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Printer and digital camera with printer

Abstract

A printer unit has a film pack room into which any one of a first instant film pack or a second instant film pack is loaded, an exposure head, and a controller. The second instant film pack is aligned in the film pack room so as to be shifted to the one side.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS (1) This application is a Continuation of PCT International Application No. PCT/JP2021/039299 filed on 25 Oct. 2021, which claims priority under 35 U.S.C. § 119(a) to Japanese Patent Application No. 2020-180732 filed on 28 Oct. 2020. The above application is hereby expressly incorporated by reference, in its entirety, into the present application.

BACKGROUND OF THE INVENTION
1. Field of the Invention
(1) The present invention relates to a printer and a digital camera with a printer.
2. Description of the Related Art
(2) Various mobile printers or digital cameras with a printer for recording images captured by a digital camera or a smartphone on a recording medium such as an instant film have been on sale.
(3) In general, a printer or a digital camera with a printer that uses an instant film as a recording medium has a configuration including a loading room and an exposure head. An instant film pack that accommodates a plurality of instant films in a case is loaded into the loading room. The exposure head exposes an image on the instant film accommodated in or discharged from the case.
(4) There are instant films having a variety of sizes, and printers or digital cameras with a printer that selectively use instant films having different sizes have been known. An instant film exposure apparatus described in JP3827217B is applied to the printer, the digital camera with a printer, or an analog-type instant camera, and has a loading room capable of accommodating instant film packs having large and small sizes. The loading room is formed in a size for accommodating the larger instant film pack, and is configured to accommodate the smaller instant film pack in a space on a left side of a partition plate. The partition plate for positioning the smaller instant film pack is movable, and in a case where the larger instant film pack is inserted into the loading room, the partition plate is pressed to the case of the instant film pack and retreated from the loading room.
(5) Meanwhile, in the instant film exposure apparatus described in JP3827217B, a claw member that discharges the instant film from an inside of the instant film pack is provided. Two claw members are provided at different positions in the loading room in accordance with positions of the instant film packs having large and small sizes loaded in the loading room.
SUMMARY OF THE INVENTION
(6) However, in the instant film exposure apparatus described in JP3827217B, two claw members are provided, and furthermore a complicated mechanism is required that drives only one claw member among the two claw members in accordance with the instant film pack loaded in the loading room. Therefore, the number of components increases, and costs of the printer and the digital camera with a printer also increase.
(7) The present invention has been made to solve the above-mentioned problems, and an object of the present invention is to provide a printer and a digital camera with a printer capable of accommodating two types of instant film packs and preventing the increase in the number of components at a low cost.
(8) In order to solve the above-mentioned problems, a printer according to an aspect of the present invention includes a loading room, an exposure head, a transport mechanism, a discharge mechanism, and a position alignment unit. First and second cases have insertion ports into which the claw member is inserted. A second instant film pack has a dimension smaller than a dimension of a first instant film pack in a width direction. The position alignment unit aligns the second instant film pack so as to be shifted to one side in the width direction on which claw member is

positioned. The first and second instant film packs aligned by the position alignment unit have the insertion ports arranged at the same position in the loading room. The loading room is loaded with any one of the first instant film pack or the second instant film pack, the first instant film pack including at least a plurality of first instant films and the first case which accommodates the first instant films in a stacking manner and in which a discharge port for discharging the first instant film is formed, the second instant film pack including at least a plurality of second instant films and the second case which accommodates the second instant films in a stacking manner and in which a discharge port for discharging the second instant film is formed. The exposure head exposes an image on the first instant film or the second instant film. The transport mechanism transports the first instant film or the second instant film to an exposure position at which the exposure head exposes the image. The discharge mechanism has a claw member that is positioned on one side in a width direction of the loading room and that enters inside the first case or the second case, and in which the claw member presses and discharges the first or second instant film through the discharge port. The position alignment unit aligns the first and second instant film packs in the loading room.

(9) It is preferable that the second instant film pack has a stepped portion having a dimension larger than a dimension of the first instant film pack in a thickness direction parallel to a loading direction into the loading room and orthogonal to the width direction, and the position alignment unit includes a first position alignment unit that aligns the first instant film pack by touching both side surfaces of the first instant film pack, and a second position alignment unit that aligns the second instant film pack so as to be shifted to the one side in the width direction on which the claw member is positioned in the loading room by being fitted to the stepped portion.

(10) It is preferable that the stepped portion is a rib that extends in parallel with a length direction orthogonal to the width direction and the thickness direction, and protrudes in the thickness direction, and the second position alignment unit is a position alignment groove that is fitted to the rib.

(11) It is preferable that the first position alignment unit is a wedge-shaped position alignment protrusion provided on the side surface of the loading room. It is preferable that the second position alignment unit is positioned inside the loading room in the width direction with respect to the first position alignment unit.

(12) A digital camera with a printer according to an aspect of the present invention includes the printer and an imaging unit that includes an imaging optical system, and captures a subject image to output image data to the above printer.

(13) According to the present invention, it is possible to accommodate two types of instant film packs and prevent an increase in the number of components.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. **1** is a front perspective view of a digital camera with a printer.

(2) FIG. **2** is a longitudinal cross-sectional view of a center of the digital camera with a printer.

(3) FIG. **3** is a rear perspective view of the digital camera with a printer with a loading cover in a closed position.

(4) FIG. **4** is a rear perspective view of the digital camera with a printer with the loading cover in an opened position.

(5) FIG. **5** is a perspective view of a first instant film pack.

(6) FIG. **6** is a cross-sectional view of the first instant film pack.

(7) FIG. **7** is an exploded perspective view of the first instant film pack.

(8) FIG. **8** is a cross-sectional view of a first instant film.

(9) FIG. **9** is a front view of the first instant film.
(10) FIG. **10** is a perspective view of a second instant film pack.
(11) FIG. **11** is a perspective view of the second instant film pack as viewed from a bottom surface side.
(12) FIG. **12** is a front view of the second instant film pack.
(13) FIG. **13** is a front view of a second instant film.
(14) FIG. **14** is a cross-sectional view of a printer unit.
(15) FIG. **15** is a perspective view of the printer unit.
(16) FIG. **16** is a perspective view of a film pack room.
(17) FIG. **17** is a perspective view of the film pack room viewed from another angle.
(18) FIG. **18** is an explanatory diagram for comparing dimensions of the first instant film pack and the second instant film pack.
(19) FIG. **19** is a traversal cross-sectional view of a digital camera with a printer into which the first instant film pack is loaded.
(20) FIG. **20** is a traversal cross-sectional view of the digital camera with a printer into which the second instant film pack is loaded.
(21) FIG. **21** is a traversal cross-sectional view of the digital camera with a printer showing a configuration around a cut-off portion in a loading room.
(22) FIG. **22** is an exploded perspective view of a film holding portion.
(23) FIG. **23** is an explanatory diagram showing dimensions of a spike roller member and a sub roller member.
(24) FIG. **24** is an explanatory diagram showing a positional relationship between a transport roller pair and the first instant film.
(25) FIG. **25** is an explanatory diagram showing a positional relationship between the transport roller pair and the second instant film.
(26) FIG. **26** is an explanatory diagram showing a positional relationship between the first instant film, the second instant film, and an exposure head.
(27) FIG. **27** is an explanatory diagram showing an operation of a detection switch.
(28) FIG. **28** is a flowchart illustrating switching control of the exposure head by a controller.
(29) FIG. **29** is an explanatory diagram showing an operation of the controller and the exposure head.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

(30) [Overview of Digital Camera with Printer]
(31) In FIG. **1**, a digital camera **10** with a printer according to an embodiment of the present invention includes a camera body **11**, an imaging unit **12**, and a printer unit **13**. An imaging window **15** and two release switches **16**A and **16**B are provided on a front surface of the camera body **11**.
(32) The camera body **11** has a substantially square shape viewed from a front surface. The digital camera **10** with a printer selectively uses any one of two types of instant films **28** and **29** (see FIGS. **9** and **13**). A first instant film **28** is a square type instant film, and a second instant film **29** is a card type instant film. As will be described later, the second instant film **29** has a dimension in a width direction X smaller than a dimension of the first instant film **28**, and has the same dimension in a transport direction.
(33) The imaging window **15** is disposed in a center on the front surface of the camera body **11**. The imaging window **15** exposes an imaging optical system **19** (see FIG. **2**) constituting the imaging unit **12**.
(34) As shown in FIG. **2**, the imaging optical system **19** and a solid-state imaging element **20** are provided in the imaging unit **12**. For example, the solid-state imaging element **20** is a complementary metal-oxide-semiconductor (CMOS) image sensor, and includes a light receiving surface constituted by a plurality of pixels (not shown) arranged in a two-dimensional matrix

shape. Each pixel includes a photoelectric conversion element, photoelectrically converts a subject image formed on the light receiving surface by the imaging optical system **19**, and generates an imaging signal.

(35) The solid-state imaging element **20** includes signal processing circuits (all not shown) such as a noise removal circuit, an auto gain controller, and an A/D conversion circuit. The noise removal circuit performs a noise removal process on the imaging signal. The auto gain controller amplifies a level of the imaging signal to an optimum value. The A/D conversion circuit converts the imaging signal into a digital signal, and outputs the digital signal to a built-in memory (not shown) from the solid-state imaging element **20**. An output signal of the solid-state imaging element **20** is image data (so-called RAW data) having one color signal for each pixel.

(36) The solid-state imaging element **20** is driven by pressing at least one of the release switch **16**A or **16**B, and the subject image is captured.

(37) A film ejection port **21** is provided in a top surface of the camera body **11**. The first instant film **28** on which an image has been printed is ejected from the film ejection port **21**.

(38) As shown in FIG. **3**, a loading cover **22** is attached to a rear surface side of the camera body **11** through a hinge portion **22***c*. The hinge portion **22***c* rotatably supports the loading cover **22** between an opened position (state shown in FIG. **4**) and a closed position (state shown in FIG. **3**). The loading cover **22** opens a film pack room **23** within the camera body **11** in the opened position. The loading cover **22** covers the film pack room **23** in the closed position. A locking mechanism and an unlocking mechanism (all not shown) are provided between the camera body **11** and the loading cover **22**, and in a case where the locking mechanism holds the loading cover **22** in the closed position and operates the unlocking mechanism, the loading cover **22** moves rotationally from the closed position to the opened position.

(39) As shown in FIG. **4**, any one of a first instant film pack **24** that accommodates the first instant film **28** or a second instant film pack **25** that accommodates the second instant film **29** is loaded into the film pack room **23** (loading room). The user selects one of the first and second instant film packs **24** and **25** that accommodate the first and second instant films **28** and **29** that the user wants to use and loads the selected film pack into the film pack room **23**. A pair of film holding portions **22***a* are provided on an inner surface of the loading cover **22**. A detection switch **78** (see FIGS. **17** and **27**) is provided in the film pack room **23**.

(40) A rear display unit **17** and an operation unit **18** are provided on an outer surface of the loading cover **22**, that is, a rear surface of the camera body **11**. The rear display unit **17** is, for example, a liquid crystal display (LCD) panel. Image data items for one frame output from the solid-state imaging element **20** are sequentially input into the rear display unit **17**, and are displayed as a live preview image.

(41) A photographer presses at least one of the release switch **16**A or **16**B, and thus, capturing is started. Image data items are acquired from the solid-state imaging element **20** through the capturing. An image processing unit (not shown) performs known image processing on the image data items, and then the image data items are compressed. Examples of the image processing include matrix operation, demosaicing, γ correction, luminance conversion, color difference conversion, and resizing. The image data items on which the image processing and the compression are performed are recorded in a built-in memory (not shown) such as a flash memory provided within the camera body **11**.

(42) In a case where a menu switch **18***a* of the operation unit **18** is pressed, the image is played and displayed on the rear display unit **17** based on the image data items recorded in the built-in memory. In a case where an image desired to be printed is displayed on the rear display unit **17**, the photographer presses a print switch **18***b* of the operation unit **18**, and thus, a printing process by the printer unit **13** is started.

(43) [Configuration of Instant Film Pack]

(44) As shown in FIGS. **5** and **6**, the first instant film pack **24** includes a case **26**, a film press plate

27, a plurality of first instant films **28**, and a film cover **30**.

(45) As shown in FIG. **6**, the case **26** accommodates the plurality of first instant films **28** and one film cover **30** in a stacking manner. The case **26** is made of a material such as a thermoplastic resin or a paper resin acquired by mixing the thermoplastic resin with cellulose. The case **26** is configured of a box-shaped case member **31**, and a cover **32** that covers an opening formed in a rear surface side of the case member **31**.

(46) As shown in FIG. **7**, an exposure opening **31***a* for exposing the first instant film **28** is formed in the case member **31**. In the following description, surfaces of the first and second instant film packs **24** and **25** in which the exposure openings **31***a* are formed are "front surfaces", surfaces opposite to the "front surfaces" are "rear surfaces", surfaces facing the film ejection port **21** of the camera body **11** are "top surfaces", and surfaces opposite to the "top surfaces" are "bottom surfaces". The film cover **30** is overlapped before the first instant film **28** in a foremost layer initially set in the exposure opening **31***a* within the case member **31**. Accordingly, the exposure opening **31***a* is lighttightly blocked by the film cover **30**. A cut-off portion **31***b* into which a known claw member **57** (see FIGS. **14** and **15**) formed at the camera is inserted is formed in a lower portion of the exposure opening **31***a*. The cut-off portion **31***b* corresponds to an insertion port in the claims. The insertion port into which the claw member **57** is inserted is not limited to the cut-off portion **31***b*, and may be a through-hole that penetrates the case member **31**.

(47) A discharge port **31***c* is formed on a top surface of the case member **31**. The discharge port **31***c* is formed in a slit shape. The first instant films **28** or the film cover **30** are discharged one by one outwards from the first instant film pack **24** by the claw member **57** inserted into the cut-off portion **31***b* of the case member **31** through the discharge port **31***c*.

(48) A light shielding seal **31***d* is stuck to the case member **31** so as to close the discharge port **31***c* from the outside. The light shielding seal **31***d* is formed as a flexible sheet. The light shielding seal **31***d* is stuck to only one edge of a long side of the discharge port **31***c* so as not to hinder the first instant film **28** or the film cover **30** when the first instant film or the film cover passes through the discharge port **31***c*.

(49) As shown in FIG. **7**, the cover **32** includes a pair of openings **32***a*, a pair of unit support protrusions **32***b*, a pair of caulking pins **32***c*, and a support piece **32***d*. The pair of openings **32***a* are formed so as to be vertically spaced apart from each other by a predetermined interval, and serve as an entrance into which the film holding portions **22***a* provided in the digital camera **10** with a printer are inserted when the digital camera **10** with a printer is loaded.

(50) The pair of unit support protrusions **32***b* are provided at both side edge portions of the cover **32** so as to be vertically long, and each has an arc shape of which a center portion protrudes toward the exposure opening **31***a*. The unit support protrusions **32***b* touch both side edge portions on a rear surface of the first instant film **28** positioned in the last layer, and push up the first instant film **28** by each having the arc shape of which the center portion protrudes toward the exposure opening **31***a*. Accordingly, a gap between the film cover **30** and the exposure opening **31***a* is prevented from being formed.

(51) The pair of caulking pins **32***c* are used for attaching the film press plate **27**. The support piece **32***d* supports a center portion of the first instant film **28** positioned in the last layer from behind, and prevents the first instant film **28** from being bent in which the center portion is curved toward the cover **32**.

(52) The film press plate **27** is composed of two elastic sheets **27***a* and **27***b* made of a synthetic resin. The sheet **27***a* is pressed by the pair of film holding portions **22***a* when the loading cover **22** is closed, and is curved so as to be convex toward the cover **32**. An opening **27***c* and a pair of holes **27***d* are formed in the sheet **27***a*. The opening **27***c* is formed in a center portion of the sheet **27***a* so as to be vertically long, and the support piece **32***d* is inserted into this opening. The pair of caulking pins **32***c* are inserted into the pair of holes **27***d*, and the pair of holes is used for attaching the film press plate **27** to the cover **32**.

(53) An opening **27***e* and a pair of holes **27***f* are formed in the sheet **27***b*. The opening **27***e* is formed in a center portion of the sheet **27***a*, and the support piece **32***d* is inserted into this opening. The pair of caulking pins **32***c* are inserted into the pair of holes **27***f*. A lower end portion **27***h* of the sheet **27***b* is attached to a lower end portion **27***g* of the sheet **27***a*. Accordingly, the sheet **27***b* prevents the sheet **27***a* from being slack, and prevents light leak from the pair of openings **32***a*. The sheet **27***b* pushes up the first instant film **28** in a substantially planar manner when the sheet **27***a* is elastically bent by the pair of film holding portions **22***a*. As a result, the film cover **30** positioned in the foremost layer or the first instant film **28** is pressed rearwards on the front surface of the case member **31**.

(54) [Configuration of L-Shaped Protrusions]

(55) L-shaped protrusions **24***c* are provided on both side surfaces **24***a* and **24***b* of the first instant film pack **24**. The protrusions **24***c* are protrusions provided to prevent the first instant film pack **24** from being reversely loaded.

(56) [Configuration of First Instant Film]

(57) As shown in FIG. **8**, the first instant film **28** is configured of a mask sheet **33**, a photosensitive sheet **34**, a cover sheet **35**, a developer pod **36**, and a trap portion **37**, and is a so-called mono-sheet type film. The mask sheet **33** is formed as a sheet made of a thin synthetic resin, and includes a screen opening **33***a*. A photosensitive layer, a diffusion reflective layer, an image reception layer, and the like are provided in the photosensitive sheet **34**. The cover sheet **35** has an exposure surface **28***a* facing an exposure head **51** to be described below.

(58) The developer pod **36** is formed in a substantially bag shape, and contains a developer **38** therein. The developer pod **36** is pasted onto an end portion of the photosensitive sheet **34** close to the discharge port **31***c*, and is wrapped by an end portion of the mask sheet **33**. In the width direction X of the first instant film **28**, both ends of the developer pod **36** are spaced apart from both ends of the first instant film **28** by a predetermined interval.

(59) As shown in FIG. **9**, a dimension W**12** of the developer pod **36** in the width direction X is equal to a dimension W**11** of the exposure surface **28***a* in the width direction X. A case where the dimensions in the width direction X are equal to each other includes a case where the dimensions in the width direction are substantially equal to each other. Of the first instant film **28**, in the width direction X of the exposure surface **28***a*, portions outside both ends of the exposure surface **28***a* and the developer pod **36** are side edge portions **28***b* and **28***c*. As shown in FIG. **8**, the trap portion **37** is stuck on an end portion of the photosensitive sheet **34** opposite to the discharge port **31***c*, and is similarly wrapped by the end portion of the mask sheet **33**. In the case of the example shown in FIG. **9**, for example, the dimension W**11** of the exposure surface **28***a* in the width direction X is 62 mm, the dimension H**11** in a transport direction Y orthogonal to the width direction X is also 62 mm, and dimensions D**11** of the side edge portions **28***b* and **28***c* in the width direction X are 5 mm. In this case, a dimension W**13** of the first instant film **28** in the width direction X is 72 mm.

(60) As will be described in detail later, the photosensitive layer of the first instant film **28** is irradiated with a print light at the time of printing, and thus, the photosensitive layer is exposed. The developer pod **36** is torn at the time of development, and the developer **38** flows and is spread into a gap **39** between the photosensitive sheet **34** and the cover sheet **35**. An image acquired through the exposure of the photosensitive layer is reversed by the diffusion reflective layer, and is transferred to the image reception layer. By doing this, a positive image appears on a positive image observation surface **40** of the photosensitive sheet **34** exposed through the screen opening **33***a*.

(61) The film cover **30** is formed as a sheet thinner than the first instant film **28**, and has light-shielding properties and flexibility. The film cover **30** is a molded item made of a synthetic resin, and is made, for example, of polystyrene containing carbon black. That is, the film cover **30** has rigidity higher than the first instant film **28**. In a case where the first instant film pack **24** is loaded into the film pack room **23** and is used, the film cover **30** is ejected to the film ejection port **21** by a

spreading roller pair **54** (see FIG. **15**) to be described later.
(62) [Configuration of Protrusion for Reversal Loading Prevention and Ribs for Position Alignment]
(63) As shown in FIG. **10**, although the second instant film pack **25** has the same basic configuration as the first instant film pack **24**, since the types of the first and second instant films **28** and **29** to be accommodated are different, sizes thereof and locations at which the reversal loading prevention and the position alignment are performed are different. Hereinafter, parts having the same functions as the parts of the first instant film pack **24** are given by the same references and the description thereof will be omitted.
(64) The second instant film pack **25** includes a case **26**, a film press plate **27**, a plurality of second instant films **29**, and a film cover **30**. As described above, the case **26**, the film press plate **27**, and the film cover **30** in the second instant film pack **25** have sizes that match the second instant film **29**.
(65) Similar to the first instant film pack **24**, the discharge port **31***c* is formed in a top surface of a case member **31**. A light shielding seal **31***d* is stuck to the case member so as to close the discharge port **31***c* from the outside. The second instant film **29** or the film cover **30** are discharged one by one outwards from the second instant film pack **25** by the claw member **57** inserted into a cut-off portion **31***b* of the case member **31** through the discharge port **31***c*.
(66) As shown in FIGS. **11** and **12**, the L-shaped protrusions **24***c* present in the first instant film pack **24** are not provided on both side surfaces **25***a* and **25***b* of the second instant film pack **25**. Instead, a protrusion **25***d* for reversal loading prevention is provided on a bottom surface **25***c* of the second instant film pack **25**. The protrusion **25***d* is disposed at a position near one side surface **25***a* of the second instant film pack **25** with respect to a center line CLX**2** (see FIG. **12**) of the second instant film pack **25** in the width direction X.
(67) The protrusion **25***d* is integrally formed with the case **26** of the second instant film pack **25**. The protrusion **25***d* is formed in a cuboid shape protruding from the bottom surface **25***c* of the second instant film pack **25**.
(68) A pair of ribs **25***f* and **25***g* are provided on a front surface **25***e* of the second instant film pack **25**. The ribs **25***f* and **25***g* are positioned on both sides of the exposure opening **31***a*, extend in parallel with the transport direction Y (length direction) of the second instant film pack **25**, and protrude forward in a thickness direction along the side surfaces **25***a* and **25***b* of the second instant film pack **25**. Since one rib **25***f* is adjacent to the cut-off portion **31***b* into which the claw member **57** (see FIGS. **14** and **15**) is inserted, a lower end portion is cut off so as not to interfere with the claw member **57**. Accordingly, the dimension in the transport direction Y is formed shorter than the dimension of the other rib **25***g*.
(69) [Configuration of Second Instant Film]
(70) As shown in FIG. **13**, the second instant film **29** is a mono-sheet type film similar to the first instant film **28** except for the difference in size. Similar to the first instant film **28**, the second instant film **29** includes a mask sheet **33**, a photosensitive sheet **34**, a cover sheet **35**, a developer pod **36**, a trap portion **37**, and the like. Hereinafter, parts having the same functions as the parts of the first instant film **28** are given by the same references and the description thereof will be omitted.
(71) Of the second instant film **29**, in the width direction X of the second instant film **29**, portions outside both ends of an exposure surface **29***a* and the developer pod **36** are side edge portions **29***b* and **29***c*. In the second instant film **29**, a dimension W**22** of the developer pod **36** in the width direction X is equal to a dimension W**21** of the exposure surface **29***a* in the width direction X. A case where the dimensions in the width direction X are equal to each other includes a case where the dimensions in the width direction are substantially equal to each other. In the case of the example shown in FIG. **13**, for example, the dimension W**21** of the exposure surface **29***a* in the width direction X is 46 mm, a dimension H**21** in the transport direction Y orthogonal to the width

direction X is 62 mm, and dimensions D**21** of the side edge portions **29***b* and **29***c* in the width direction X are 4 mm. In this case, a dimension W**23** of the second instant film **29** in the width direction X is 54 mm. That is, all the dimensions of the portions of the second instant film **29** in the width direction are smaller than the dimensions of the portions of the first instant film **28**.

(72) [Configuration of Printer Unit]

(73) As shown in FIGS. **14** and **15**, the printer unit **13** is configured of the exposure head **51**, a roller drive mechanism **52**, a transport roller pair **53**, the spreading roller pair **54**, a spreading control member **56**, the film pack room **23** (see FIGS. **16** and **17**), the claw member **57**, an ejection guide **58**, a controller **59**, and a claw member drive mechanism **60**. The transport roller pair **53** and the roller drive mechanism **52** constitute a transport mechanism in the claims. The claw member **57** and the claw member drive mechanism **60** constitute a discharge mechanism in the claims.

(74) [Configuration of First Position Alignment Unit and Second Position Alignment Unit of Film Pack Room]

(75) As shown in FIGS. **16** and **17**, the film pack room **23** is formed in a box shape in which the rear surface side of the camera body **11** is opened. Position alignment protrusions **61***a* to **61***c* and **62***a* for aligning the first instant film pack **24** in the width direction X are provided in the film pack room **23**. The position alignment protrusions **61***a* to **61***c* and **62***a* constitute a first position alignment unit in the claims.

(76) The position alignment protrusions **61***a* to **61***c* are provided on a right side surface **23***a* of the film pack room **23**, and the position alignment protrusion **62***a* is provided on a left side surface **23***b* of the film pack room **23**. The position alignment protrusions **61***a* to **61***c* and **62***a* are formed in a wedge shape in which a thickness gradually increases along a loading direction Z of the first instant film pack **24**, that is, a front-rear direction of the camera body **11**.

(77) L-shaped cut-off portions **63***a* are formed on both side surfaces **23***a* and **23***b* of the film pack room **23**. The L-shaped cut-off portions **63***a* prevent the first instant film pack **24** from being reversely loaded by being fitted with the L-shaped protrusions **24***c* provided on both the side surfaces **24***a* and **24***b* of the first instant film pack **24**.

(78) FIG. **18** shows only contour shapes superimposed in order to compare the dimensions of the first and second instant film packs **24** and **25**. FIG. **18** shows the first and second instant film packs **24** and **25** aligned by the first and second position alignment units and the contour shapes in a case where the first instant film pack **24** (shape represented by a dashed double-dotted line) and the second instant film pack **25** (shape represented by a solid line) are viewed along the transport direction Y.

(79) A dimension WP**1** of the first instant film pack **24** in the width direction X is formed to be larger than a dimension WP**2** of the second instant film pack **25** in the width direction X. In a case where a direction parallel to the loading direction Z and orthogonal to the width direction X is a thickness direction, the second instant film pack **25** has a stepped portion in which a dimension TP**21** in the thickness direction is larger than a surrounding dimension TP**20**. This stepped portion is a portion including the ribs **25***f* and **25***g*. The dimension TP**21** of the portion of the second instant film pack **25** including the ribs **25***f* and **25***g* in the thickness direction is larger than a dimension TP**11** of the first instant film pack **24** in the thickness direction. The first instant film pack **24** has a shape having a substantially constant thickness in which steps are less in the thickness direction.

(80) On the other hand, in the second instant film pack **25**, the dimension TP**20** of a portion not including the ribs **25***f* and **25***g* in the thickness direction is equal to or less than the dimension TP**11** of the first instant film pack **24** in the thickness direction. That is, the contour shape of the second instant film pack **25** is formed such that only the portion including the ribs **25***f* and **25***g* protrudes from the contour shape of the first instant film pack **24**.

(81) As described above, the dimension WP**1** of the first instant film pack **24** in the width direction X is formed to be larger than the dimension WP**2** of the second instant film pack **25** in the width direction X. Accordingly, as shown in FIG. **19**, both the side surfaces **24***a* and **24***b* of the first

instant film pack **24** touch the position alignment protrusions **61***a* to **61***c* and **62***a*, and thus, the position alignment in the width direction X can be performed. Specifically, the position alignment protrusions **61***a* to **61***c* and **62***a* touch both the side surfaces **24***a* and **24***b*, and thus, a center line CLX**1** of the first instant film pack **24** in the width direction X and a center line CLX**0** of the film pack room **23** in the width direction X can coincide with each other. A case where the center lines coincide with each other includes a case where the center line CLX**1** and the center line CLX**0** substantially coincide with each other. In FIGS. **19** and **20**, in order to prevent the drawings from becoming complicated, the stacked first and second instant films **28** and **29** are not shown.

(82) Since the position alignment protrusions **61***a* to **61***c* and **62***a* are formed in the wedge shape, in a case where the first instant film pack **24** is pushed into the film pack room **23** in the loading direction, both the side surfaces **24***a* and **24***b* of the first instant film pack **24** securely touch the position alignment protrusions **61***a* to **61***c* and **62***a*. Since the second instant film pack **25** is aligned by position alignment grooves **65***a* and **65***b* to be described later, the position alignment protrusions **61***a* to **61***c* and **62***a* are not used.

(83) Elastic members **64***a* to **64***c* (see FIGS. **16** and **17**) for aligning the first and second instant film packs **24** and **25** in the transport direction Y are provided on a bottom surface **23***c* of the film pack room **23**. The elastic members **64***a* to **64***c* are cuboid members made of sponge or rubber, and are arranged at predetermined intervals along the width direction X. In a case where both the side surfaces **24***a* and **24***b* of the first instant film pack **24** touch the position alignment protrusions **61***a* to **61***c* and **62***a* and the L-shaped protrusions **24***c* are fitted into the L-shaped cut-off portions **63***a*, the bottom surface **24***d* of the first instant film pack **24** simultaneously touches the elastic members **64***a* to **64***c*. The elastic members **64***a* to **64***c* that touch the bottom surface **24***d* of the first instant film pack **24** are in a compressed state. Accordingly, an elastic force in a case where the elastic members **64***a* to **64***c* try to return from the compressed state to the state before compression acts, and a top surface **24***e* of the first instant film pack **24** is pressed against a top surface **23***d* of the film pack room **23**. The top surface **23***d* of the film pack room **23** has an opening portion connected to the transport roller pair **53**.

(84) On the other hand, the position alignment grooves **65***a* and **65***b* for aligning the second instant film pack **25** in the width direction X are provided in the film pack room **23**. The position alignment grooves **65***a* and **65***b* constitute a second position alignment unit in the claims.

(85) The position alignment grooves **65***a* and **65***b* are formed on a front surface **23***e* of the film pack room **23** (a surface facing the exposure openings **31***a* of the first and second instant film packs **24** and **25**). The position alignment groove **65***a* is disposed at a position near the right side surface **23***a* of the film pack room **23**. The position alignment groove **65***b* is disposed at a position spaced apart from the position alignment groove **65***a* at a predetermined interval. A width and an interval between the position alignment grooves **65***a* and **65***b* match a width and an interval between the ribs **25***f* and **25***g* of the second instant film pack **25**.

(86) The film pack room **23** includes a cut-off portion **23***f* (see FIG. **16** and FIG. **21**). The cut-off portion **23***f* is formed at a position facing the cut-off portions **31***b* of the first and second instant film packs **24** and **25**, and is continuous with the bottom surface of the film pack room **23**. The claw member **57** enters the inside of the first and second instant film packs **24** and **25** through the cut-off portion **23***f*, and the first and second instant films **28** and **29** are discharged one by one outwards from the first and second instant film packs **24** and **25**.

(87) As shown in FIG. **21**, the cut-off portion **23***f* is disposed at a position closer to the right side surface **23***a* than the center of the film pack room **23** in the width direction X. The cut-off portions **31***b* of the first and second instant film packs **24** and **25** loaded into the film pack room **23** are also formed at positions close to the one side surfaces **24***a* and **25***a* of the first and second instant film packs **24** and **25** according to the position of the cut-off portion **23***f*. In FIG. **21**, in order to prevent the drawings from becoming complicated, the first and second instant film packs **24** and **25** are not shown.

(88) The claw member **57** is disposed at a position aligned with the cut-off portion **23***f*. Specifically, the claw member **57** is disposed at a position closer to the right side surface **23***a* than the center line CLX**0** of the film pack room **23** in the width direction X. The claw member drive mechanism **60** is a well-known mechanism that is configured of a motor as a drive source, a gear train, a spring member, and the like as a drive source, and reciprocates the claw member (see FIG. **14**).

(89) As described above, the second instant film pack **25** has a smaller dimension in the width direction X than the first instant film pack **24**, and the dimension TP**21** of the portion including the ribs **25***f* and **25***g* in the thickness direction is larger than the dimension TP**11** of the first instant film pack **24** in the thickness direction. Thus, as shown in FIG. **20**, the position alignment in the width direction X can be performed by fitting the ribs **25***f* and **25***g* into the position alignment grooves **65***a* and **65***b* (second position alignment unit) positioned inside the film pack room **23** in the width direction X with respect to the position alignment protrusions **61***a* to **61***c* and **62***a* (first position alignment unit). Specifically, the ribs **25***f* and **25***g* are fitted into the position alignment grooves **65***a* and **65***b*, and thus, the center line CLX**2** of the second instant film pack **25** in the width direction X can be aligned with the center line CLX**0** of the film pack room **23** in the width direction X to be shifted to the right side surface **23***a*.

(90) The position alignment of the second instant film pack **25** is not merely shifted, but the right side surface **25***a* of the second instant film pack **25** aligned by the ribs **25***f* and **25***g* is aligned with respect to the right side surface **24***a* of the first instant film pack **24** aligned by the position alignment protrusions **61***a* to **61***c* and **62***a* so as to be shifted to the inside of the film pack room **23** by about 0.5 mm. Accordingly, as will be described later, the image can be exposed in an appropriate exposure range by absorbing a dimensional difference between both the side edge portions **28***b* and **28***c* of the first instant film **28** and both the side edge portions **29***b* and **29***c* of the second instant film **29**.

(91) Since the second position alignment unit is configured of the position alignment grooves **65***a* and **65***b* fitted into the ribs **25***f* and **25***g*, a space S between the position alignment grooves **65***a* and **65***b* and opposite to the film pack room **23** (hatched location in FIG. **20**) can be secured. Accordingly, parts and the like can be arranged in the space S, and the thickness of the printer as a whole can be further reduced. Although in a case where the second position alignment unit is not a groove but a recess portion having a large dimension in the width direction, the space S cannot be secured, in the present embodiment, since the second position alignment unit includes the position alignment grooves **65***a* and **65***b*, the space can be secured.

(92) A cut-off portion **66** for reversal loading prevention is formed on the bottom surface **23***c* of the film pack room **23**. The cut-off portion **66** for reversal loading prevention prevents the second instant film pack **25** from being reversely loaded by being fitted into protrusion **25***d* having the cuboid-shaped provided on the bottom surface **25***c* of the second instant film pack **25**.

(93) In a case where the ribs **25***f* and **25***g* of the second instant film pack **25** and the position alignment grooves **65***a* and **65***b* are fitted and the protrusion **25***d* and the cut-off portion **66** for reversal loading prevention are fitted, the bottom surface **25***c* of the second instant film pack **25** simultaneously touches the elastic members **64***a* and **64***b*. Since the second instant film pack **25** has a smaller dimension in the width direction than the first instant film pack **24**, the bottom surface **25***c* does not touch the elastic member **64***c*. Accordingly, the elastic force acts from the elastic members **64***a* and **64***b*, and a top surface **25***h* of the second instant film pack **25** is pressed against the top surface **23***d* of the film pack room **23**.

(94) As described above, the first and second instant film packs **24** and **25** are aligned with respect to the film pack room **23** in the width direction X and the transport direction Y, and the position alignment in the loading direction Z is performed by closing the loading cover **22**. Specifically, the pair of film holding portions **22***a* provided at the loading cover **22** align the first and second instant film packs **24** and **25** in the loading direction Z.

(95) That is, in a case where one of the first and second instant film packs **24** and **25** is loaded into the film pack room **23** and the loading cover **22** is positioned in the closed position, the pair of film holding portions **22***a* pass through the openings **32***a*, are inserted into the first and second instant film packs **24** and **25**, and press the film press plate **27**. Accordingly, the first and second instant films **28** and **29** in the first and second instant film packs **24** and **25** are pressed in the stacking direction.
(96) As shown in FIG. **22**, the film holding portion **22***a* is configured of a pair of press members **67**, a holding frame **68**, and springs **69**. The holding frame **68** holds the press members **67**, and is fixed to an inner wall surface side of the loading cover **22**.
(97) The pair of press members **67** face each other such that positions of distal end portions **67***a* and rotational shafts **67***b* are opposite to each other, and are held by the holding frame **68**. For example, the holding frame **68** is fixed to the loading cover **22** through screwing. The springs **69** are torsion coil springs, and are attached between the press members **67** and the holding frame **68**. The springs **69** urge the press members **67** such that the distal end portions **67***a* move rotationally upward in the drawing. Accordingly, the distal end portions **67***a* press the film press plate **27**.
(98) As described above, since the second instant film pack **25** has a smaller dimension in the width direction than the first instant film pack **24** and one position alignment groove **65***a* is disposed at a position near the right side surface **23***a* of the film pack room **23**, the second instant film pack **25** is aligned with the film pack room **23** so as to be shifted to the right side surface **23***a*.
(99) The pair of film holding portions **22***a* are arranged at positions corresponding to the second instant film pack **25**, and are formed to have a small dimension in the width direction X so as to correspond to the opening **32***a* of the second instant film pack **25**. Thus, in a case where the second instant film pack **25** is loaded into the film pack room **23** (state shown in FIG. **20**), the film holding portions **22***a* enter the opening **32***a* so as to correspond to the positions, and the second instant film **29** is pressed in the stacking direction via the film press plate **27**. Accordingly, the second instant film pack **25** is pressed against the front surface **23***e* of the film pack room **23** and is aligned in the loading direction Z.
(100) On the other hand, the first instant film pack **24** has a larger dimension in the width direction than the second instant film pack **25**, and the opening **32***a* of the first instant film pack **24** is formed so as to have a larger dimension in the width direction X than the opening **32***a* of the second instant film pack **25**. The dimensions of the opening **32***a* of the first instant film pack **24** and the opening **32***a* of the second instant film pack **25** in the transport direction Y are substantially equal to each other. In a case where the first instant film pack **24** is loaded into the film pack room **23** (state shown in FIG. **19**), the film holding portions **22***a* are arranged at the positions corresponding to the second instant film pack **25**, that is, the positions shifted to one side with respect to the first instant film pack **24**. However, since the opening **32***a* of the first instant film pack **24** has a long dimension in the width direction X, the film holding portions **22***a* enter, and the first instant film **28** is pressed in the stacking direction via the film press plate **27**. Accordingly, the first instant film pack **24** is pressed against the front surface **23***e* of the film pack room **23** and is aligned in the loading direction Z.
(101) The first and second instant film packs **24** and **25** are loaded as described above, and the image is recorded by the printer unit **13** on the first and second instant films **28** and **29** ejected from the first and second instant film packs **24** and **25**.
(102) The transport roller pair **53** and the spreading roller pair **54** are driven to be rotated by the roller drive mechanism **52**, and transport the film cover **30** and the first and second instant films **28** and **29**. The roller drive mechanism **52** includes, for example, a motor as a drive source and a transmission mechanism such as a gear train that transmits rotational drive. The transport roller pair **53** includes a capstan roller **71** and a pinch roller **72**. The capstan roller **71** and the pinch roller **72** are arranged at positions at which these rollers pinch a transport path of the first instant film **28**.
(103) The capstan roller **71** is disposed on a side (a left side of the transport path in the diagram)

facing the exposure surfaces **28***a* and **29***a* of the first and second instant films **28** and **29**. The capstan roller **71** includes a pair of columnar spike roller members **71***a* and **71***b*, a sub roller member **71***c*, and a rotational shaft **71***d* that holds each spike roller member **71***a* and the sub roller member **71***c*.

(104) A spike (not shown) including a plurality of small protrusions (convex portions) is formed on a circumferential surface of the spike roller member **71***a*. A holding force of the spike roller member **71***a* is further improved by the protrusions. The number and shape of protrusions may be appropriately designed. The protrusion includes a small convex and a small concave formed by filing the circumferential surface of the spike roller member **71***a*. The sub roller member **71***c* is formed in a smooth curved surface shape in which a cross section cut along a plane including an axial direction and a diametrical direction is convex outward.

(105) As shown in FIG. **23**, in a case where an average value of a maximum outer diameter RM including a distal end of the convex portion of the spike roller member **71***a* or **71***b* and a minimum outer diameter RO not including the convex portion is an effective outer diameter R**1** of the spike roller member **71***a* or **71***b*, it is preferable that an outer diameter R**2** of the sub roller member **71***c* is smaller than the effective outer diameter R**1** of the spike roller member **71***a* or **71***b* and is larger than the minimum outer diameter RO of the spike roller member **71***a* or **71***b*.

(106) It is preferable that a dimension SL**2** of the sub roller member **71***c* in the width direction X is smaller than a dimension SL**1** of the spike roller member **71***a* or **71***b* in the width direction X. It is preferable that the dimension SL**1** of the spike roller member **71***a* or **71***b* in the width direction X is 1.4 mm and the dimension SL**2** of the sub roller member **71***c* in the width direction X is 1.2 mm.

(107) As shown in FIG. **14**, the pinch roller **72** is disposed on a side (a right side of the transport path in the diagram) facing the positive image observation surface **40** (see FIG. **8**) of the first instant film **28**. The pinch roller **72** includes a roller member **72***a* and a rotational shaft **72***b*. Both end portions of the roller member **72***a* are supported so as to freely move by a support member (not shown) within a thickness range of the first instant film **28**, and are pressed toward the capstan roller **71** by springs **76** as press mechanisms. Thus, the pinch roller **72** is elastically supported in a direction orthogonal to the transport direction of the first instant film **28**.

(108) The transport roller pair **53** transports the first and second instant films **28** and **29** discharged out from the first and second instant film packs **24** and **25** by the claw member **57** toward the spreading roller pair **54**. The configuration for transporting the first and second instant films **28** and **29** by the transport roller pair **53** will be described later. An exposure position P (see FIG. **14**) at which the exposure head **51** exposes the print light to the first and second instant films **28** and **29** is positioned between the discharge ports **31***c* of the first and second instant film packs **24** and **25** and the transport roller pair **53**. The exposure using the exposure head **51** is performed for a period during which the instant film is transported by the transport roller pair **53**.

(109) The exposure is performed by sequentially exposing line images on the first and second instant films **28** and **29** by the exposure head **51** while moving the first and second instant films **28** and **29** for each line. Accordingly, an image corresponding to a single screen is exposed on the photosensitive layer of the first and second instant films **28** and **29**. The first and second instant films **28** and **29** are subsequently transported toward the spreading roller pair **54** by the transport roller pair **53**.

(110) Since the first and second instant films **28** and **29** have different dimensions in the width direction X, the exposure of the line images by the exposure head **51** is also different. The exposure by the exposure head **51** is switched according to the signal of the detection switch **78** provided in the film pack room **23**, as will be described later.

(111) The spreading roller pair **54** includes spreading rollers **73** and **74**, and is disposed on a downstream side of the transport roller pair **53** in the transport direction. The spreading roller **73** is disposed on a side (the left side of the transport path in the diagram) facing the exposure surfaces **28***a* and **29***a* of the first and second instant films **28** and **29**. The spreading roller **74** is disposed on

a side (the right side of the transport path in the diagram) facing the image observation surfaces of the first and second instant films **28** and **29**. Both end portions of the spreading roller **74** are supported so as to freely move within the thickness range of the first and second instant films **28** and **29** by a support member (not shown), and are pressed toward the spreading roller **73** by springs **77** as press mechanisms. Thus, the spreading roller **74** is elastically supported in a direction orthogonal to the transport direction of the first instant film **28**.

(112) Although not shown, driving gears are attached to one-side shaft end portions of the spreading rollers **73** and **74**, and both the driving gears mesh each other. The motor is connected to one of the driving gears through an intermediate gear. Thus, in a case where the motor rotates, the spreading rollers **73** and **74** are rotated in synchronization with the motor.

(113) The ejection guide **58** is disposed on the downstream side of the spreading roller pair **54** in the transport direction. The spreading roller pair **54** transports the first instant film **28** transported by the transport roller pair **53** toward the ejection guide **58** while sandwiching the first instant film over the entire width. The first instant film is sandwiched by the spreading roller pair **54**, and thus, the developer pod **36** of the first instant film **28** is crushed. Accordingly, the developer is spread (unfolded) into the gap **39** (see FIG. **8**). The first instant film **28** discharged from the spreading roller pair **54** is transported toward the ejection guide **58**.

(114) The spreading control member **56** is provided between the transport roller pair **53** and the spreading roller pair **54**. The spreading control member **56** touches the positive image observation surface **40** of the transported first instant film **28**, and rubs the positive image observation surface **40** of the first instant film **28**. Thus, the spreading control member **56** that controls a distribution of developer being spread extends in a direction parallel to the width direction of the first instant film **28** being transported and orthogonal to the transport direction of the first instant film **28**. The spreading control member **56** is formed integrally with a plate-shaped support member **56***a*, and is fixed to the camera body **11** through the support member **56***a*.

(115) A distal end of the spreading control member **56** protrudes toward the first instant film **28** from a sandwiching position at which the spreading roller pair **54** sandwiches the first instant film **28** on a cross section which is orthogonal to the exposure surface **28***a* of the first instant film **28** being transported and is in parallel with the transport direction. Accordingly, the spreading control member **56** can securely rub the positive image observation surface **40** of the first instant film **28**.

(116) Action of Position Alignment Unit of Film Pack Room

(117) In a case where the first instant film pack **24** is loaded into the film pack room **23**, the position alignment in the width direction X, the transport direction Y, and the loading direction Z is performed by the position alignment protrusions **61***a* to **61***c* and **62***a*, the elastic members **64***a* to **64***c*, and the pair of film holding portions **22***a*. That is, the first instant film **28** built in the first instant film pack **24** is aligned with respect to the transport roller pair incorporated in the camera body **11**.

(118) As shown in FIG. **24**, the pair of spike roller members **71***a* and **71***b* are arranged at intervals from each other so as to correspond to the dimension of the first instant film **28** in the width direction X. More specifically, a first distance L**1** which is an interval between inner edges **71***e* and **71***f* of the pair of spike roller members **71***a* and **71***b* is longer than the dimension W**11** of the exposure surface **28***a* in the width direction X and is shorter than the dimension W**13** of the first instant film **28** in the width direction X.

(119) In a case where the transport roller pair **53** transports the first instant film **28**, the first instant film **28** is aligned at a position at which both the side edge portions **28***b* and **28***c* of the first instant film **28** are in slidably contact with the pair of spike roller members **71***a* and **71***b*, respectively, especially by the position alignment of the position alignment protrusions **61***a* to **61***c* and **62***a* in the width direction X. Accordingly, the pair of spike roller members **71***a* and **71***b* can transport the first instant film **28** toward the spreading roller pair **54** by securely holding both the side edge portions **28***b* and **28***c* of the first instant film **28**. The inner edges **71***e* and **71***f* of the spike roller members

71*a* and **71***b* refer to edges arranged on sides of the rotational shaft **71***d* facing each other in the axial direction in a case where the sub roller member **71***c* is excluded. FIGS. **24** and **25** are diagrams of the first and second instant films **28** and **29**, the transport roller pair **53**, the spreading roller pair **54**, and the like as viewed from the exposure surfaces **28***a* and **29***a*.

(120) In a case where the transport roller pair **53** transports the first instant film **28**, the sub roller member **71***c* is present between the spike roller members **71***a* and **71***b* at a position at which the developer pod **36** of the first instant film **28** is pressed. However, as described above, since the sub roller member **71***c* is formed in a smooth curved surface shape that is convex outward, a pressing force is very small. Thus, the developer pod **36** is not crushed, and unevenness in the development does not occur only in the portion at which the sub roller member **71***c* touches the first instant film **28**. Since the outer diameter R**2** of the sub roller member **71***c* is formed to be smaller than the effective outer diameter R**1** of the spike roller member **71***a* or **71***b*, it is possible to obtain a holding force in a case where the second instant film **29** is transported while further reducing the pressing force on the first instant film **28**.

(121) On the other hand, in a case where the second instant film pack **25** is loaded into the film pack room **23**, the position alignment in the width direction X, the transport direction Y, and the loading direction Z is performed by the position alignment grooves **65***a* and **65***b*, the elastic members **64***a* and **64***b*, and the pair of film holding portions **22***a*. That is, the second instant film **29** built in the second instant film pack **25** is aligned with respect to the transport roller pair **53** incorporated in the camera body **11**.

(122) As shown in FIG. **25**, the sub roller member **71***c* is disposed at an interval with respect to one spike roller member **71***b* so as to correspond to the dimension of the second instant film **29** in the width direction X. More specifically, a second distance L**2** which is an interval between inner edges **71***e* and **71***g* of one spike roller member **71***b* and the sub roller member **71***c* is longer than the dimension W**21** of the exposure surface **29***a* in the width direction X and is shorter than the dimension W**23** of the second instant film **29** in the width direction X. Accordingly, since the spike roller member **71***b* securely holds one side edge portion **29***b* of the second instant film **29** and the other side edge portion **29***b* and the sub roller member **71***c* are in slidably contact with each other, the second instant film **29** can be transported toward the spreading roller pair **54**.

(123) Since the size of the second instant film **29** is smaller than the size of the first instant film **28**, only one side edge portion is held and the other side edge portion is in slidably contact with the sub roller member, and thus, it is possible to obtain a sufficient torque. Accordingly, it is possible to transport the second instant film. The inner edges **71***e* and **71***g* of the spike roller member **71***b* and the sub roller member **71***c* refer to edges arranged on sides of the rotational shaft **71***d* facing each other in the axial direction.

(124) As described above, the second instant film pack **25** is aligned with the film pack room **23** so as to be shifted to the right side surface **23***a*. Accordingly, as shown in FIG. **25**, in a case where the transport roller pair **53** transports the second instant film **29**, the second instant film **29** is aligned so as to correspond to the position at which one side edge portion **29***b* of the second instant films **29** is in slidably contact with one spike roller member **71***b* and so as to correspond to the position at which the other side edge portion **29***c* of the second instant film **29** is in slidably contact with the sub roller member **71***c* by the position alignment of the position alignment grooves **65***a* and **65***b* especially in the width direction X.

(125) As described above, the dimensions D**11** and D**21** of both the side edge portions **28***b* and **28***c* of the first instant film **28** and both the side edge portions **29***b* and **29***c* of the second instant film **29** in the width direction X have dimensional differences. In the examples shown in FIGS. **9** and **13**, a difference between D**11** and D**21** is 1 mm. That is, even though the second instant film pack **25** and the second instant film **29** are shifted to the right side surface **23***a* of the film pack room **23** as described above, the positions of one side edge portion **28***b* and one side edge portion **29***b* cannot be perfectly aligned. In a case where positions of lateral sides of the first and second instant films

28 and **29** are aligned, positions of lateral sides of the exposure surfaces **28***a* and **29***a* are not aligned.

(126) Thus, in a case where the position alignment is performed as described above, as shown in FIG. **26**, a position of one lateral side **29***e* of the second instant film **29** is slightly shifted inward with respect to a position of one lateral side **28***e* of the first instant film **28**. As described above, since the right side surface **25***a* of the second instant film pack **25** is aligned with the right side surface **24***a* of the first instant film pack **24** so as to be shifted to the inside of the film pack room **23** by about 0.5 mm, the position can be shifted and the instant film can be transported as shown in FIG. **26**. FIG. **26** shows position comparison in a case where the first and second instant films **28** and **29** are aligned by the position alignment protrusions **61***a* to **61***c* and **62***a* or the position alignment grooves **65***a* and **65***b* as described above and are transported by the transport roller pair **53**. FIG. **26** is an explanatory diagram for comparison, and is different from an actual positional relationship between the first and second instant films **28** and **29**, the exposure head **51**, and the like.

(127) In the example shown in FIG. **26**, a difference G**1** between the position of one lateral side **28***e* of the first instant film **28** and the position of one lateral side **29***e* of the second instant film **29** is 0.5 mm. However, a difference between the dimensions D**11** and D**21** of the side edge portions **29***b* and **29***c* in the width direction X is 1 mm as described above, and the position of the lateral side **29***f* of the exposure surface **29***a* is still positioned outside the position of the lateral side **28***f* of the exposure surface **28***a* by a difference G**2**, and the difference G**2** is 0.5 mm. A shift between the positions of the exposure surfaces **28***a* and **29***a* will be described later.

(128) As described above, the first and second instant film packs **24** and **25** are aligned by the position alignment protrusions **61***a* to **61***c* and **62***a* or the position alignment grooves **65***a* and **65***b* and the second instant film pack **25** is aligned with the film pack room **23** so as to be shifted to the right side surface **23***a*. Thus, in a case where any one of the first or second instant film packs **24** and **25** is loaded into film pack room **23**, the cut-off portion **31***b* of the first instant film pack **24** and the cut-off portion **31***b* of the second instant film pack **25** are arranged at the same position (see FIG. **19** and FIG. **20**). Accordingly, the common claw member **57** and the claw member drive mechanism **60** can press the first and second instant films **28** and **29**. Further, it is possible to prevent an increase in the number of components without requiring the plurality of claw members or the complicated mechanism, and it is possible to reduce the cost. The same position includes a position within a range where the common claw member **57** can be inserted, and in a case where the position alignment is performed, any position where the claw member **57** can be inserted is acceptable even though the position of the cut-off portion **31***b* is slightly deviated.

(129) The claw member **57** enters the inside of the first and second instant film packs **24** and **25** through the cut-off portion **23***f* and the cut-off portions **31***b* by the claw member drive mechanism **60**, and presses the film cover **30** or the foremost first and second instant films **28** and **29**. Accordingly, the film cover **30** or the foremost first and second instant films **28** and **29** can be discharged outwards from the first and second instant film packs **24** and **25** through the discharge ports **31***c*.

(130) For example, the exposure head **51** is configured of a light source, a liquid crystal shutter, and a lens. The exposure head **51** is disposed on the upstream side of the transport roller pair **53** in the transport direction of the instant film and at a position facing the transport path of the instant film. The exposure head **51** irradiates the exposure surfaces **28***a* and **29***a* with line-shaped print light parallel to the width direction X of the first and second instant films **28** and **29**.

(131) The exposure is started based on output signals from a detection sensor (not shown) that detects the passing of the distal end portions of the first and second instant films **28** and **29** and a rotation speed detection sensor that detects a rotation speed of the capstan roller **71**. Initially, the passing of the distal end portions is detected by a distal-end-portion passing detection sensor. The detection of the rotation speed is started by the rotation speed detection sensor based on the

detection signal. In a case where the rotation speed reaches a predetermined value, the detection sensor detects that the exposure surface **28***a* of the first instant film **28** is transported to a position facing the exposure head **51**. Accordingly, the exposure by the exposure head **51** is started.

(132) The exposure by the exposure head **51** is switched according to the signal of the detection switch **78** (detector) provided in the film pack room **23**. As shown in (A) of FIG. **27**, the detection switch **78** is configured of a press portion **78***a*, a spring, a contact (both not shown), a case **78***b* holding these components, and the like. The detection switch **78** is provided on the left side surface **23***b* of the film pack room **23**. The case **78***b* is fitted into an opening portion **23***g* formed in the left side surface **23***b* of the film pack room **23**, and does not protrude to the inside of the film pack room **23**.

(133) As described above, since the second instant film pack **25** is aligned with the film pack room **23** so as to be shifted to the right side surface **23***a*, the second instant film pack does not touch the detection switch **78**. Since the first instant film pack **24** touches the position alignment protrusion **62***a* provided on the left side surface **23***b*, the first instant film similarly touches the detection switch **78** provided on the left side surface **23***b*.

(134) The press portion **78***a* has a fan shape. The press portion **78***a* is rotatably supported with respect to the case **78***b* via a rotational shaft **78***c*. The press portion **78***a* protrudes from the case **78***b* and enters the inside of the film pack room **23** by a spring incorporated in the case **78***b*.

(135) As shown in (B) of FIG. **27**, in a case where the first instant film pack **24** is loaded into the film pack room **23**, a side surface **24***b* of the first instant film pack **24** presses the press portion **78***a*. The press portion **78***a* is pushed into the case **78***b* against the urging force of the spring, and presses an internal contact and the like. Accordingly, the detection switch **78** outputs an on signal. In a case where the press portion **78***a* is not pressed, the detection switch **78** outputs an off signal.

(136) As described above, the dimension W**21** of the exposure surface **29***a* of the second instant film **29** in the width direction X is smaller than the dimension W**11** of the exposure surface **28***a* of the first instant film **28** in the width direction X. On the other hand, the position of the lateral side **29***f* of the exposure surface **29***a* is positioned outside the position of the lateral side **28***f* of the exposure surface **28***a* by the difference G**2** by the position alignment of the position alignment protrusions **61***a* to **61***c* and **62***a* or the position alignment grooves **65***a* and **65***b* (see FIG. **26**). Even though the exposure surface **28***a* having a larger dimension in the width direction X is irradiated with the line-shaped print light to be applied to the exposure surfaces **28***a* and **29***a*, since one lateral side **29***f* of the exposure surface **29***a* is positioned outside the lateral side **28***f* of the exposure surface **28***a*, the exposure can be performed by the difference G**2**. Thus, in the exposure head **51** of the present embodiment, a maximum irradiation range W**31** of the line-shaped print light is set to be larger than the dimension W**11** of the exposure surface **28***a* in the width direction X. In a case where the first and second instant films **28** and **29** illustrated above are used, it is preferable that the maximum irradiation range W**31** of the line-shaped print light is set to be about 1 mm larger than the dimension W**11** of the exposure surface **28***a* in the width direction X.

(137) The controller **59** controls to switch between exposure ranges in which the exposure head **51** exposes an image according to the signal from the detection switch **78**. That is, the controller **59** switches between control such that the exposure head **51** exposes in an exposure range corresponding to the first instant film **28** in a case where the on signal is output from the detection switch **78** and control such that the exposure head exposes in an exposure range corresponding to the second instant film **29** in a case where the off signal is output from the detection switch **78**.

(138) The switching control of the exposure head **51** by the controller **59** will be described with reference to a flowchart shown in FIG. **28** and explanatory diagrams shown in FIGS. **26** and **29**. The printing process by the printer unit **13** is started by the photographer pressing the print switch **18***b*. First, the controller **59** determines whether the signal output from the detection switch **78** is the on signal or the off signal (S**11**).

(139) In a case where the first instant film pack **24** is loaded into the film pack room **23**, that is, in a

case where the on signal is output from the detection switch **78** (Yin S**11**), the controller **59** creates image data D**1** corresponding to the exposure surface **28***a* of the large first instant film **28** of which the dimension in the width direction X is large (S**12**). After the image data D**1** is created, the controller **59** controls the exposure head **51** based on the image data D**1** recorded in the built-in memory, and irradiates the exposure range corresponding to the first instant film **28**, that is, so as to correspond to the dimension W**11** of the exposure surface **28***a* in the width direction X with the line-shaped print light (S**13**; see FIG. **26**). The transport roller pair **53** transports the first instant film **28** discharged from the first instant film pack **24** by the claw member **57** toward the spreading roller pair **54**. Accordingly, an image can be formed over the entire surface of the exposure surface **28***a*. The first instant film **28** on which the image is formed is ejected from the film ejection port **21** to the outside of the camera body **11** by the spreading roller pair **54**.

(140) On the other hand, in a case where the second instant film pack **25** is loaded into the film pack room **23**, that is, in a case where the off signal is output from the detection switch **78** (N in S**11**), the controller **59** creates image data D**2** corresponding to the exposure surface **29***a* of the second instant film **29** of which the dimension in the width direction X is small (S**14**). In the example shown in FIG. **29**, since the dimension of the exposure surface **29***a* in the width direction X is smaller than the dimension of the exposure surface **28***a* in the width direction X, the image data D**2** is created by trimming (cutting out) an image in a center portion in the width direction X from the image data D**1**.

(141) After the image data D**2** is created, the controller **59** controls the exposure head **51** based on the image data D**2**, and irradiates the exposure range corresponding to the second instant film **29**, that is, so as to correspond to the dimension W**21** of the exposure surface **29***a* in the width direction X with the line-shaped print light (S**15**; see FIG. **26**). The transport roller pair **53** transports the second instant film **29** discharged from the second instant film pack **25** by the claw member **57** toward the spreading roller pair **54**. In a case where the exposure head **51** irradiates the exposure surface **29***a* with the print light, the position of the lateral side **29***f* of the exposure surface **29***a* is positioned outside the position of the lateral side **28***f* of the exposure surface **28***a* by the difference G**2**. However, since the maximum irradiation range W**31** of the exposure head **51** with the print light is set to be large, an image can be formed over the entire surface of the exposure surface **29***a*. The second instant film **29** on which the image is formed is ejected from the film ejection port **21** to the outside of the camera body **11** by the spreading roller pair **54**.

(142) In the example shown in FIG. **29**, the image data D**2** is created by trimming the image in the center portion in the width direction X from the image data D**1**, but the present invention is not limited thereto. The image data D**2** corresponding to the exposure surface **29***a* of the second instant film **29** may be created. For example, the image data D**2** may be created by reducing the image data D**1** corresponding to the exposure surface **28***a* of the first instant film **28** by the same ratio in the width direction X and the transport direction Y.

(143) In the above embodiment, the detection switch **78** that detects the pressure from the first instant film pack **24** is used as the detector that detects that the first instant film pack **24** is loaded into the film pack room **23**. However, the present invention is not limited thereto, and a contact-type detector that outputs an on signal by coming contact with the first instant film pack **24**, a detector including a photoelectric sensor, or the like may be used.

(144) In the above embodiment, an example in which a transport device for an instant film is applied to the digital camera with a printer is used, but the present invention is not limited thereto, and may be applied to a printer. For example, in the printer unit **13** similar to the above embodiment and a device main body having the printer unit, a printer in which any one of the first and second instant film packs **24** and **25** is loaded into the film pack room **23**, image data is received by using wireless communication from an electronic device such as a smartphone, and image is printed on the first and second instant films **28** and **29** based on the received image data is preferable.

(145) In the above embodiment, a hardware structure of a processing unit that executes various kinds of processing such as the controller **59** includes various processors to be described below. The various processors include a central processing unit (CPU) which is a general-purpose processor that functions as various processing units by executing software (program), a graphical processing unit (GPU), a programmable logic device (PLD) such as a field programmable gate array (FPGA) which is a processor capable of changing a circuit configuration after manufacture, a dedicated electric circuit which is a processor having a circuit configuration specifically designed to execute various processing, and the like.

(146) One processing unit may be configured by one of these various processors, or may be configured by a combination of two or more processors having the same type or different types (for example, a combination of a plurality of FPGAs, a combination of a CPU and an FPGA, a combination of a CPU and a GPU, or the like). The plurality of processing units may be constituted by one processor. As an example in which the plurality of processing units are constituted by one processor, firstly, one processor is constituted by a combination of one or more CPUs and software as represented by computers such as clients and servers, and this processor functions as the plurality of processing units. Secondly, a processor that realizes the functions of the entire system including the plurality of processing units via one integrated circuit (IC) chip is used as represented by a system on chip (SoC). As described above, the various processing units are constituted by using one or more of the various processors as the hardware structure.

(147) More specifically, an electric circuitry in which circuit elements such as semiconductor elements are combined can be used as the hardware structure of these various processors.

EXPLANATION OF REFERENCES

(148) **10**: digital camera with printer **11**: camera body **12**: imaging unit **13**: printer unit **15**: imaging window **16**A: release switch **16**B: release switch **17**: rear display unit **18**: operation unit **18***a*: menu switch **18***b*: print switch **19**: imaging optical system **20**: solid-state imaging element **21**: film ejection port **22**: loading cover **22***a*: film holding portion **22***c*: hinge portion **23**: film pack room **23***a*: right side surface **23***b*: left side surface **23***c*: bottom surface **23***d*: top surface **23***e*: front surface **23***f*: cut-off portion **23***g*: opening portion **24**, **25**: instant film pack **24***a*, **24***b*: side surface **24***c*: L-shaped protrusion **24***d*: bottom surface **24***e*: top surface **25***a*, **25***b*: side surface **25***c*: bottom surface **25***d*: protrusion **25***e*: front surface **25***f*, **25***g*: rib **25***h*: top surface **26**: case **27**: film press plate **27***a*, **27***b*: sheet **27***c*, **27***e*: opening **27***d*, **27***f*: hole **27***g*, **27***h*: lower end portion **28**, **29**: instant film **28***a*, **29***a*: exposure surface **28***b*, **28***c*, **29***b*, **29***c*: side edge portion **28***e*, **28***f*, **29***e*, **29***f*: lateral side **30**: film cover **31**: case member **31***a*: exposure opening **31***b*: cut-off portion **31***c*: discharge port **31***d*: light shielding seal **32**: cover **32***a*: opening **32***b*: unit support protrusion **32***c*: pair of caulking pins **32***d*: support piece **33**: mask sheet **33***a*: screen opening **34**: photosensitive sheet **35**: cover sheet **36**: developer pod **37**: trap portion **38**: developer **39**: gap **40**: positive image observation surface **51**: exposure head **52**: roller drive mechanism **53**: transport roller pair **54**: spreading roller pair **56**: spreading control member **56***a*: support member **57**: claw member **58**: ejection guide **59**: controller **60**: claw member drive mechanism **61***a*, **61***b*, **61***c*, **62***a*: position alignment protrusion **63***a*: L-shaped cut-off portion **64***a*, **64***b*, **64***c*: elastic member **65***a*, **65***b*: position alignment groove **66**: cut-off portion for reversal loading prevention **67**: press member **67***a*: distal end portion **67***b*: rotational shaft **68**: holding frame **69**: spring **71**: capstan roller **71***a*: spike roller member **71***b*: spike roller member **71***c*: sub roller member **71***d*: rotational shaft **71***e*: inner edge **71***f*: inner edge **71***g*: inner edge **72**: pinch roller **72***a*: roller member **72***b*: rotational shaft **73**: spreading roller **74**: spreading roller **76**: spring **77**: spring **78**: detection switch **78***a*: press portion **78***b*: case **78***c*: rotational shaft CLX**0**, CLX**1**, CLX**2**: center line D**11**, D**21**: dimension G**1**, G**2**: difference H**11**, H**21**: dimension L**1**: first distance L**2**: second distance P: exposure position R**1**: effective outer diameter R**2**: outer diameter RM: maximum outer diameter RO: minimum outer diameter S: space SL**1**, SL**2**, TP**11**, TP**20**, TP**21**, W**11**, W**12**, W**13**, W**21**, W**22**, W**23**, WP**1**, WP**2**: dimension W**31**: maximum irradiation range

Claims

1. A printer comprising: a loading room into which any one of a first instant film pack or a second instant film pack is loaded, the first instant film pack including at least a plurality of first instant films and a first case which accommodates the first instant films in a stacking manner and in which a discharge port for discharging the first instant film is formed, the second instant film pack including at least a plurality of second instant films and a second case which accommodates the second instant films in a stacking manner and in which a discharge port for discharging the second instant film is formed; an exposure head that exposes an image on the first instant film or the second instant film; a transport mechanism that transports the first instant film or the second instant film to an exposure position at which the exposure head exposes the image; a discharge mechanism that has a claw member that is positioned on one side in a width direction of the loading room and that enters inside the first case or the second case, and in which the claw member presses and discharges the first or second instant film through the discharge port; and a position alignment unit that aligns the first and second instant film packs in the loading room; wherein the first and second cases have insertion ports into which the claw member is inserted, the second instant film pack has a dimension smaller than a dimension of the first instant film pack in the width direction, the position alignment unit aligns the second instant film pack so as to be shifted to the one side in the width direction on which the claw member is positioned, and the first and second instant film packs aligned by the position alignment unit have the insertion ports arranged at the same position in the loading room.
2. The printer according to claim 1, wherein the second instant film pack has a stepped portion having a dimension larger than a dimension of the first instant film pack in a thickness direction parallel to a loading direction into the loading room and orthogonal to the width direction, and the position alignment unit includes: a first position alignment unit that aligns the first instant film pack by touching both side surfaces of the first instant film pack; and a second position alignment unit that aligns the second instant film pack so as to be shifted to the one side in the width direction on which the claw member is positioned in the loading room by being fitted to the stepped portion.
3. The printer according to claim 2, wherein the stepped portion is a rib that extends in parallel with a length direction orthogonal to the width direction and the thickness direction, and protrudes in the thickness direction, and the second position alignment unit is a position alignment groove that is fitted to the rib.
4. The printer according to claim 2, wherein the first position alignment unit is a wedge-shaped position alignment protrusion provided on a side surface of the loading room.
5. The printer according to claim 2, wherein the second position alignment unit is positioned inside the loading room in the width direction with respect to the first position alignment unit.
6. A digital camera with a printer comprising: the printer according to claim 1; and an imaging unit that includes an imaging optical system, and captures a subject image to output image data to the printer.