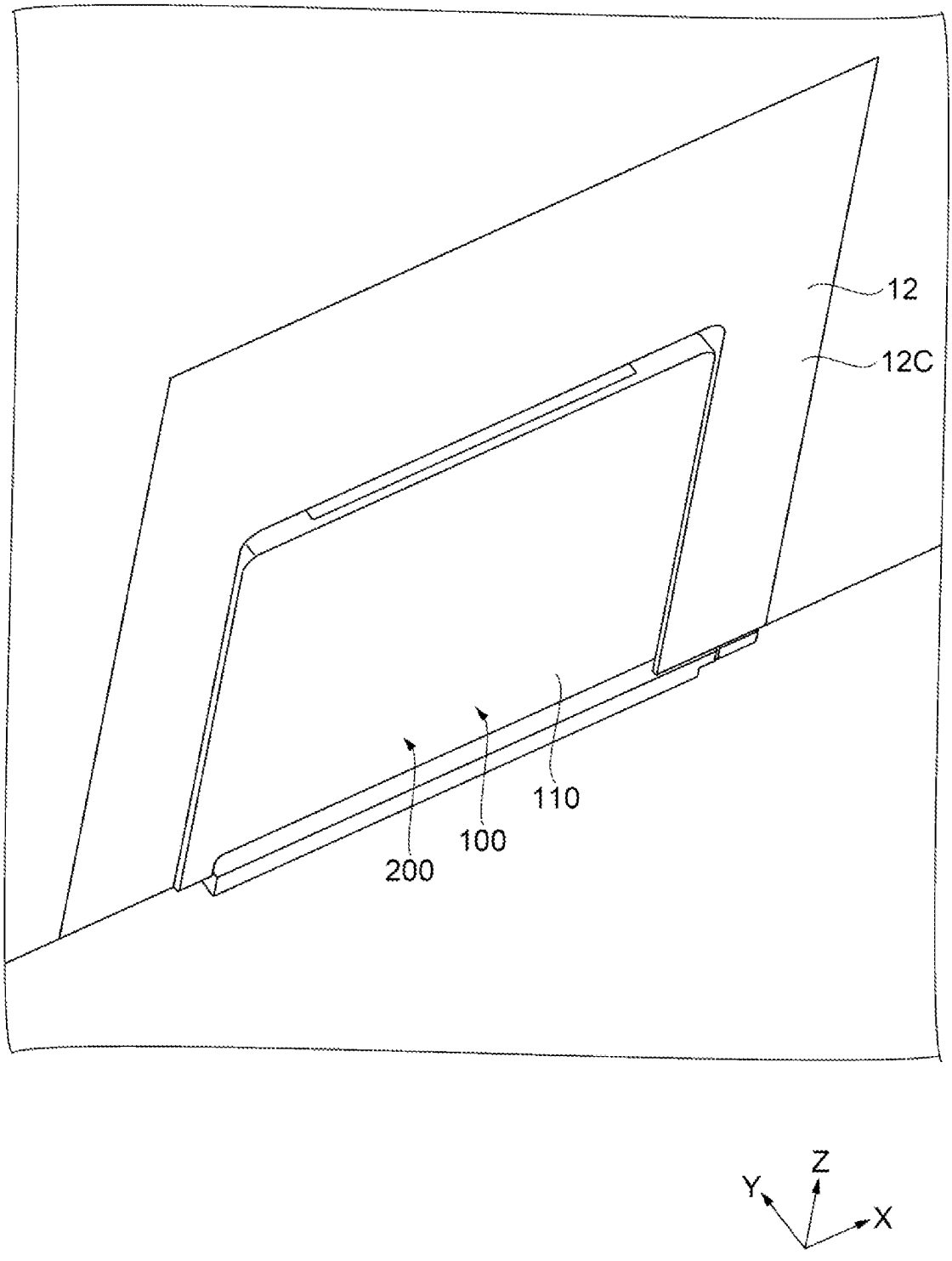
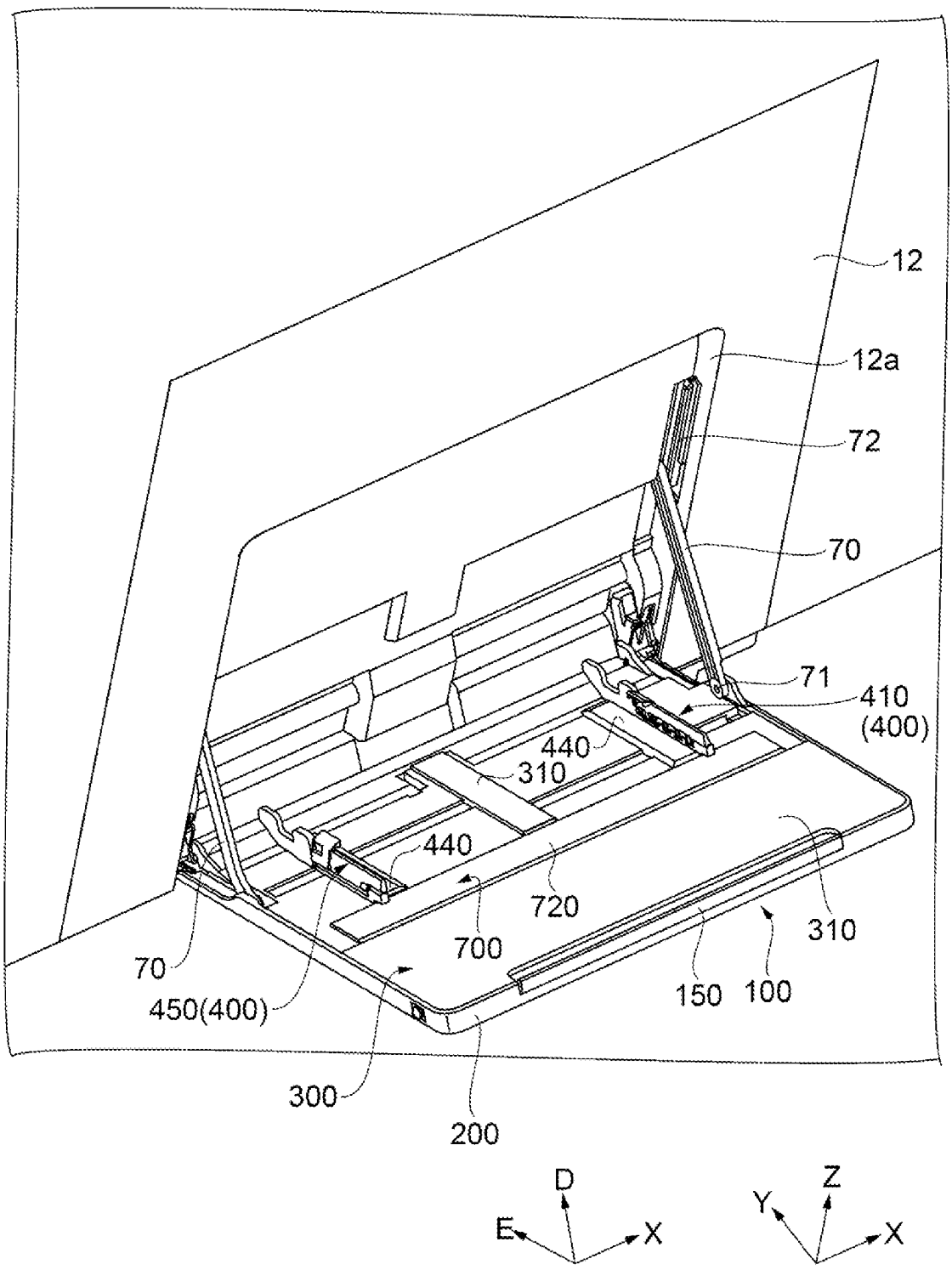


FIG. 2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Y
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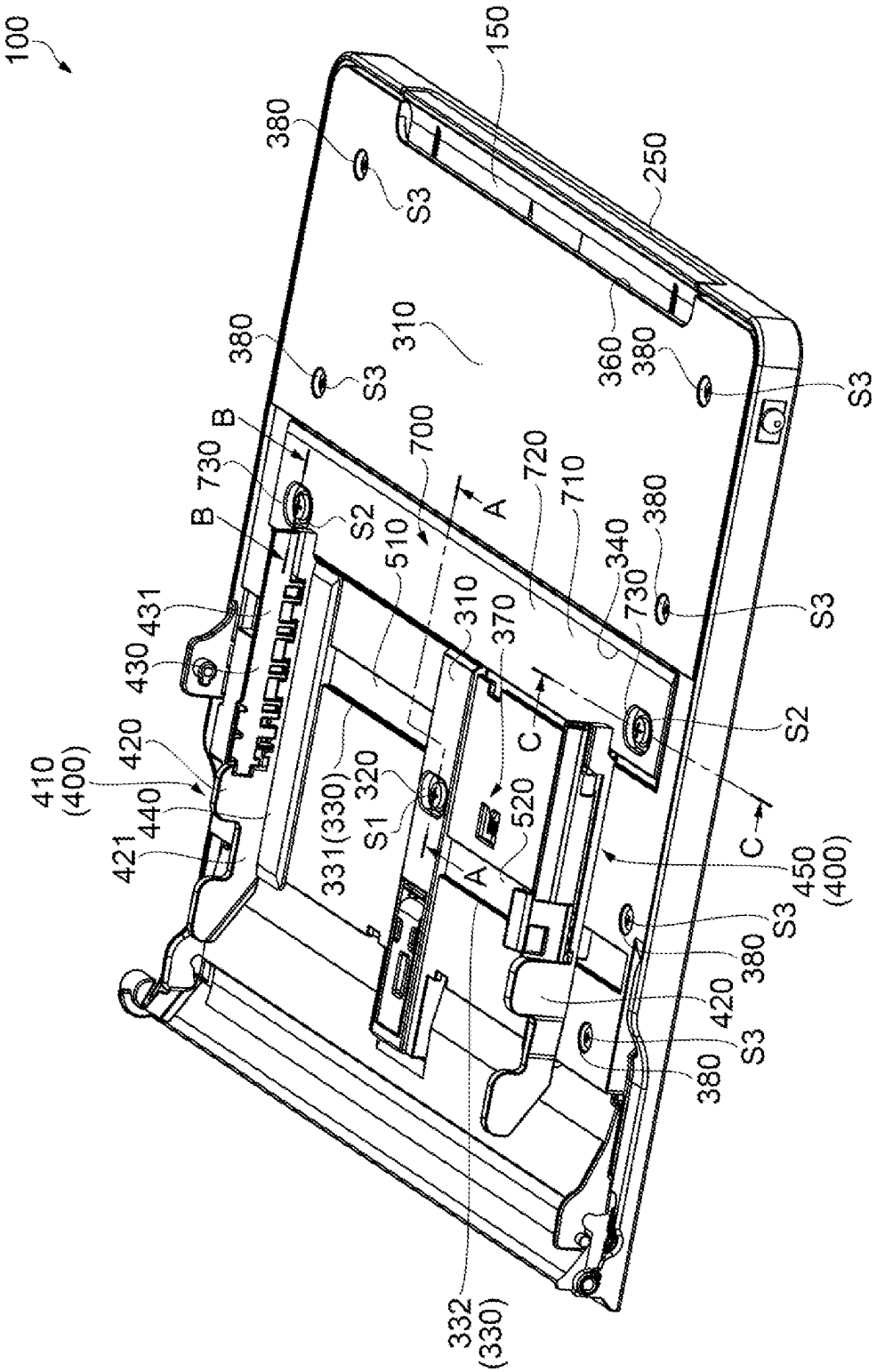
FIG. 3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430
S2
420
C
410
(400)
320
520
440
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A
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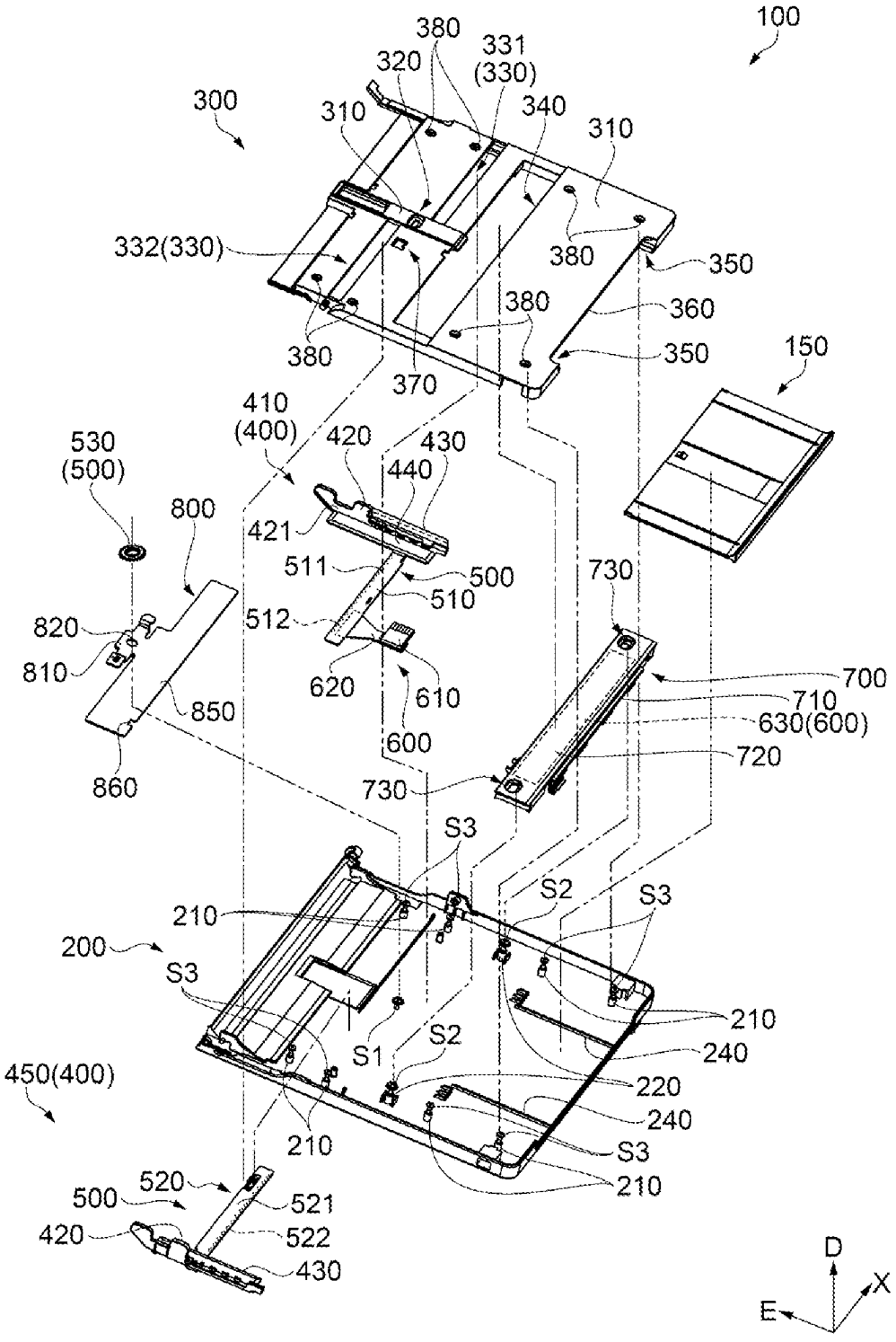
FIG. 4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S3
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210
S1
S2
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FIG. 5

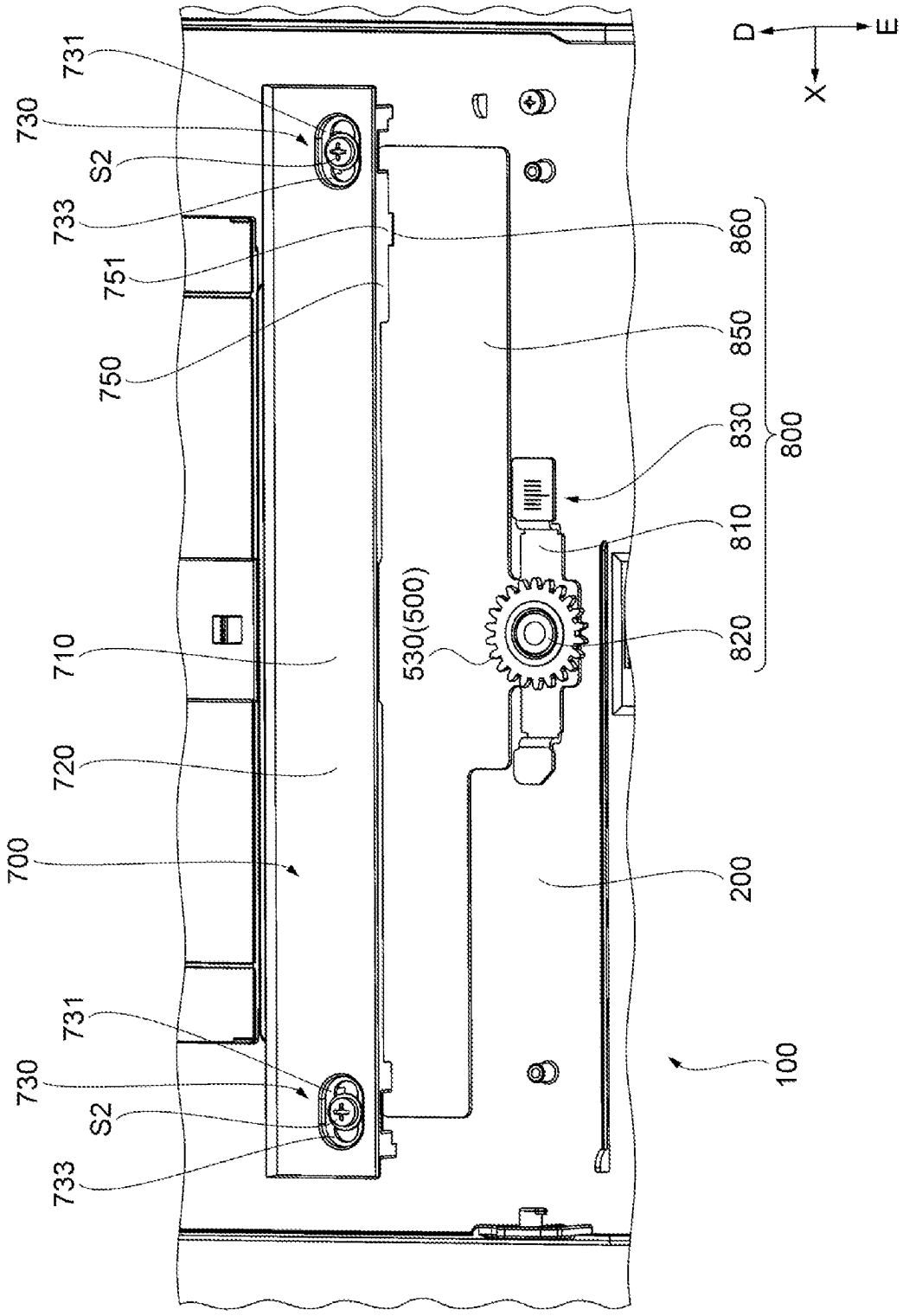
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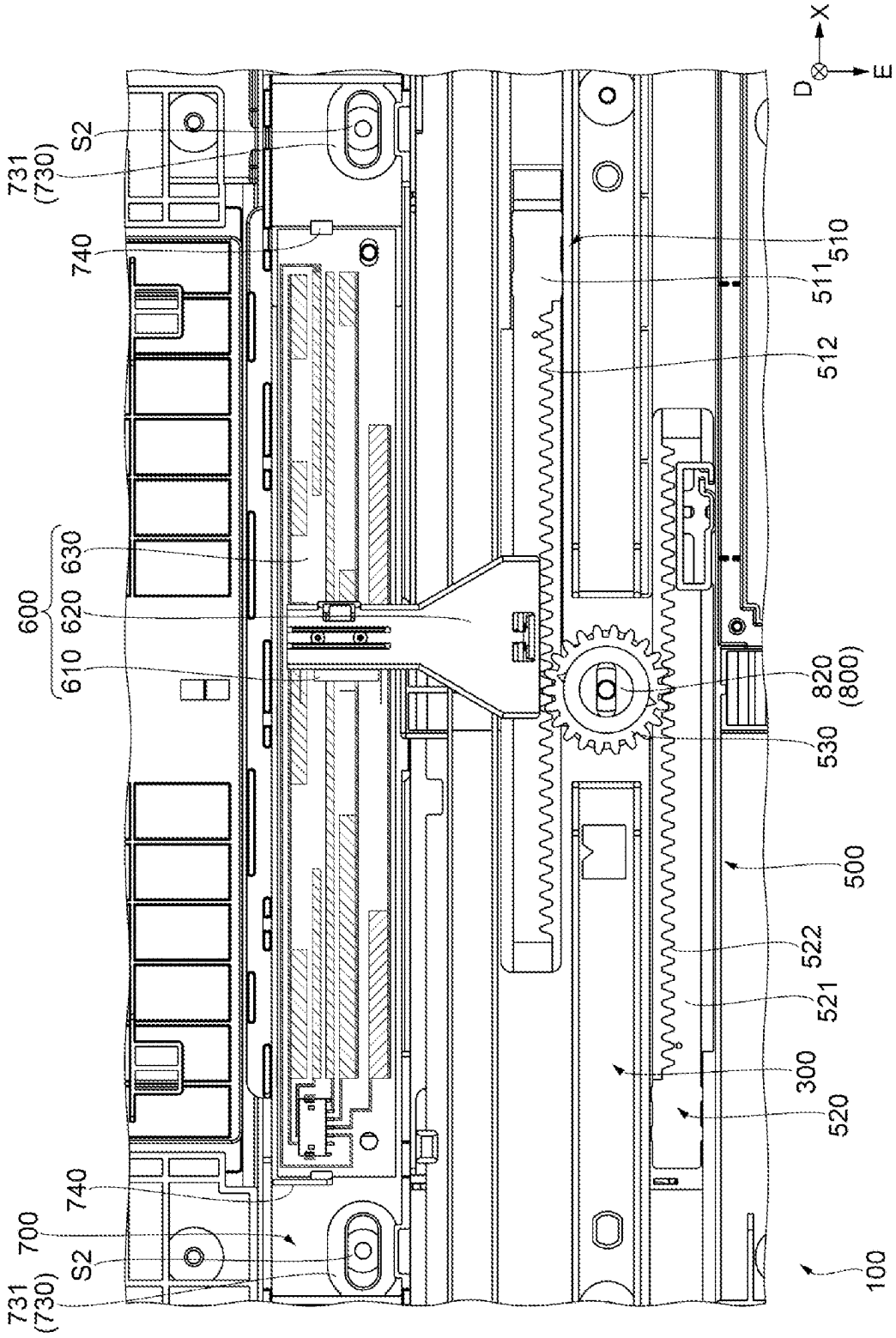
FIG. 6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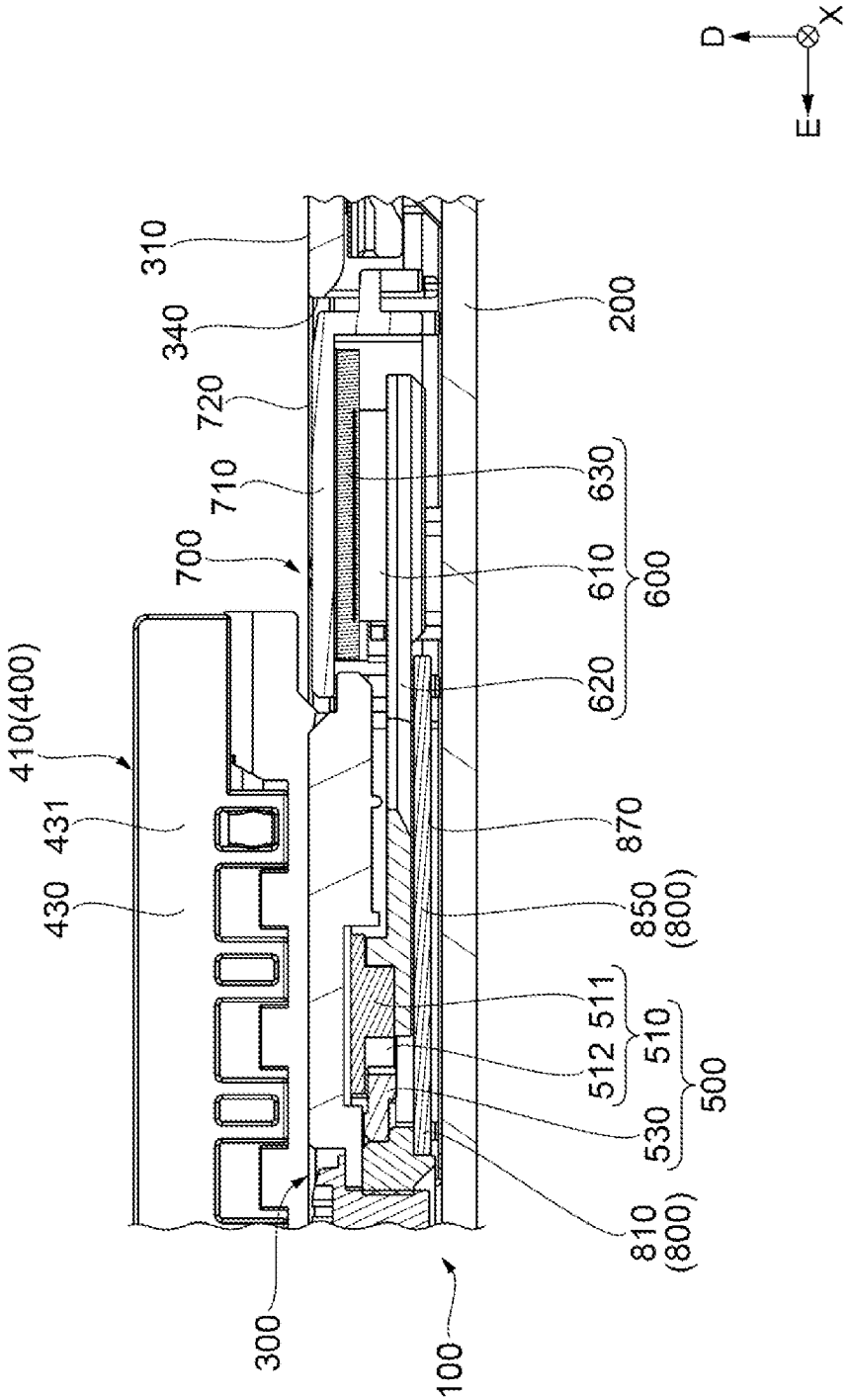
S2
731
(730)

FIG. 7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300
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510
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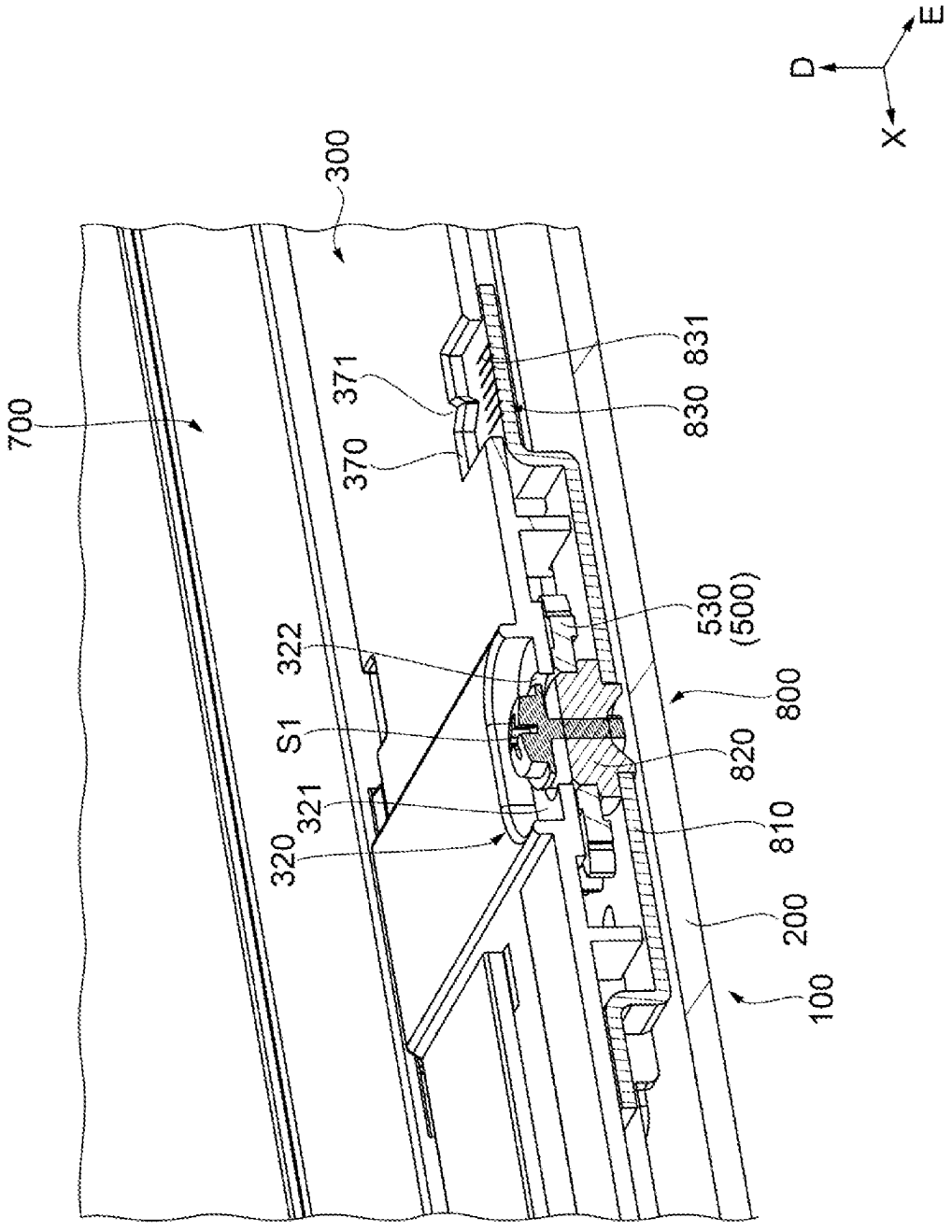
500
810
(800)

FIG. 8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S1
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320
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820
810
200
100

FIG. 9

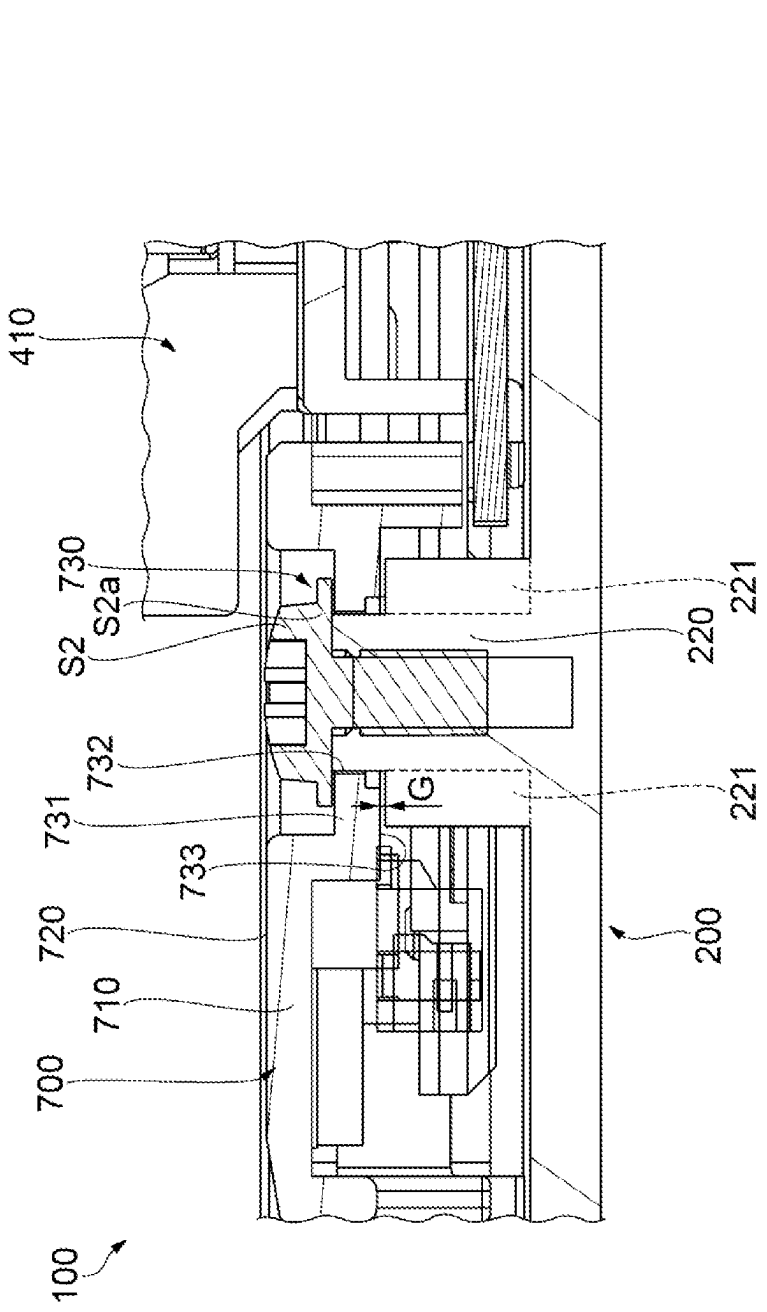

FIG. 10

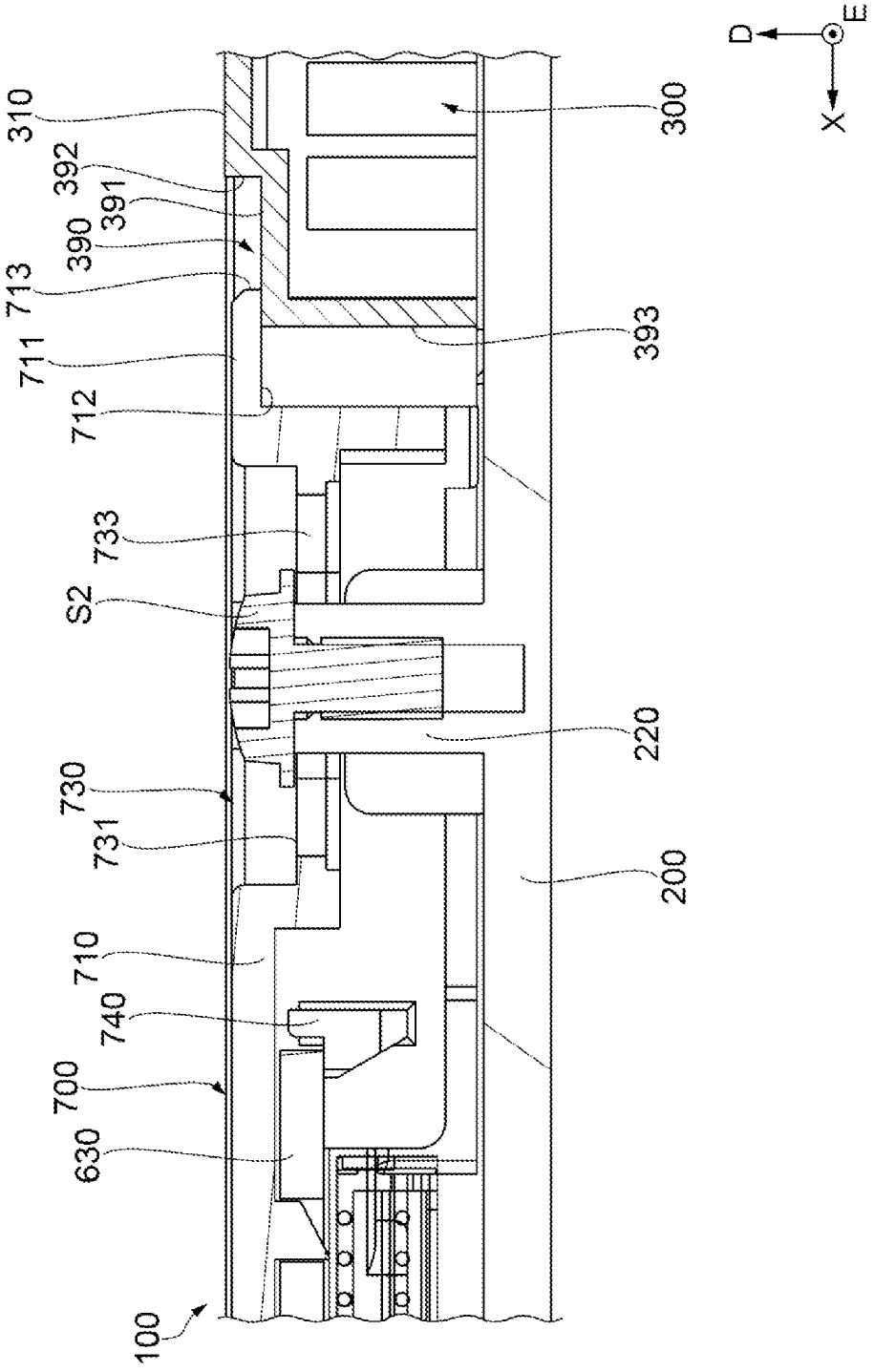
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FIG. 11

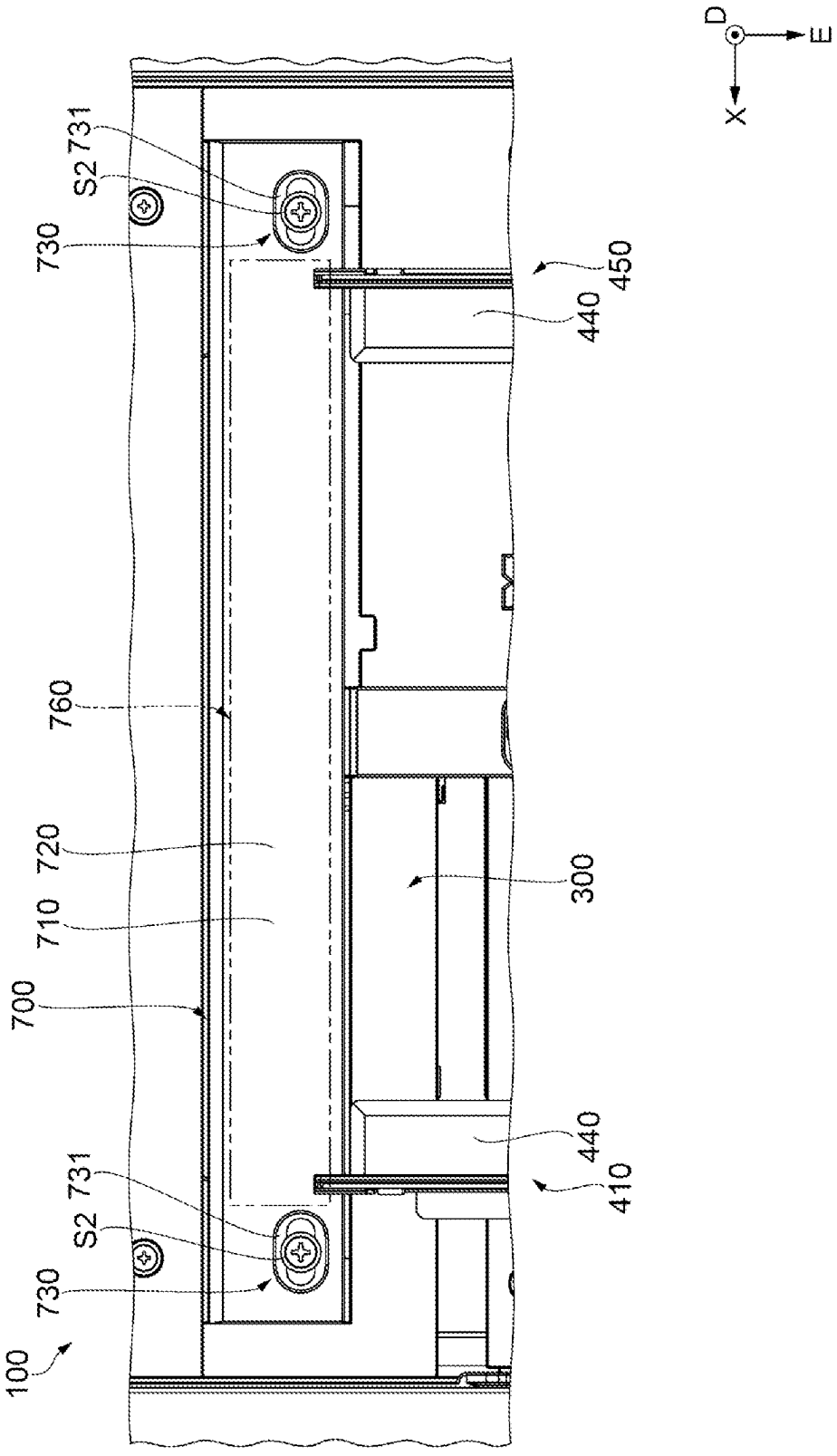

FIG. 12

MEDIUM PLACING DEVICE AND RECORDING APPARATUS

The present application is based on, and claims priority from JP Application Serial Number 2021-170732, filed Oct. 19, 2021, the disclosure of which is hereby incorporated by reference herein in its entirety.

BACKGROUND

1. Technical Field

The present disclosure relates to a medium placing device and a recording apparatus including the medium placing device.

2. Related Art

In the related art regarding a paper feeding device (corresponding to a medium placing device) included in a recording apparatus, JP-A-4-298442 discloses a configuration in which a holding means is movable in a vertical direction with respect to a paper-feeding direction of a sheet, the holding means for integrally holing a pinion and a rack that move a pair of regulating means in directions opposite to each other.

In JP-A-4-298442, when a sheet width is to be detected from a position of the regulating means in the paper feeding device, a sheet width detection mechanism is required to move integrally with the regulating means. However, JP-A-4-298442 does not describe arrangement of the sheet width detection mechanism and a position adjustment mechanism of the regulating means. Note that, with regard to the arrangement of the sheet width detection mechanism and the position adjustment mechanism of the regulating means, when the sheet width detection mechanism and the position adjustment mechanism merely overlap with each other, the paper feeding device is generally increased in size in a direction in which a sheet is stacked, which causes a problem.

SUMMARY

A medium placing device includes a placement unit at which a medium is placed, a regulation unit configured to regulate a movement of the medium placed on the placement unit in a first direction, a displacement unit configured to hold the regulation unit in a movable manner in the first direction, a detection unit configured to detect a position of the regulation unit in the first direction, and an adjustment unit configured to adjust positions of the regulation unit, the displacement unit, and the detection unit in the first direction, wherein the regulation unit includes a first regulation member configured to regulate a first edge of the medium in the first direction, and a second regulation member configured to regulate a second edge of the medium in the first direction, the second edge being opposite to the first edge, the displacement unit is configured to move the first regulation member and the second regulation member in directions opposite to each other along the first direction, and the detection unit is provided between the placement unit and the adjustment unit.

A recording apparatus includes the above-mentioned medium placing device and a recording unit configured to perform recording on the medium placed on the medium placing device.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an internal configuration diagram of a recording apparatus according to the present exemplary embodiment.

FIG. **2** is a perspective view illustrating a closed state of a feeding tray.

FIG. **3** is a perspective view illustrating an opened state of the feeding tray.

FIG. **4** is a perspective view of the feeding tray.

FIG. **5** is an exploded perspective view of the feeding tray.

FIG. **6** is a perspective view illustrating an adjustment unit, a displacement unit, and a detection holding unit that are provided on a tray main body.

FIG. **7** is a plan view illustrating the adjustment unit, the displacement unit, a detection unit, and the detection holding unit.

FIG. **8** is a cross-sectional view illustrating the detection unit, the displacement unit, a placement unit, and the adjustment unit.

FIG. **9** is a perspective view illustrating a state taken along an X-D plane with a pinion as a center.

FIG. **10** is a cross-sectional view illustrating the detection holding unit, the tray main body, and a screw.

FIG. **11** a cross-sectional view illustrating an end of the detection holding unit in a −X direction.

FIG. **12** is a plan view illustrating a marking portion of the detection holding unit.

DESCRIPTION OF EXEMPLARY EMBODIMENTS

1. Exemplary Embodiments

FIG. **1** is an internal configuration diagram of a recording apparatus **10** according to the present exemplary embodiment.

With reference to FIG. **1**, the configuration of the recording apparatus **10** is described.

As illustrated in FIG. **1**, the recording apparatus **10** according to the present exemplary embodiment is a printer that forms an image by ejecting ink Q being a liquid onto a sheet P being a medium. Note that, an X-Y-Z coordinate system illustrated in each of the drawings is an orthogonal coordinate system.

A direction along an X-axis indicates a width direction of the recording apparatus **10**, and a direction along a Y-axis indicates a depth direction of the recording apparatus **10**. A direction along a Z-axis indicates a height direction of the recording apparatus **10**. The direction along the X-axis is also a width direction of the sheet P.

A direction along an A-axis illustrated in FIG. **1** is a direction intersecting the direction along the Y-axis as viewed in a +X direction, and is an oblique direction in which a position in a −Y direction is inclined in a −Z direction with respect to a position in a +Y direction. A +A direction is a direction in which a line head **40** described later approaches a transporting belt **31**. A −A direction is a direction in which the line head **40** retracts from the transporting belt **31**. A direction along a B-axis illustrated in FIG. **1** is a direction intersecting the direction along the A-axis as viewed in the +X direction. A +B direction is a transport direction of the sheet P in a recording region between the line head **40** and the transporting belt **31**.

In the recording apparatus **10**, the sheet P is transported through a transport path T indicated with the broken line. Note that the transport direction in which the sheet P is transported is a direction along the transport path T, and

hence differs in each part of the transport path T. A side to which the sheet P is transported is referred to as "downstream," and a side opposite thereto is referred to as "upstream" in some cases. Note that, in the recording apparatus **10**, as examples of the sheet P, a sheet PA and a sheet PB that have different lengths in the transport direction may be used. The length of the sheet PA in the transport direction is shorter than the length of the sheet PB in the transport direction.

The recording apparatus **10** includes a main body unit **12** being an apparatus main body and an extension unit **13** arranged below the main body unit **12**. Specifically, the recording apparatus **10** includes a sheet cassette **16**, the line head **40** being a recording unit, and a transport unit **39**. The transport unit **39** transports the sheet P, and includes a forward feeding unit **49**, a reverse unit **50**, and a feeding unit **60**. In addition, the recording apparatus **10** includes an ink supply unit **30**, a cap unit **32**, a wiper unit **34**, a waste liquid tank **38**, and a control unit, which is not illustrated.

The main body unit **12** includes a casing being an exterior. A discharge tray **17** is provided at a part of the main body unit **12** in the +Z direction with respect to the center thereof in the direction along the Z-axis. The sheet cassette **16** is provided to the main body unit **12** and the extension unit **13**.

The extension unit **13** includes a casing being an outline. The extension unit **13** is detachable from the main body unit **12**. An upper end of the extension unit **13** in the +Z direction and a lower end of the main body unit **12** in the −Z direction are continuous. With this, the sheet P can be transported from the extension unit **13** to the main body unit **12**.

The discharge tray **17** is a part from which the sheet P on which the line head **40** performs recording is discharged. The discharge tray **17** extends in the direction along the A-axis. In the discharge tray **17**, edges of the plurality of placed sheets P in the +A direction are aligned along the +B direction.

The sheet cassette **16** is an accommodation unit that accommodates the sheet P. For example, the sheet cassette **16** includes a first cassette **22** that is provided to the main body unit **12** and a second cassette **24** and a third cassette **26** that are provided to the extension unit **13**.

The first cassette **22** is formed into a rectangular-parallelepiped box-like shape that is opened in the +Z direction, and accommodates the sheet PA. When a pick-up roller **19**A and a roller pair **19**B rotate, the sheet P (PA) accommodated in the first cassette **22** is fed to the transport path T.

The second cassette **24** is positioned below the first cassette **22** in the direction along the Z-axis. The second cassette **24** is formed into a rectangular-parallelepiped box-like shape that is opened in the +Z direction, and accommodates the sheet PB. When the pick-up roller **19**A and the roller pair **19**B rotate, the sheet P (PB) accommodated in the second cassette **24** is fed to the transport path T via a path T**2**.

The third cassette **26** is positioned below the second cassette **24** in the direction along the Z-axis in the extension unit **13**. Note that the third cassette **26** is configured similarly to the second cassette **24**, and only arrangement thereof is different.

The ink supply unit **30** supplies the ink Q to the line head **40**.

The cap unit **32** is formed into a box-like shape that is opened in the −A direction. The cap unit **32** is driven by a driving mechanism unit, which is not illustrated, and thus is reciprocally movable in the direction along the B-axis. When maintenance work is performed for the line head **40**, the cap unit **32** moves in the +B direction and covers an ejection unit **42** described later, and thus the ink Q is sucked. When the line head **40** performs recording, the cap unit **32** retracts in a −B direction.

The wiper unit **34** includes a unit main body **36** capable of accommodating the ink Q and a wiper blade **37** that is provided to the unit main body **36** and that wipes off the ink Q adhering to the ejection unit **42**. The wiper unit **34** is driven by a driving mechanism unit, which is not illustrated, and thus is reciprocally movable in the direction along the X-axis. When maintenance work is performed for the line head **40**, the wiper unit **34** wipes the surface of the ejection unit **42** while moving in the +X direction. With this, the ink Q is collected. When the line head **40** performs recording, the wiper unit **34** retracts to a home position in the +X direction.

The waste liquid tank **38** is replaceably provided to the substantially central portion of the main body unit **12** in the direction along the Y-axis and the direction along the Z-axis. The waste liquid tank **38** accommodates the ink Q collected by the cap unit **32** and the ink Q collected by the wiper unit **34**.

The control unit, which is not illustrated, is configured to include a Central Processing Unit (CPU), a Read Only Memory (ROM), a Random Access Memory (RAM), and a storage that are not illustrated, and controls transport of the sheet P and an operation of each of the portions including the line head **40** in the recording apparatus **10**.

Under a state in which the line head **40** is positioned at the home position before an operation, the line head **40** is positioned above the sheet cassette **16** and the waste liquid tank **38** in the direction along the Z-axis. The line head **40** is one example of a recording unit that records an image or the like on the sheet P transported from the sheet cassette **16** along the transport path T described later. The line head **40** is driven by a moving mechanism unit **44** described later, and thus is movable in the +A direction and the −A direction. Specifically, the line head **40** includes a carriage **41** driven by the moving mechanism unit **44** and the ejection unit **42** supported by the carriage **41**.

The ejection unit **42** ejects, onto the sheet P, the ink Q supplied from the ink supply unit **30**.

The moving mechanism unit **44** in the present exemplary embodiment has a configuration including a rack portion **46**, a pinion **48**, and a motor, which is not illustrated. The rack portion **46** is mounted on a bottom portion of the carriage **41** in the −Z direction. The rack portion **46** includes a plurality of tooth portions, which are not illustrated. The pinion **48** is rotated by the motor in a forward direction or a reverse direction. A plurality of tooth portions, which are not illustrated, are formed on the outer peripheral portion of the pinion **48**, and are meshed with the plurality of tooth portions of the rack portion **46**.

The transport path T extends from the sheet cassette **16** to the discharge tray **17**, and is a path in which the sheet P is transported. The forward feeding unit **49** is arranged in the transport path T. Specifically, the pick-up roller **19**A, the roller pair **19**B, a receiving roller pair **21**, roller pairs **23** and **25**, the transporting belt **31**, a driving roller **33**, a driven roller **35**, a roller pair **27**, and a discharge roller pair **29** are arranged. Each of the roller pairs is rotated about the axis in the direction along the X-axis. The driving roller **33** and the driven roller **35** are arranged at an interval therebetween in the direction along the B-axis, and are rotatable about the axis in the direction along the X-axis.

The receiving roller pair **21** is provided in a rotatable manner to the lower end of the main body unit **12** in the −Z

direction. The receiving roller pair **21** receives the sheet P transported from the extension unit **13**.

The transporting belt **31** is formed into a cylindrical shape, and is wound about the driving roller **33** and the driven roller **35**. The transporting belt **31** is positioned in the +A direction with respect to the line head **40**. When the driving roller **33** is rotated by a motor, which is not illustrated, the transporting belt **31** circularly moves. Under a state in which the sheet P is in contact with the outer peripheral surface of the transporting belt **31**, the transporting belt **31** circularly moves. With this, the sheet P is transported in the +B direction.

Specifically, the transport path T includes a path T**1**, the path T**2**, a path T**3**, a path T**4**, and a path T**5**. The path T**1** extends from a position corresponding to the end of the third cassette **26** in the −Y direction to a nip center position N**1** of the roller pair **23**. The path T**2** extends from a position corresponding to the end of the second cassette **24** in the −Y direction, and merges with the path T**1** at a position upstream of the receiving roller pair **21**.

The path T**3** extends from the nip center position N**1** to a nip center position N**2** of the roller pair **25**. The path T**4** extends from a position corresponding to the end of the first cassette **22** in the −Y direction, and merges with the path T**3**. The path T**5** extends from the nip center position N**2** to a nip center position N**3** of the discharge roller pair **29** via the transporting belt **31** and the roller pair **27**.

The reverse unit **50** includes a reverse path R, four roller pairs **52**, and a motor, which is not illustrated. Further, the reverse unit **50** reverses the sides of the sheet P on which the line head **40** performs recording, and then feeds the sheet P to the transport path T again. The reverse path R is a path that includes a curve path R**4** and is coupled to an upstream part and a downstream part of the transport path T with respect to the line head **40**. The reverse path R includes a branch path R**1**, a switch back path R**2**, an upstream path R**3**, and the curve path R**4**. The branch path R**1** is branched from the path T**5** at a position in the +Z direction with respect to the roller pair **27**, and extends to a position in the −Y direction and the +Z direction. The switch back path R**2** extends from the end of the branch path R**1** in the +Z direction to a position in the +Y direction and the +Z direction.

The upstream path R**3** is positioned upstream of the curve path R**4**, which is described later, and downstream of the switch back path R**2** in the transport direction of the sheet P. The upstream path R**3** includes a vertical path part R**3**A and an inclined part R**3**B. The vertical path part R**3**A extends linearly in the −Z direction from a merging position of the branch path R**1** and the switch back path R**2**.

The curve path R**4** is positioned downstream of the upstream path R**3** in the transport direction of the sheet P. Specifically, the upstream end of the curve path R**4** is continuous with the lower end of the inclined part R**3**B in the −Z direction. The curve path R**4** is a path that is curved to be convex in the −Z direction as viewed in the +X direction. The curve path R**4** merges with the path T**3** at the nip center position N**1** of the roller pair **23**. The roller pair **23** is one example of a transport roller pair provided in the curve path R**4**. The roller pair **23** transports the sheet P along with rotation.

The feeding unit **60** includes a feeding tray **100** being a medium placing device, a feeding roller **64**, and a separating roller **66**. The feeding unit **60** includes a feeding path K in which the feeding roller **64** and the separating roller **66** are arranged. Further, the feeding unit **60** feeds the sheet P from the feeding tray **100** to the transport path T via the feeding path K.

The feeding path K is a path that extends from the feeding tray **100** to the transport path T, is coupled to the upstream part of the transport path T with respect to the line head **40**, and allows transport of the sheet P.

The feeding tray **100** in configured so that a plurality of sheets P can be placed thereon. The feeding roller **64** is arranged downstream of the feeding tray **100** in a feeding direction in which the sheet P is fed in the feeding path K, and is arranged above the feeding path K. The feeding roller **64** is rotated by a motor, which is not illustrated, and thus feeds the sheet P to the transport path T while being rotated.

The separating roller **66** is arranged downstream of the feeding tray **100** in a feeding direction in which the sheet P is fed in the feeding path K, and is arranged below the feeding path K. The separating roller **66** has a predetermined load in a rotation direction in which the sheet P is fed. With this, one sheet P is separated from the plurality of sheets P placed on the feeding tray **100**, and is fed. Note that a lift-up mechanism unit, which is not illustrated, for pushing the sheet P upward is provided between the feeding tray **100** and the separating roller **66**.

FIG. **2** is a perspective view illustrating a closed state of the feeding tray **100**. FIG. **3** is a perspective view illustrating an opened state of the feeding tray **100**. FIG. **3** illustrates a diagram in which a screw for fixing each configuration component of the feeding tray **100**, a hole portion for inserting a screw, and the like, are omitted. FIG. **4** is a perspective view of the feeding tray **100**.

A configuration of the feeding tray **100** is described.

As illustrated in FIG. **2** and FIG. **3**, the feeding tray **100** is provided so as to be displaceable between an opened state and a closed state with respect to the main body unit **12**. Note that, in the present exemplary embodiment, the opened state of the feeding tray **100** is referred to as a used state, hereafter. In the present exemplary embodiment, the closed state of the feeding tray **100** is referred to as an accommodated state, hereafter. The feeding tray **100** according to the present exemplary embodiment is arranged on the side surface of the main body unit **12** in the −Y direction at a lower part with respect to the center in the direction along the Z-axis.

As illustrated in FIG. **2**, when the feeding tray **100** is in the accommodated state, the feeding tray **100** is accommodated in the main body unit **12**. When the feeding tray **100** is in the accommodated state, the sheet P cannot be placed thereon, which corresponds to a non-used state in which the feeding tray **100** is not used. As illustrated in FIG. **3**, when the feeding tray **100** is in the used state, the feeding tray **100** is inclined with respect to the main body unit **12**. Thus in the used state, the plurality of sheets P can be placed thereon.

After FIG. **3**, for convenience of the description, a normal line direction of a placement surface **310** of the feeding tray **100**, which is described later, is regarded as a D direction (the arrow direction indicates a +D direction), and a direction in which the sheet P placed on the placement surface **310** is fed toward the main body unit **12** along the placement surface **310** is regarded as an E direction (the arrow direction indicates a +E direction). Thus, an orthogonal coordinate system indicated with D-E-X is newly given in illustration. Note that a direction opposite to the +E direction is regarded as the −E direction. A direction opposite to the +D direction is regarded as the −D direction. The +D direction is a

direction in which the sheet P is stacked, and corresponds to a height direction and a thickness direction on the feeding tray **100**.

As illustrated in FIG. **3** and FIG. **4**, the feeding tray **100** is generally formed into a plate-like shape, and hence the plurality of sheets P can be placed on the placement surface **310** of a placement unit **300** provided on a tray main body **200**. The placement surface **310** is formed into a substantially flat surface. As described later, placement surfaces **440** and **720** configured in other configuration units are also formed into substantially flat surfaces similar to the placement surface **310**, are formed as substantially continuous flat surfaces (flush surfaces), in other words, as substantially even horizontal surfaces, and allow placement of the plurality of sheets P together with the placement surface **310**. The tray main body **200** is formed into a rectangular shape in plan view from the +D direction.

In the main body unit **12**, a recess portion **12***a* recessed in an inward direction of the main body unit **12** is formed. When the feeding tray **100** is in the accommodated state (FIG. **2**), an outer surface **12***c* of the main body unit **12** and an outer surface **110** of the feeding tray **100** are formed as substantially continuous flat surfaces (flush surfaces).

The feeding tray **100** is configured to be openable and closable about a rotational movement shaft along the X-axis being a width direction between the accommodated state (FIG. **2**) and the used state (FIG. **3**). An end of the tray main body **200** in the −X direction and an end thereof in the +X direction is provided with a rod-like ling member **70** for coupling the feeding tray **100** and the main body unit **12**. One end of the link member **70**, which is coupled to the tray main body **200**, is coupled in a pivotable manner with the tray main body **200** about a rotational movement shaft **71** parallel to the X-axis. The other end of the link member **70**, which is coupled to the main body unit **12**, is engaged with a guide rail **72** provided to the main body unit **12**.

The guide rail **72** extends in the direction along the Z-axis, and the other end of the link member **70** moves along the guide rail **72**. Furthermore, the other end of the link member **70** abuts against the lower end of the guide rail **72**, and thus the position of the feeding tray **100** in the used state is regulated. In other words, in the used state, the link member **70** regulates an opening angle of the feeding tray **100** with respect to the main body unit **12**.

FIG. **5** is an exploded perspective view of the feeding tray **100**. Note that FIG. **5** is an exploded perspective view of main configuration units of the feeding tray **100**.

With reference to FIG. **4** and FIG. **5**, the configuration of the feeding tray **100** is described.

As illustrated in FIG. **4** and FIG. **5**, the feeding tray **100** is generally configured to include the tray main body **200**, the placement unit **300**, an edge guide **400** being a regulation unit, a displacement unit **500**, a detection unit **600**, a detection holding unit **700**, and an adjustment unit **800**.

The tray main body **200** functions as an exterior of the feeding tray **100** and a base member that receives the respective configuration units.

The placement unit **300** functions as a frame for placing the sheet P being a medium and providing each of the configuration units at a predetermined portion.

The edge guide **400** regulates movement of the sheet P, which is placed on the placement unit **300**, in a first direction. Note that, in the present exemplary embodiment, the first direction is the width direction of the sheet P, and corresponds to the X direction.

The displacement unit **500** is a configuration unit that holds the edge guide **400** in a movable manner in the first direction. The detection unit **600** is a configuration unit that detects a position of the edge guide **400** in the first direction.

The detection holding unit **700** is a configuration unit that holds the detection unit **600**.

The adjustment unit **800** is a configuration unit capable of adjusting positions of the edge guide **400**, the displacement unit **500**, and the detection unit **600** in the first direction.

An outline of an assembly of the feeding tray **100** is described.

First, the adjustment unit **800** is provided at a predetermined position on an inner surface of the tray main body **200** using the tray main body **200** as a base member. The adjustment unit **800** is formed of a pinion holding portion **810** and a fixing portion **850** for the detection unit, which are continuous in a plate-like shape. Note that the pinion holding portion **810** holds a pinion **530** of the displacement unit **500** via a fixing pin **820** provided by crimping. Specifically, the pinion holding portion **810** guides the pinion **530** in a slidable manner to the outer peripheral of the fixing pin **820**, and holds the pinion **530** in a freely pivotable manner. The fixing portion **850** for the detection unit fixes a printed wired board **630** being a position detection portion of the detection unit **600**.

Next, the placement unit **300** is provided using the tray main body **200** as a base member. With a reference position, which is not illustrated, formed in the tray main body **200** as a reference, the placement unit **300** is provided on the inner surface of the tray main body **200**.

Note that, when the placement unit **300** is provided on the tray main body **200**, both ends of the extension member **150** in the X direction are engaged with an opening portion **360** for the extension member, which is formed at the end of the placement unit **300** in the −E direction, and an accommodation portion **350** for the extension member, which is formed on the inner surface side along the +E direction from both the ends of the opening portion **360** for the extension member in the X direction. With this, the extension member **150** is accommodated. Furthermore, the placement unit **300** in this state is provided on the tray main body **200**. When the placement unit **300** accommodating the extension member **150** is provided on the tray main body **200**, the lower surface of the extension member **150** is guided to a rib **240** of the tray main body **200** for guiding the extension member, slides along the accommodation portion **350** for the extension member, and thus can extend in the −E direction from the opening portion **360** for the extension member and an opening portion **250** for the extension member, which is formed in the tray main body **200**.

When, in the used state of the feeding tray **100**, the extension member **150** accommodated in the tray main body **200** and the placement unit **300** is drawn out and extended in the −E direction, the sheet P can be supported in a stable state in accordance with a size of the sheet P to be placed. When, in the accommodated state of the feeding tray **100**, the extension member **150** is contracted in the +E direction and accommodated in the tray main body **200** and the placement unit **300**, the feeding tray **100** and the recording apparatus **10** can be reduced in size.

When the placement unit **300** is provided on the tray main body **200**, a plurality of fixing screw hole portions **380** formed in the placement unit **300** are positioned on an upper surface of dowels **210** for fixing the placement unit, which are correspondingly formed on the tray main body **200**. When the placement unit **300** is provided on the tray main body **200**, a screw hole portion **320** for fixing the adjustment

unit, which is formed in the placement unit **300**, is positioned on the upper surface of the fixing pin **820** of the adjustment unit **800**.

Next, the edge guides **400** are provided on the tray main body **200** and the placement unit **300**.

A configuration of the edge guides **400** is described below.

The edge guides **400** include a first edge guide **410** and a second edge guide **450**. The first edge guide **410** is a first regulation member that regulates a first edge of the sheet P in the first direction, and the second edge guide **450** is a second regulation member that regulates a second edge of the sheet P in the first direction, which is opposite to the first edge. Note that the first edge of the sheet P in the first direction is an end surface (side surface) of the sheet P in the +X direction. The second edge of the sheet P in the first direction, which is opposite to the first edge, is an end surface (side surface) of the sheet P in the −X direction.

The first edge guide **410** and the second edge guide **450** are configured to be substantially symmetric to each other with respect to the transport direction (the +E direction). The edge guides **400** (the first edge guide **410** and the second edge guide **450**) are plate-like members, and are arranged to extend along the transport direction of the sheet P (the +E direction). The edge guides **400** are provided at the −X side and the +X side of the tray main body **200**, and interlock with the displacement unit **500** (the pinion **530**, a first rack portion **510**, and a second rack portion **520** that are described later). Thus, the edge guides **400** are movable in the opposite directions along the direction along the X-axis. The pair of edge guides **400** (the first edge guide **410** and the second edge guide **450**) move in the opposite directions so as to correspond to various sizes of the placed sheet P in the width direction.

The first edge guide **410** and the second edge guide **450** are configured in a substantially similar manner. Thus, a configuration of the first edge guide **410** provided in the +X direction is described, and the second edge guide **450** is described while focusing on a difference between the configurations.

The first edge guide **410** includes a fixing portion **420**, a movable portion **430**, and the placement surface **440**. The movable portion **430** has a plate-like shape, and is configured to be pivotable between a posture of laying down in the +X direction along the placement surface **440** in the accommodated state and a posture of standing up with respect to the placement surface **440** in the used state (FIG. **3** and FIG. **5**). A flat surface **431** is provided to the movable portion **430** in the −X direction in the used state. The flat surface **431** is a surface substantially vertical to the placement surface **440**. The side surface (the first edge) of the sheet P in the width direction can be regulated by the flat surface **431**.

The fixing portion **420** has a plate-like shape, and is fixed at a posture of standing up with respect to the placement surface **440**. The fixing portion **420** is a portion that is brought into contact with a hand of a user at the time of moving the first edge guide **410** in the direction along the X-axis. A flat surface **421** is provided to the fixing portion **420** in the −X direction. The flat surface **421** is a surface substantially vertical to the placement surface **440**. The flat surface **421** regulates the side surface (the first edge) of the sheet P in the width direction. In other words, the flat surface **421** of the fixing portion **420** and the flat surface **431** of the movable portion **430** are formed continuously with each other along the transport direction of the sheet P, and the flat surface **421** and the flat surface **431** regulate the side surface (the first edge) of the sheet P in the width direction.

The first rack portion **510** is formed at the first edge guide **410**, and extends from the placement surface **440** in the −X direction on the lower side of the placement surface **440**. The first rack portion **510** forms the displacement unit **500**, and includes a first flat plate portion **511** and a first rack **512**. The first flat plate portion **511** has a flat plate-like shape extending in the −X direction, and the first rack **512** is formed along the edge end of the first flat plate portion **511** in the +E direction (along the X direction) on the lower side (on the back surface side) of the first flat plate portion **511**.

A plate metal holding portion **620** extending in the −E direction is fixed to the lower side of the first flat plate portion **511** in the −D direction. Note that the first flat plate portion **511** and the plate metal holding portion **620** may be integrally formed. The plate metal holding portion **620** forms the detection unit **600**, and a plate metal **610** being a detected portion is fixed to the upper surface of the edge end of the plate metal holding portion **620** in the −E direction.

The second edge guide **450** is provided with the second rack portion **520** correspondingly to the first rack portion **510** of the first edge guide **410**, and the second rack portion **520** is provided with a second flat plate portion **521** and a second rack **522** correspondingly to the first flat plate portion **511** and the first rack **512**. The second rack portion **520** forms the displacement unit **500** in a similar manner to the first rack portion **510**.

The first edge guide **410** thus configured is inserted or the like inside through a first opening portion **331** of an opening portion **330** for the regulation unit, which is formed in the placement unit **300**, and thus is provided in the tray main body **200**. Note that, as another installation method, the first edge guide **410** may be divided into a configuration unit provided in the upper direction (the +D direction) with respect to the placement unit **300** and a configuration unit provided inside the placement unit **300**, while regarding the placement unit **300** as a reference, and thus may be provided on the tray main body **200**. In a similar manner to the first edge guide **410**, the second edge guide **450** is also inserted or the like inside through a second opening portion **332** of the opening portion **330** for the regulation unit, which is formed in the placement unit **300**, and thus is provided in the tray main body **200**. The second edge guide **450** may be divided into a configuration unit provided in the upper direction (the +D direction) with respect to the placement unit **300** and a configuration unit provided inside the placement unit **300**, while regarding the placement unit **300** as a reference, and thus may be provided on the tray main body **200**.

The edge guide **400** is provided, and thus the pinion **530** of the displacement unit **500** is meshed with the second rack **522** of the displacement unit **500** provided to the second edge guide **450** in the +E direction. The pinion **530** is meshed with the first rack **512** of the displacement unit **500** provided to the first edge guide **410** in the −E direction. Note that, as the displacement unit **500** in the present exemplary embodiment, a so-called rack pinion mechanism is used, and has a configuration in which both the racks move with respect to the center in the opposite directions with the pinion as a center. With this assembly, the displacement unit **500** is configured.

When the first edge guide **410** and the placement unit **300** are assembled in the tray main body **200**, the plate metal holding portion **620** and the plate metal **610** of the detection unit **600** are exposed through the opening portion **340** for the detection unit, which is formed in the placement unit **300**. A fixing cutout portion **860** formed in the fixing portion **850** for

the detection unit, which is provided to the initially provided adjustment unit **800** is exposed through the opening portion **340** for the detection unit.

Next, the detection holding unit **700** is provided on the tray main body **200** on which the placement unit **300** is provided. A configuration of the detection holding unit **700** is described below.

The detection holding unit **700** is a member that holds the printed wired board **630** being a position detection portion of the detection unit **600**. The detection holding unit **700** has a rectangular plate-like shape extending in the X direction, and includes a holding unit main body **710** that is formed to be opened in the −D direction. One screw hole portion **730** for holding the detection unit is formed in each of the edge ends of the holding unit main body **710** in the X direction.

The printed wired board **630** is held on the inner peripheral surface of the holding unit main body **710** in the −D direction under a state in which both the ends thereof in the X direction are sandwiched between the screw hole portions **730** for holding the detection unit. Note that a circuit pattern is formed on the surface of the printed wired board **630** in the −D direction so as to detect a size of the sheet P in the width direction. A plate member **750** (FIG. **6**) having a protrusion portion **751** (FIG. **6**) protruding in the −D direction is provided on the inner peripheral surface of the holding unit main body **710**.

The detection holding unit **700** thus configured is inserted from above through the opening portion **340** for the detection unit, which is formed in the placement unit **300**. When the detection holding unit **700** is inserted through the opening portion **340** for the detection unit, the plate metal **610** being a detected portion abuts against the circuit pattern of the printed wired board **630** being a position detection portion.

Note that, when the first edge guide **410** is provided, the plate metal **610** is provided so as to be positioned at a set initial position. Furthermore, when the detection holding unit **700** is inserted through the opening portion **340** for the detection unit, the plate metal **610** is positioned at the initial position that is set on the printed wired board **630**. When the detection holding unit **700** is inserted through the opening portion **340** for the detection unit, the protrusion portion **751** of the detection holding unit **700** is engaged with the fixing cutout portion **860**.

When the main configuration units are assembled to the tray main body **200** as described above, screws S**3** are finally inserted through the plurality of fixing screw hole portions **380** of the placement unit **300**, and are threaded with the dowels **210** for fixing the placement unit. With this, the placement unit **300** is fixed to the tray main body **200**. The screw S**1** is inserted through the screw hole portion **320** for fixing the adjustment unit, which is formed in the placement unit **300**, and is threaded with the fixing pin **820** of the adjustment unit **800**. With this, the adjustment unit **800** is fixed with respect to the placement unit **300**.

Screws S**2** are inserted through the screw hole portions **730** for holding the detection unit, which are formed in the detection holding unit **700** (the holding unit main body **710**), and are threaded with dowels **220** for holding the detection unit. With this, the tray main body **200** holds the detection holding unit **700**. Note that, when the detection holding unit **700** is threaded with the dowels **220** for holding the detection unit by using the screws S**2**, the top surfaces of the dowels **220** for holding the detection unit protrude upward with respect to a holding portion **731** of the detection holding unit **700**, which is sandwiched between the screws S**2**. The holding portion **731** is described later. Thus, when the screws S**2** are threaded, the holding portion **731** is not fixed by abutting against the top surfaces of the dowels **220** for holding the detection unit.

When the detection holding unit **700** (the holding unit main body **710**) is provided on the tray main body **200**, an upper surface being an external surface of the holding unit main body **710** forms the placement surface **720** on which the sheet P is placed, together with the placement surface **310** of the placement unit **300**. Note that the placement surface **720** corresponds to a first surface of the detection holding unit **700**.

The respective configuration units are assembled as described above. With this, the feeding tray **100** is completed.

The functions and operations of each of the configuration units in the present exemplary embodiment are described below.

In the drawings given hereinafter, it is assumed that the respective configuration units of the feeding tray **100** are assembled, and functions and operations of each of the configuration units are described. Thus, for convenience, a relevant configuration unit is extracted in illustration, and an irrelevant configuration unit is omitted in illustration in some cases.

FIG. **6** is a perspective view illustrating the adjustment unit **800** (the pinion holding portion **810** and the fixing portion **850** for the detection unit), the displacement unit **500** (the pinion **530**), and the detection holding unit **700** (the holding unit main body **710** and the plate member **750**) that are provided on the tray main body **200**. FIG. **6** is a perspective view as viewed obliquely from above.

As illustrated in FIG. **6**, the pinion **530** is guided to the outer periphery of the fixing pin **820** of the pinion holding portion **810** in a freely pivotable manner. The protrusion portion **751** formed on the plate member **750** of the detection holding unit **700** is inserted from above and engaged with the fixing cutout portion **860** of the fixing portion **850** for the detection unit. The protrusion portion **751** is engaged with the fixing cutout portion **860**. With this, the fixing portion **850** for the detection unit, which is provided to the adjustment unit **800**, and the detection holding unit **700**, which holds the printed wired board **630** of the detection unit **600**, are fixed to each other. Furthermore, when the fixing portion **850** for the detection unit moves in the X direction, the detection holding unit **700** also moves in the X direction in an interlocking manner.

In other words, the adjustment unit **800** (the fixing cutout portion **860** of the fixing portion **850** for the detection unit) is engaged with the detection holding unit **700** (the protrusion portion **751**), and the detection holding unit **700** interlocks with an operation of the adjustment unit **800**. Note that a configuration in which the detection holding unit **700** moves in the X direction in interlocking with the adjustment unit **800** is described below in detail.

FIG. **7** is a plan view illustrating the adjustment unit **800**, the displacement unit **500**, the detection unit **600**, and the detection holding unit **700**. Note that FIG. **7** is a plan view as viewed from below. FIG. **8** is a cross-sectional view illustrating the detection unit **600** (the plate metal **610**, and the printed wired board **630**), the displacement unit **500** (the pinion **530** and the first rack **512**), the placement unit **300** (the placement surface **310**, the opening portion **340** for the detection unit), and the adjustment unit **800** (the pinion holding portion **810**, the fixing portion **850** for the detection unit). FIG. **8** is a cross-sectional view taken along the line A-A in FIG. **4**.

As illustrated in FIG. **7** and FIG. **8**, with the pinion **530** guided to the outer periphery of the fixing pin **820** in a freely pivotable manner, the first rack **512** of the first rack portion **510**, which extends in the X direction, is meshed in the −E direction, and the second rack **522** of the second rack portion **520**, which extends in the X direction, is meshed in the +E direction. Thus, for example, when a user grips the fixing portion **420** of the first edge guide **410**, and moves the first edge guide **410** in the direction along the X-axis, the second edge guide **450** moves accordingly in a direction opposite to the first edge guide **410** via the pinion **530**.

In other words, the displacement unit **500** (the first rack **512**, the second rack **522**, and the pinion **530**) moves the first regulation member (the first edge guide **410**) and the second regulation member (the second edge guide **450**) in the directions opposite to each other along the first direction (the width direction of the sheet P: the X direction).

The plate metal **610** that is held by the plate metal holding portion **620** fixed to the lower surface of the first flat plate portion **511** is positioned at the lower surface of the printed wired board **630** held by the holding unit main body **710**. Note that the printed wired board **630** is fixed by a hooking structure using elastic deformation of a board fixing portion **740** that is formed to protrude downward of the holding unit main body **710**.

A plurality of circuit patterns corresponding to sheet sizes are formed on the printed wired board **630** so as to detect a size of the sheet P in the width direction (for example, A4 size or B5 size). Note that the circuit patterns are formed on the lower surface of the printed wired board **630**. The plate metal **610** (specifically, a plurality of abutting terminals of the plate metal **610**) abuts against the circuit patterns from below so as to traverse in the E direction, and thus the printed wired board **630** is short-circuited.

Note that the plate metal **610** moves in the X direction in interlocking with the first edge guide **410**. With this, the position of the abutting terminal that abuts against the circuit patterns moves while sliding, and is brought into contact with different positions of the circuit patterns (short-circuit). Furthermore, based on a combination of the circuit patterns that are short-circuited in the traverse direction (the E direction) and are read by a sensor or the like, which is not illustrated, the sheet size is detected. Note that, when the sheet size is detected, it can also be said that the printed wired board **630** being a position detection portion detects a position of the plate metal **610** being a detected portion in the width direction of the sheet P.

As illustrated in FIG. **8**, the detection unit **600** (the plate metal **610** and the printed wired board **630**) are provided between the placement unit **300** (specifically, the placement surface **310** being an upper surface of the placement unit **300**) and the adjustment unit **800** (specifically, the pinion holding portion **810** and a lower surface **870** of the fixing portion **850** for the detection unit).

As illustrated in FIG. **8**, the detection unit **600** (the plate metal **610** and the printed wired board **630**) overlaps with the displacement unit **500** (the pinion **530**, the first rack **512**, and the first rack portion **510**) in the D direction being a stacking direction of the sheet P.

FIG. **9** is a perspective view illustrating a state taken along the X-D plane with the pinion **530** as a center. With reference to FIG. **9**, description is made on a position adjustment method in which the adjustment unit **800** adjusts positions of the edge guide **400** being a regulation unit, the displacement unit **500**, and the detection unit **600**. Note that FIG. **9** does not illustrate the edge guide **400** and the detection unit **600**.

As the position adjustment method, in the present exemplary embodiment, the placement unit **300** provided on the feeding tray **100** is regarded as a reference, and adjustment is performed by moving the adjustment unit **800** with respect to the placement unit **300**. With this, basic positioning of the edge guide **400**, the displacement unit **500**, the detection unit **600**, and also the adjustment unit **800** is performed. Note that it is assumed that the placement unit **300** is fixed to the tray main body **200** and that the position thereof on the side close to the main body unit **12** is adjusted.

In the position adjustment method, the adjustment unit **800** performs adjustment in the X direction in accordance with a deviation amount of the sheet position in the X direction on the side close to the main body unit **12**. Specifically, the movement amount of the adjustment unit **800** is determined by a deviation amount of the sheet position in the X direction with respect to the position of the recording unit (the line head **40**) on the side close to the main body unit **12**. Thus, the adjustment unit **800** moves in accordance with the deviation amount.

Here, a fixing portion **321** is formed in a one-stage lower area of the screw hole portion **320** for fixing the adjustment unit. A hole portion **322** is formed in the fixing portion **321**. The hole portion **322** has an elliptical shape having the X direction as a longitudinal direction and the E direction as a transverse direction. The screw S**1** is inserted through the hole portion **322**.

Furthermore, when the adjustment unit **800** moves, threading between the screw S**1** and the fixing pin **820** is loosened first, as illustrated in FIG. **9**. With this, fixing of the fixing portion **321** sandwiched between the screw S**1** and the fixing pin **820** is loosened.

With this, the screw S**1** threaded with the fixing pin **820** can move in the X direction (the longitudinal direction of the hole portion **322**). The screw S**1** moves to the X direction, so that the adjustment unit **800** (the pinion holding portion **810** and the fixing portion **850** for the detection unit) moves in an interlocking manner. Note that, when the adjustment unit **800** moves, the protrusion portion **751** of the detection holding unit **700** engaged with the fixing cutout portion **860** of the adjustment unit **800** (the fixing portion **850** for the detection unit) moves in an interlocking manner. Therefore, when the screw S**1** moves in the X direction, the detection holding unit **700** moves in an interlocking manner.

When the screw S**1** moves in the X direction, the pinion holding portion **810** moves in the X direction in an interlocking manner. Thus, the pinion **530** held by the pinion holding portion **810** (the fixing pin **820**) also moves in the X direction. With this operation, the first rack **512** and the second rack **522** that are meshed with the pinion **530** interlock with each other, and move in the X direction. Thus, the first edge guide **410** and the second edge guide **450** also follows and moves in the X direction.

Note that, as illustrated in FIG. **9**, a scale portion **830** that indicates a moving amount at the time of moving is formed on the pinion holding portion **810** by protruding one stage. In the present exemplary embodiment, the upper surface of the scale portion **830** has a plurality of scales **831** that are formed as streaks along the E direction and formed at an interval of 1 mm in the X direction.

A scale window portion **370** through which the scale portion **830** is exposed is formed in the placement unit **300** above the scale portion **830**. An indication portion **371** is formed on the center position of the scale window portion **370** in the X direction. The indication portion **371** extends in

a triangular shape indicating a position of the scales **831** at the time of adjustment, by pointing to the center of the scale window portion **370**.

For example, description is made on a case in which the adjustment unit **800** moves in the +X direction by 2 mm. In this case, the scales **831** exposed through the scale window portion **370** and the indication portion **371** are viewed in the +D direction. Then, the scales **831** move in the +X direction by 2 mm (**2** scales) in consideration of, for example, a difference between a position of the scale portion **830**, which is currently indicated by the indication portion **371**, and a position of the scales **831** (streaks). With the adjustment method described above, the adjustment unit **800** is capable of adjusting positions of the edge guide **400**, the displacement unit **500**, and the detection unit **600**.

Note that, after the adjustment unit **800** completes position adjustment, the screw S**1** is threaded with the fixing pin **820** again. With this, the fixing portion **321** positioned between the fixing pin **820** and the screw S**1** is sandwiched in the transverse direction, and is fixed. With this, the edge guide **400**, the displacement unit **500**, and the detection unit **600** for which the adjustment unit **800** completes adjustment can be fixed with respect to the placement unit **300** being a reference.

FIG. **10** is a cross-sectional view illustrating the detection holding unit **700** (the screw hole portion **730** for holding the detection unit), the tray main body **200** (the dowel **220** for holding the detection unit), and the screw S**2**. FIG. **10** is a cross-sectional view taken along the line B-B in FIG. **4**.

With reference to FIG. **10**, description is made on holding of the detection holding unit **700** with the screw S**2**.

In the present exemplary embodiment, the screw hole portion **730** for holding the detection unit (specifically, the holding portion **731** described later) of the detection holding unit **700** is not completely fixed to the dowel **220** for holding the detection unit with the screw S**2**. In the present exemplary embodiment, the screw S**2** is threaded with the dowel **220** for holding the detection unit for the purpose of preventing the detection holding unit **700** from floating and the purpose of holding the position.

The holding portion **731** is formed in a one-stage lower area of the screw hole portion **730** for holding the detection unit, which is formed in the detection holding unit **700**. A hole portion **732** is formed in the holding portion **731**. The hole portion **732** has an elliptical shape having the X direction as a longitudinal direction and the E direction as a transverse direction. The screw S**2** is inserted through the hole portion **732**. A holding rib **221** is formed at the dowel **220** for holding the detection unit, at a one-stage lower position from the top surface of the dowel **220** for holding the detection unit. The holding rib **221** is in contact with the side surfaces of the dowel **220** for holding the detection unit in the +E direction and the −E direction, and extends in the X direction.

The length of the holding rib **221** in the X direction is formed to be longer than the diameter of the hole portion **732** in the transverse direction. The position of the top surface of the dowel **220** for holding the detection unit substantially matches with the position of the upper surface of the holding portion **731**. Furthermore, the position of the top surface of the holding rib **221** is formed below a lower surface **733** of the holding portion **731**. Therefore, when the screw S**2** is inserted through the hole portion **732** of the holding portion **731** and is threaded with the dowel **220** for holding the detection unit, and a head portion S**2***a* of the screw S**2** abuts against the top surface of the dowel **220** for holding the detection unit, a gap G is formed between the lower surface **733** of the holding portion **731** and the top surface of the holding rib **221**.

The upper surface of the holding portion **731** in the transverse direction of the hole portion **732** abuts against the head portion S**2***a* of the screw S**2**, and hence is regulated from moving upward. With this, the detection holding unit **700** can be prevented from floating upward.

The gap G is formed, and hence the holding portion **731** is not fixed by the screw S**2**. Thus, the detection holding unit **700** is capable of moving in the X direction being the longitudinal direction of the hole portion **732**. Note that the other screw hole portion **730** for holding the detection unit is configured similarly. Therefore, when the screw S**1** moves in the X direction at the time of positioning, the detection holding unit **700** moves in the X direction in an interlocking manner. Note that, when the detection holding unit **700** is pressed from above, a downward movement amount can be suppressed by setting the gap G to be small.

Note that, in the present exemplary embodiment, threading between the screw S**2** of the screw hole portion **730** for holding the detection unit and the dowel **220** for holding the detection unit is released, so that the detection holding unit **700** can be removed upward from the side close to the placement surface **720**. With this, the detection unit **600** (the printed wired board **630**) and the detection holding unit **700** are integrally formed, and are detachably provided to the placement unit **300** from the side close to the placement surface **720** being the first surface side.

FIG. **11** is a cross-sectional view illustrating an end **711** of the detection holding unit **700** (the holding unit main body **710**) in the −X direction. FIG. **11** is a cross-sectional view taken along the line C-C in FIG. **4**.

With reference to FIG. **11**, description is made on a prevention mechanism of a planar gap between the end **711** of the holding unit main body **710** in the −X direction and the placement unit **300**. Note that a prevention mechanism of a planar gap between the end of the holding unit main body **710** in the +X direction and the placement unit **300** is similar to the prevention mechanism of the planar gap between the end **711** of the holding unit main body **710** in the −X direction and the placement unit **300**. Thus, description therefor is omitted.

As described above, the detection holding unit **700** in the present exemplary embodiment moves in the X direction in interlocking with movement of the adjustment unit **800**. As illustrated in FIG. **11**, a reception portion **390** is formed at the placement unit **300**. The reception portion **390** receives the end **711** of the holding unit main body **710** in the −X direction. The reception portion **390** is recessed one stage from the placement surface **310**, and a lower surface **712** of the end **711** and a reception surface **391** of the reception portion **390** are formed at such positions that a gap is formed therebetween in a cross-sectional manner.

The reception portion **390** is formed to have a width dimension of the opening portion **340** for the detection unit in the E direction, in a planar manner. The reception portion **390** is formed to have, in the X direction, such a length that an end surface **713** of the end **711** does not abut against an end surface **392** of the reception portion **390** in the −X direction (in other words, such a length that a gap is formed) when the end **711** moves in the −X direction, in a planar manner. The reception portion **390** is formed to have, in the X direction, such a length that the reception surface **391** of the reception portion **390** and the lower surface **712** of the end **711** overlap with each other in plan view, when the end **711** moves in the +X direction, in a planar manner. Note that

the configuration described above is also applied similarly in the +X direction of the holding unit main body **710**.

With the configuration described above, when the detection holding unit **700** (the holding unit main body **710**) moves in the X direction, the lower surface **712** of the holding unit main body **710** (the end **711**) slides on the reception surface **391** of the reception portion **390**, and moves. In this case, when the detection holding unit **700** (the holding unit main body **710**) moves by a maximum amount within a movement range thereof, both the ends **711** of the holding unit main body **710** in the X direction also overlap with the reception portion **390** of the placement unit **300** in the X direction (the width direction of the sheet P) as viewed from above. Thus, a planar gap is not formed.

In other words, the placement unit **300** has the reception portion **390** being a region overlapping with the end **711** of the holding unit main body **710** in the width direction of the sheet P in plan view from the +D direction. Thus, even when the detection holding unit **700** moves, a planar gap is not formed.

FIG. **12** is a plan view illustrating the marking portion **760** of the detection holding unit **700**.

With reference to FIG. **12**, the marking portion **760** provided to the detection holding unit **700** is described.

The marking portion **760** in the present exemplary embodiment is formed on the placement surface **720** being the first surface of the holding unit main body **710** of the detection holding unit **700**. In the present exemplary embodiment, as indicated with the two-dot chain line in FIG. **12**, the marking portion **760** is formed in a region surrounded by the two screw hole portions **730** for holding the detection unit, which are formed in the X direction.

Note that the marking portion **760** is a portion indicating a sheet edge surface position according to various sizes of the sheet P in the width direction and a position of the edge guide **400**. The marking method may include engraving, printing, etching, and the like on the placement surface **720**. The marking method may include affixing of a printed sheet.

According to the present exemplary embodiment, the following effects can be exerted.

The feeding tray **100** being the medium placing device according to the present exemplary embodiment includes the placement unit **300** on which the medium (the sheet P) is placed, the edge guide **400** being a regulation unit that regulates movement of the sheet P, which is placed on the placement unit **300**, in the first direction (the width direction of the sheet P), and the displacement unit **500** that holds the edge guide **400** in a movable manner in the width direction of the sheet P. The feeding tray **100** includes the detection unit **600** that detects a position of the edge guide **400** in the width direction of the sheet P and the adjustment unit **800** capable of adjusting positions of the edge guide **400**, the displacement unit **500**, and the detection unit **600** in the width direction of the sheet P. Furthermore, the edge guide **400** includes the first regulation member (the first edge guide **410**) that regulates the edge surface of the sheet P in the +X direction, which is the first edge of the sheet P in the width direction, and the second regulation member (the second edge guide **450**) that regulates the edge surface of the sheet P in the −X direction, which is the second edge of the sheet P in the width direction and is opposite to the first edge. The displacement unit **500** is capable of moving the first edge guide **410** and the second edge guide **450** in the directions opposite to each other along the width direction of the sheet P. The detection unit **600** is provided between the placement unit **300** and the adjustment unit **800**.

With this configuration, the detection unit **600** is provided between the placement unit **300** and the adjustment unit **800**, specifically, between the placement surface **310** of the placement unit **300** and the lower surface **870** of the adjustment unit **800** (the fixing portion **850** for the detection unit), and hence the dimension of the feeding tray **100** in the stacking direction of the sheet P (the height direction) can be suppressed.

In the feeding tray **100** according to the present exemplary embodiment, the detection unit **600** (the plate metal **610** and the printed wired board **630**) overlaps with the displacement unit **500** (the pinion **530**, the first rack **512**, and the first rack portion **510**) in the D direction being the stacking direction of the sheet P.

With this configuration, the dimension of the feeding tray **100** in the stacking direction can be suppressed.

In the feeding tray **100** according to the present exemplary embodiment, the detection unit **600** includes the plate metal **610** being the detected portion that is provided to the edge guide **400** being the regulation unit and interlocks with the edge guide **400** and the printed wired board **630** being the position detection portion that detects a position of the plate metal **610** in the width direction of the sheet P.

With this configuration, the position detection portion (the printed wired board **630**) detects a position of the detected portion (the plate metal **610**) interlocking with the regulation unit (the edge guide **400**). Thus, a position of the edge guide **400** can be detected with a simple configuration. The detection unit **600** performs detection with a combination of the position detection portion (the printed wired board **630**) and the detected portion (the plate metal **610**) interlocking with the edge guide **400**. Thus, various detection methods may be used.

In the feeding tray **100** according to the present exemplary embodiment, the detection unit **600** detects a position of the regulation unit (the edge guide **400**) by bringing the detected portion (the plate metal **610**) into contact with different positions of the position detection portion (the printed wired board **630**).

With this configuration, the detection unit **600** functions as a contact-type sensor in which the detected portion (the plate metal **610**) is brought into contact with different positions of the position detection portion (the printed wired board **630**) thereby detecting a position of the detected portion (the plate metal **610**). With this, an interval between the detected portion (the plate metal **610**) and the position detection portion (the printed wired board **630**) can be reduced, and the dimension in the stacking direction can further be reduced.

The feeding tray **100** according to the present exemplary embodiment includes the detection holding unit **700** that holds the detection unit **600** and has the placement surface **720** being the first surface. Furthermore, the placement surface **720** forms a placement surface on which the sheet P is placed, together with the placement surface **310** of the placement unit **300**.

With this configuration, the placement surface **720** being the first surface that holds the detection unit **600** (the printed wired board **630**) is used as part of the placement surface together with the placement surface **310**. Thus, the dimension in the stacking direction can be suppressed by the thickness of the first surface (the placement surface **720**).

In the feeding tray **100** according to the present exemplary embodiment, the detection holding unit **700** includes the marking portion **760** on the placement surface **720** being the first surface.

With this configuration, the detection holding unit **700** includes the mark on the first surface forming the placement surface **720**, and the mark indicates a sheet edge surface position corresponding to various sizes of the sheet P in the width direction and a position of the regulation unit (the edge guide **400**), for example. Thus, when the sheet P is placed, the mark can be used as a reference for moving the edge guide **400**. When the adjustment unit **800** adjusts the position of the edge guide **400**, the detection holding unit **700** has a configuration of moving together with the edge guide **400**, and hence deviation of the position of the edge guide **400** from the position of the mark can be suppressed.

In the feeding tray **100** according to the present exemplary embodiment, the detection unit **600** (the printed wired board **630**) and the detection holding unit **700** are integrally formed, and are detachably provided to the placement unit **300** from the side close to the placement surface **720** being the first surface.

With this configuration, for example, when the detection unit **600** (the printed wired board **630**) and the detection holding unit **700** are assembled to or removed from the feeding tray **100**, the assemble and removal can be performed from the side close to the placement surface **720**. Thus, assemble and removal workability can be improved. With this configuration, assembly workability and maintenance workability are improved.

In the feeding tray **100** according to the present exemplary embodiment, the adjustment unit **800** (the fixing cutout portion **860**) is engaged with the detection holding unit **700** (the protrusion portion **751**), and the detection holding unit **700** interlocks with the operation of the adjustment unit **800**.

With this configuration, the adjustment unit **800** interlocks with the detection holding unit **700**, and an operation of the adjustment unit **800** and the detection holding unit **700** are in an interlocking relationship. With this simple configuration, when the position of the regulation unit (the edge guide **400**) is adjusted, the position of the detection unit **600** (the printed wired board **630**) can be adjusted by moving the detection unit **600** (the printed wired board **630**) held by the detection holding unit **700**. In particular, in a configuration in which the detection unit **600** (the printed wired board **630**) is detachably assembled, replacement of the detection unit **600** (the printed wired board **630**) is more facilitated than a case in which the adjustment unit **800** and the detection holding unit **700** are integrally formed, instead of engaging the both units with each other.

In the feeding tray **100** according to the present exemplary embodiment, the detection holding unit **700** (the end **711** of the holding unit main body **710**) has the region (the reception portion **390**) that overlaps with the placement unit **300** in the first direction (the width direction of the sheet P) as viewed in top view (in plan view from the +D direction). Note that, when the adjustment unit **800** adjusts the position of the regulation unit (the edge guide **400**), the detection holding unit **700** that holds the detection unit **600** (the printed wired board **630**) also moves. Thus, it is required to secure the movement range of the detection holding unit **700** in the placement unit **300**. Thus, with the above-mentioned configuration, within the movement range of the detection holding unit **700**, the end **711** of the detection holding unit **700** and the reception portion **390** of the placement unit **300** overlap with each other in the first direction. With this, even when the detection holding unit **700** moves, a planar gap in the first direction can be prevented. Thus, a foreign matter can be prevented from entering the feeding tray **100**, and designability of the feeding tray **100** can be improved.

The recording apparatus **10** according to the present exemplary embodiment includes the feeding tray **100** described above and a printing unit (the line head **40**) that performs recording onto the sheet P placed on the feeding tray **100**.

With this configuration, the recording apparatus **10** includes the feeding tray **100** in which the dimension in the stacking direction is suppressed. Thus, the recording apparatus can be reduced in size.

In the recording apparatus **10** according to the present exemplary embodiment, the feeding tray **100** is displaceable between the used state in which the sheet P is able to be stacked and the accommodated state in which the sheet P is not able to be stacked.

With this configuration, the feeding tray **100** is displaceable between the used state and the accommodated state, and hence the recording apparatus **10** can be reduced in size during the accommodated state in which the feeding tray **100** is not used. In particular, when, in the recording apparatus **10**, the feeding tray **100** is provided to a side surface as a multi-purpose (MP) tray, that is, a so-called manual feed tray, the dimension of the recording apparatus **10** in the side surface direction can be suppressed particularly at the time of accommodation.

2. First Modification Example

In the present exemplary embodiment, the entirety of the detection unit **600** (the plate metal **610** and the printed wired board **630**) substantially overlaps with the displacement unit **500** (the pinion **530**, the first rack **512**, and the first rack portion **510**) in the D direction being the stacking direction of the sheet P. However, the present exemplary embodiment is not limited thereto, and both the units may partially overlap with each other in the stacking direction.

3. Second Modification Example

In the present exemplary embodiment, the feeding tray **100** is described as one example of a multi-purpose (MP) tray, that is, a so-called manual feed tray. However, the present exemplary embodiment is not limited thereto, and the feeding tray **100** is applicable to a sheet cassette having a function similar to that of the sheet cassette **16** in the present exemplary embodiment, a document tray having an automatic document feeding (ADF) function, and the like.

4. Third Modification Example

In the present exemplary embodiment, when the detection unit **600** detects a sheet size, the circuit patterns formed on the printed wired board **630** is short-circuited with the plate metal **610**, and the sheet size is detected based on a combination of the circuit patterns at the position. However, the present exemplary embodiment is not limited thereto. A slide volume or the like may be used, and a sheet size may be detected based on change in resistance value obtained by moving a moving element or the like.

5. Fourth Modification Example

In the present exemplary embodiment, in the detection unit **600**, the plate metal **610** is used as a contact type sensor that is brought into contact with the circuit patterns formed on the printed wired board **630**. However, the present exemplary embodiment is not limited thereto. A non-contact type sensor, for example, an optical sensor may be used, and

detection may be performed based on a difference in reflectivity, transmission/non-transmission of light, or the like.

6. Fifth Modification Example

In the present exemplary embodiment, as the detection unit **600**, there is adopted a configuration in which the plate metal **610** is used and brought into contact with the circuit patterns formed on the printed wired board **630** (short-circuit). However, the present exemplary embodiment is not limited thereto, and there may be used a mechanical switch that turns a switch to an on state or an off state when receiving a force from a part formed correspondingly to a sheet size.

7. Sixth Modification Example

In the present exemplary embodiment, the detection unit **600** detects a sheet size through use of the plate metal **610** interlocking with an operation of the first edge guide **410**. However, the present exemplary embodiment is not limited thereto, and the detection unit **600** may interlock with an operation of the second edge guide **450** instead of an operation of the first edge guide **410**. A detection unit that interlocks with each of the first edge guide **410** and the second edge guide **450** may be used so as to detect a sheet size.

What is claimed is:

1. A medium placing device comprising:
- a base part;
- a placement surface at which a medium is placed;
- a regulation unit configured to regulate a movement of the medium placed on the placement surface in a first direction;
- a rack pinion mechanism configured to hold the regulation unit in a movable manner in the first direction;
- a detection unit configured to detect a position of the regulation unit in the first direction; and
- an adjustment unit configured to:
  - adjust positions of the regulation unit, the rack pinion mechanism, and the detection unit in the first direction; and
  - move the regulation unit, the rack pinion mechanism, and the detection unit in an interlocking manner in a same direction along the first direction, wherein
    - the regulation unit includes
      - a first regulation member configured to regulate a first edge of the medium in the first direction, and
      - a second regulation member configured to regulate a second edge of the medium in the first direction, the second edge being opposite to the first edge,
    - the rack pinion mechanism is configured to move the first regulation member and the second regulation member in directions opposite to each other along the first direction,
    - the detection unit is provided between the placement surface and the adjustment unit,
    - the adjustment unit is arranged on the base part,
    - the rack pinion mechanism is configured to move relative to the base part,
    - the placement surface is connected to the base part via the adjustment unit, and
    - the placement surface is configured to move relative to the base part.

2. The medium placing device according to claim **1**, wherein at least a part of the detection unit overlaps with the rack pinion mechanism in a stacking direction of the medium.

3. The medium placing device according to claim **1**, wherein the detection unit includes:
- a detected portion being provided to the regulation unit, wherein the detected portion is configured to interlock with the regulation unit; and
- a position detection portion configured to detect a position of the detected portion in the first direction.

4. The medium placing device according to claim **3**, wherein
- the detection unit is configured to detect the position of the regulation unit by the detected portion being brought into contact with a different part of the position detection portion.

5. The medium placing device according to claim **1**, comprising: a detection holding unit having a first surface, wherein
- the detection holding unit is configured to hold the detection unit, and
- the first surface forms the placement surface at which the medium is placed.

6. The medium placing device according to claim **5**, wherein the detection holding unit includes a marking portion as a reference for moving the regulation unit at the first surface.

7. The medium placing device according to claim **6**, wherein
- the detection unit and the detection holding unit are integrally formed, and are detachably provided to the placement surface from a direction in which the first surface is located.

8. The medium placing device according to claim **6**, wherein
- the adjustment unit is engaged with the detection holding unit, and
- the detection holding unit interlocks with an operation of the adjustment unit.

9. The medium placing device according to claim **6**, wherein
- the marking portion indicates a medium edge surface position according to various sizes of the medium in a width direction and a position of the edge guide.

10. The medium placing device according to claim **5**, wherein the detection holding unit has a region that overlaps with the placement surface in the first direction as viewed in a top view.

11. The medium placing device according to claim **1**, wherein
- the adjustment unit is fixed to the placement surface with a fixing member, and
- the fixing member is configured to switch between a state in which the adjustment unit is movable in the first direction and a state in which the adjustment unit is not movable.

12. A recording apparatus comprising:
- the medium placing device according to claim **1**; and
- a recording unit configured to perform recording onto the medium placed at the medium placing device.

13. The recording apparatus according to claim **12**, wherein
- the medium placing device is configured to be displaced between a used state in which the medium is stackable and an accommodated state in which the medium is not stackable.

14. A medium placing device comprising:
a placement surface at which a medium is placed;
a regulation unit configured to regulate a movement of the medium placed on the placement surface in a first direction;
a rack pinion mechanism configured to hold the regulation unit in a movable manner in the first direction;
a detection unit configured to detect a position of the regulation unit in the first direction;
a detection holding unit configured to hold the detection unit; and
an adjustment unit configured to adjust positions of the regulation unit, the rack pinion mechanism, and the detection unit in the first direction, wherein
a fixing cutout portion of the adjustment unit is engaged with a protrusion portion of the detection holding unit such that the detection holding unit interlocks with the adjustment unit, and
the regulation unit includes
a first regulation member configured to regulate a first edge of the medium in the first direction, and
a second regulation member configured to regulate a second edge of the medium in the first direction, the second edge being opposite to the first edge,
the rack pinion mechanism is configured to move the first regulation member and the second regulation member in directions opposite to each other along the first direction, and
the detection unit is provided between the placement surface and the adjustment unit.

15. A medium placing device comprising:
a base part;
a placement surface at which a medium is placed;
a regulation unit configured to regulate a movement of the medium placed on the placement surface in a first direction;
a rack pinion mechanism configured to hold the regulation unit in a movable manner in the first direction, wherein
the rack pinion mechanism includes a flat plate portion having a flat plate-like shape;
a detection unit configured to detect a position of the regulation unit in the first direction, wherein
the detection unit includes a plate metal holding portion, and
the plate metal holding portion is fixed to the flat plate portion; and
an adjustment unit configured to adjust positions of the regulation unit, the rack pinion mechanism, and the detection unit in the first direction, wherein
the regulation unit includes
a first regulation member configured to regulate a first edge of the medium in the first direction, and
a second regulation member configured to regulate a second edge of the medium in the first direction, the second edge being opposite to the first edge,
the rack pinion mechanism is configured to move the first regulation member and the second regulation member in directions opposite to each other along the first direction,
the detection unit is provided between the placement surface and the adjustment unit,
the adjustment unit is arranged on the base part,
the rack pinion mechanism is configured to move relative to the base part,
the placement surface is connected to the base part via the adjustment unit, and
the placement surface is configured to move relative to the base part.

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