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Remarks:
A request for correction of the description has been filed pursuant to Rule 139 EPC. A decision on the request will be taken during the proceedings before the Examining Division (Guidelines for Examination in the EPO, A-V, 3.).

(54) A METHOD OF STACKING PRINTED SHEETS IN A PRINTER

(57) A productive method of stacking sheets (A1-A14) which minimizes media waste is provided, which method comprising the steps of:
- removing at least one selected sheets (A1-A14) from a stream of sheets (A1-A14) designated for forming a stack with a queue of images (F1-F12, B1-B12) thereon in a predetermined image order:
- directing sheets (A1-A14) upstream of the at least one selected sheet (A1-A14) in the stream to a first stack holder (54) to stack these according to predetermined image order;
- directing sheets (A1-A14) downstream of the at least one selected sheet (A1-A14) in the stream to a second stack holder (70) different from the first stack holder (54) to stack these according to the predetermined image order;
- printing the one or more images for the selected sheets (A1-A14) on at least one re-print sheet (A1-A14) added to the stream and directing the printed at least one re-print sheet (A1-A14) to the first stack holder (54), so that the at least one re-print sheet (A1-A14) is stacked on the previously stacked sheet (A1-A14) according to the image order.

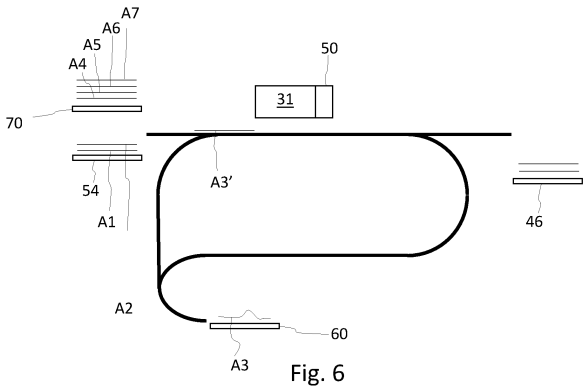

Fig. 6

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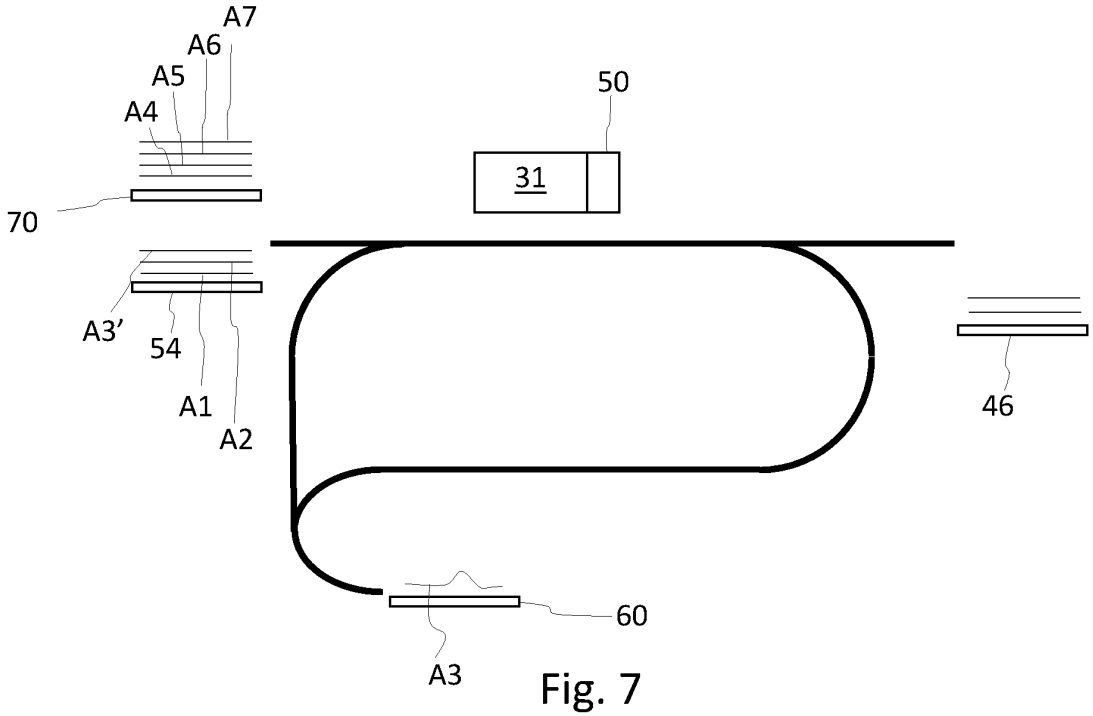

Fig. 7

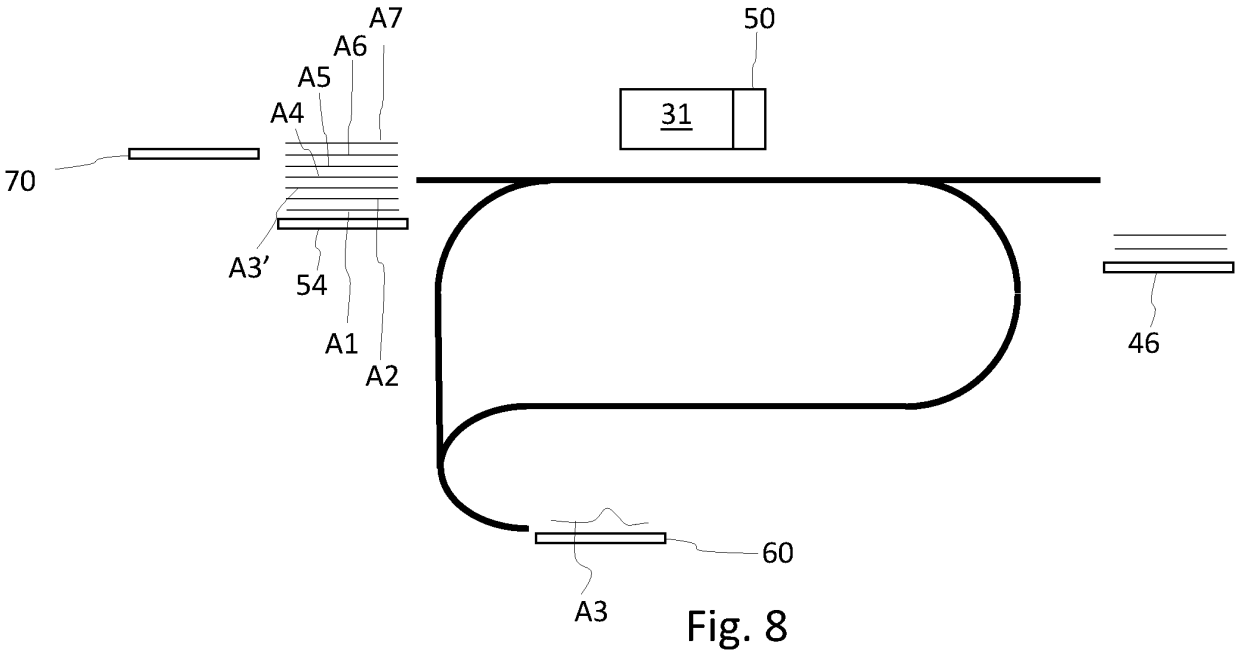

Fig. 8

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Description

BACKGROUND OF THE INVENTION

1. Field of the invention

[0001] The present invention relates to a method of stacking sheets, a sheet printer, and a software product for performing said method on said printer.

2. Description of Background Art

[0002] It is known from e.g. US 20180345693 A1, to provide a sheet printer with a detector for inspecting sheets for deviations, such as out-of-plane deformation and/or print artifacts in the printed image. Sheets determined to comprise a deviation are then removed from the transport path and directed to a reject collector. This prevents the deviating sheets from becoming part of the stack that is formed of the printed sheets. When multiple sheets are present on the transport path of the printer at the same time, the removal of a deviating sheets may disrupt the sheet order, for example when an image has already been printed on the deviating sheet and/or one or more sheets following it. To come to a correct image order in the stack, several printed sheets already present on the transport path are also directed to the reject collector. The corresponding images are then re-scheduled to blank sheets, so that these sheets arrive at the stack in the correct image order.

SUMMARY OF THE INVENTION

[0003] It is an object of the invention to provide an alternative or improved method of stacking printed sheets, which reduces the amount of media waste and/or improves productivity.

[0004] In accordance with the present invention, a method of stacking sheets according to claim 1, a sheet printer according to claim 10, and a computer program according to claim 15 are provided.

[0005] The method comprises the steps of:

- removing at least one selected sheet from a stream of sheets designated for forming a stack with a queue of images thereon in a predetermined image order.

[0006] The method is characterized by the steps of:

- directing sheets upstream of the at least one selected sheet in the stream to a first stack holder to stack these according to predetermined image order;
- directing sheets downstream of the at least one selected sheet in the stream to a second stack holder different from the first stack holder to stack these sheets according to the predetermined image order;
- printing the one or more images for the selected sheets on at least one re-print sheet added to the stream and directing the printed at least one re-print sheet to the first stack holder, so that the at least one re-print sheet is stacked on the previously stacked sheets according to the image order.

[0007] It is in the insight of the inventors that media waste can be reduced by splitting the stream of sheets around the sheets selected for removal, so that a first portion of the sheets in the stack upstream of the selected sheets can be stacked on a first stack holder and a second portion of the sheets in the stack downstream of the selected sheets can be stacked on a different, second stack holder. This allows any images that were ejected with the selected sheet(s) to be re-printed on one or more re-print sheet(s), which re-print sheet(s) can then be effectively inserted into the stack between the first and second portions by directing these sheet(s) to the first stack holder. Thereby, the image order in the stack is maintained while the number of sheets selected for ejection can be minimized.

[0008] While no deviations are detected in the sheets, the completely printed sheets of a print job are stacked onto the first stack holder in the image order. In case a sheet has been determined to be deviating from a predetermined reference, that sheet is selected for removal from the transport path of the printer upstream of the stack holders, so that said sheet will not be added to the stack of sheet for said print job. Preferably, after determining the sheet's deviation, printing on said sheet is prevented, which may include not printing on additional sheets trailing said sheets, which sheets may then also be selected for removal. Images originally assigned to the selected sheets are re-scheduled to blank sheets. A first portion of the completely printed sheets was stacked on the first stack holder. The removal of the selected sheets results in a 'gap' in the image order between the last sheet stacked on the first stack holder and the first following sheet completing its printing after the selected sheet(s). This first following sheet and one or more similar sheets trailing it are directed towards the second stack holder. There, the first following sheet and its trailing sheets are stacked according to the image order forming a second portion of a stack for the print job. Due to the removal one or more images are missing between the last sheet on the first stack holder and the first sheet on the second stack holder. These one or more images are re-scheduled to be printed on re-print sheet(s), which are directed to the first stack holder, so that the missing sheet(s) are stacked on the first portion in the image order. The second portion from the second stack holder can then be transferred onto the re-print sheet(s) on the first portion, so that a stack is formed with the images in the image order prescribed by the print job. This allows media waste to be reduced. Productivity is improved as the quality of the stacks is improved. Thereby, the object of the present invention has been achieved.

[0009] More specific optional features of the invention

are indicated in the dependent claims.

[0010] In an embodiment, the method according to the present invention further comprises the step of transferring the sheets from the second stack holder onto the sheets on the first stack holder, so that the sheets in the joint stack on the first stack holder are in the image order.

[0011] Completely printed sheets upstream of the selected sheets are stacked as the first portion on the first stack holder. Completely printed sheets downstream of the selected sheets are stacked as the second portion on the second stack holder. Images that were assigned to the selected sheet(s) are printed on re-print sheet(s), which are directed to be stacked on the first portion on the first stack holder. The re-print sheet(s) are stacked on the first portion in the image order until the image upstream of the first image on the second stack holder. By transferring the second portion from the second stack holder on the re-print sheet(s), a joint stack with the image order prescribed by the print job is formed.

[0012] In an embodiment, the step of transferring comprises positioning the second stack holder over the first stack holder and withdrawing the second stack holder from between a first portion and a second portion of the final stack, while holding the second portion over the first portion. As the second stack holder is withdrawn, the second portion is prevented from moving with it, for example by a retention element, such as a stop plate. The retention element engages the side of the second portion, where the second stack holder is withdrawn from, so that the second stack holder slides away from under the second portion. The second portion is thereby gradually lowered onto the re-print sheet(s) on the first portion.

[0013] In an embodiment, the method according to the present invention further comprises the step of the second stack holder moving into a working position of a stacker after the first stack holder has moved away from said working position. A single stacker may be arranged for stacking sheets on the first and second stack holder. The stacker defines a working position at which a stack holder is to be positioned to form a stack thereon. The stack holders can be moved in and out of said position, so that one of the stack holders can be at the working position, so that sheets are stacked thereon, while the other stack holder is in a remote position. Preferably, the remote position is overlapping and/or over the working position.

[0014] In an embodiment, the method according to the present invention further comprises the steps of:

- inspecting the sheets for deviations; and
- if a sheet is determined to comprise a deviation, selecting said sheet for removal from the transport path and directing it to a reject collector different from the first and second stack holders. A detector is arranged along the transport path upstream of the first and second stack holders to inspect sheets. The detector may be configured for detecting deformations in the sheet and/or for detecting deviations in the printed images as compared to the print job information. For example, if the detector compares the signal for each sheet to a predetermined threshold, and if said threshold is passed, the sheet is selected for removal and directed to a reject collector. The reject collector may comprise a tray, waste bin, shredder, etc.

[0015] In an embodiment, selecting a sheet for removal further comprises preventing a print assembly from printing an image on the at least one selected sheet. The detector is preferably positioned upstream of the print assembly and in case a deviation on a sheet is detected, that sheet passes the print assembly without printing thereon. To return the print assembly to its printing state may require additional sheets to also pass the print assembly without printing, which sheets may also be selected for removal to the reject collector.

[0016] In an embodiment, a protective action is performed to prevent contact between the print assembly and the at least one selected sheet. When the detector determines that there is risk of a sheet contacting the print assembly, the protective action is performed which results in a number of sheets passing the print assembly without printing thereon. For example, the print assembly may be protected by raising the print assembly and/or lowering the transport path section opposite the print assembly. The print assembly may be covered by means of a shield. The sheets may also be flattened by pressing means and/or by increasing suction on the side of the sheet opposite the print assembly. While performing the protective action, printing is prevented for a certain period of time. The period may be lengthened by a time required for returning the print assembly to its regular printing state. In this non-printing time period, a number of sheets pass the print assembly without printing thereon. The number may be 1, 2, 3, etc.

[0017] In an embodiment, when a deviating sheet has been detected, that sheet and at least any front side printed sheet trailing it within a non-printing time period of a protective action to prevent the deviating sheet from contacting the print assembly are selected and directed to a reject collector. The detector detects whether a sheet sufficiently deformed to risk coming into contact with the print assembly. Printing is then disabled for a non-printing period by protecting the print assembly and returning it to its printing state. In this non-printing period, a number of sheets pass along the print assembly without printing. Of this number at least the deviating sheet and any front side printed sheets are directed to the reject collector. Any blanks sheets trailing the deviating sheet in this non-printing time period may also be directed to the reject collector and/or returned to the print assembly via the duplex pass to re-used as blank sheets.

[0018] In an embodiment, the at least one selected sheet is at least one front side printed sheet on a second pass towards the print assembly for printing a back side

image on it. When the detector determines the to be selected sheet comprises a deviation, a front side image is present on said sheet and/or on one of the sheets that are selected to be directed to the reject collector with the deviating sheet. In one example, the image is on the sheet comprising the front side image and in another example the front side image is on a sheet directly trailing a deviating sheet, which former sheet cannot be printed on due to a protective action to prevent the printheads from printing on and/or contacting the latter sheet. The at least one selected sheet has already passed the print assembly once and is returned to the print assembly via a duplex loop for printing on its unprinted side. The selected sheet with the front side image is part of a stream of sheets with such front side images in the order defined by the image order. By removal of the selected sheet with the respective front side image, the image order is broken. The front side printed sheets trailing the selected sheet with the front side image at the time of the selection, are directed to the second stack holder to form the second stack portion. Ejection of these sheets is not required as these are stacked in the image order on the second stack holder. The second stack holder temporarily holds this second portion of the stack until a re-print sheet with the images for the selected sheet(s) with the front side image has been printed and positioned on the first portion on the stack on the first stack holder. It will be appreciated that the selected sheet(s) may further comprise multiple sheets printed with a front side image.

[0019] In an embodiment, the method according to the present invention further comprises the steps of:

- returning front side printed sheets upstream of the selected front side printed sheet to the print assembly for back side printing; and
- re-scheduling front side images scheduled for printing on blank sheets in the stream to blank sheets trailing the at least one selected sheet in the image order.

[0020] When a deviating sheet is detected and at two sheets are to be removed as a consequence of interrupting the printing, at least one those sheets may comprise a front side printed image and passes the print assembly without printing the respective back side image due to printing being prevented. These to be re-directed sheets are trailed on the transport path by a number of sheets already provided with a front side image in the order set by the image order. These trailing front side printed sheets were being returned to the print assembly via the duplex loop, wherein these sheets were flipped for back side printing. A back side image is then provided opposite the front side image in accordance with the print job. Thereby, a stream of double side printed sheets is formed according to the image order, which double side printed sheets are directed to the second stack holder for forming the second portion of the stack thereon. In between said front side printed sheets, blank sheets are present on the transport path section running towards the print assembly. In case a blank sheet is selected for removal to the reject collector, this triggers a re-scheduling of the queue of front side image by the number of blank sheets re-directed to the reject collector. The image queue is delayed, so that its first image is printed on the first blank sheet passing the print assembly following the non-printing period. The image queue is then printed on other blank sheets in the image order defined by the print job. Re-prints are inserted on the transport path in accordance with the number of sheet ejected onto the reject collector, so that the image queue can be finalized.

[0021] In an embodiment, the method according to the present invention further comprises re-scheduling a front side image and a back side image initially assigned to the at least one selected sheet to a blank sheet added to the stream, so that it trails at least the last of the returning front side printed sheets that were on the duplex loop. When a front side printed sheet is directed to the reject collector, a corresponding re-print sheet is inserted onto the transport path towards the print assembly. The re-print is scheduled for two passes along the print assembly, wherein the front side and back side images of the respective sheet directed onto the reject collector are printed. After completing printing, the double side printed sheet is directed to the first stack holder to land on the last sheet of the first portion of the stack. It will be appreciated that more than one front side printed sheet may be ejected from the transport path and that multiple re-print sheets are scheduled with the skipped images according to the image order.

[0022] In an embodiment, blank and front side printed sheets are interwoven in the stream upstream of a print assembly. The transport path comprises an input transport path coming from an input holder for holding at least one stack of sheets. The input holder supplies sheets to the input transport path. The input transport path and the duplex loop connect at an intersection, so that alternatingly sheet from the input transport path and sheet from the duplex loop may be inserted to form a stream of sheets moving towards the print assembly. This latter stream preferably comprises an alternating series of blank sheets and front side printed sheets. Optionally, blank sheets may be present on the duplex loop if a blank sheet fell with the non-printing time period without being a deviating sheet. These blank sheets can be recycled via the duplex loop and accordingly inserted into the stream.

[0023] In an embodiment, the at least one selected sheet comprises at least two subsequent sheets. The protective action results in a non-printing period wherein at least two adjacent pass the print assembly without printing. The upstream sheet is the deviating sheet, while any trailing sheets may be free of deviations. For larger print job of e.g. ten or more sheets, the stream of sheets towards the print assembly alternates blank sheets with front side printed sheets (with the possible exception of starts and ends of the print jobs). In consequence, a protective action will result in at least one front side

printed sheet being directed to the reject collector.

[0024] The present invention further relates to a sheet printer comprising:

- a stacker assembly comprising at least one stacker and a first and second stack holder for forming a stack of sheets thereon;
- a print assembly positioned along a transport path comprising a loop for returning front side printed sheets to the print assembly;
- a detector for inspecting the sheets for deviations;
- a reject collector positioned along the transport path;
- a controller configured to:

    - direct at least one sheet determined to comprise a deviation to the reject collector, thereby preventing said at least one deviating sheet from being stacked by the stacker assembly;
    - direct sheets upstream of the at least one deviating sheet to the stacker assembly to be stacked on the first stacker holder according to a predetermined image order;
    - direct sheets downstream of the at least one deviating sheet to the stacker assembly to be stacked on the second stacker holder according to a predetermined image order;
    - re-assign images originally the at least one deviating sheet are printed to at least one re-print sheet, which is directed to the first stack holder to be stacked on the sheets thereon according to the image order.

[0025] The detector is configured to detect deviations in and/or on a sheet. Deviations may comprises deviations in the shape of the sheet, e.g. out-of-plane deformations, and/or print artifacts, wherein a printed image visibly differs from the image comprised in the print job. The detector transmits a signal to the controller, which compares signal information to a pre-determined reference or threshold. In one example, the signal comprises height information and is compared to a height threshold, which corresponds to the print gap distance between the print assembly and its underlying transport path section. In another example, the signal comprises image data and is compared to corresponding image data of the print job. If the comparison yields that the signal is outside of a predetermined margin with respect to the reference, then the controller determines the sheet to comprise a deviation. The sheet is then directed to the reject collector. Thereby, a sheet comprising an already printed image may be removed from the stream of sheets on the transport path. If stacking continues as originally scheduled, the image order in the stack will be incorrect due to the absence of the removed, deviating sheet. Sheets that were scheduled to complete their printing upstream or ahead of the deviating sheet were and are stacked on the first stack holder. Sheets downstream or trailing the deviating sheet are stacked on the second stack holder. The controller further insert a blank re-print sheet onto the transport path and assigns the images originally scheduled to the deviating sheet to the re-print sheet. The re-print sheet is then directed onto the first stack holder, so that the first portion of the stack on the first stack holder has sheets with images in the correct image order. The second portion of the stack on the second stack holder can then be transferred onto the first portion to form a stack with the correct image order. It will be appreciated that more than one deviating sheet can be removed during a print job. In addition, the removal of a deviation sheet may require the removal of one or more sheets trailing the deviating sheet. In case multiple subsequent sheets are scheduled for removal, the images corresponding to these sheets are re-scheduled to blank sheets, so that these sheets arrive at the first stack holder with the images in the correct image order. Thus, the quality of the output stack is improved. In addition, productivity is increased, as operators can rely on the printer ensuring the quality of the stack.

[0026] In an embodiment, the printer according further comprises an actuator for moving the second stack holder with respect to the first stack holder for transferring sheets from the second stack holder to the first stack holder, so that a combined stack of sheets corresponding to the image order is formed. The transfer of the second portion onto the first portion with the re-print sheets on it can thus be performed without operator interference, though in another embodiment the transfer may be performed manually. The first and second stack holders are preferably movable in the during use vertical direction, so that a top of a stack can be maintained at the stacker or reliable stacking. The second stack holder is further movable with respect to the first stack holder by means of the actuator in a during use horizontal direction. This allows the second portion of the stack on the second stack holder be positioned over the first stack holder. The actuator is arranged to withdraw the second stacker holder from in between the first and second portions of the stack, so that the second portion is transferred onto the re-print sheet(s) on top of the first portion on the first stack holder.

[0027] The present invention further relates to a sheet printer comprising:

- a stacker assembly comprising at least one stacker and a first and second stack holder for forming a stack of sheets thereon;
- a print assembly positioned along a transport path comprising a loop for returning front side printed sheets to the print assembly;
- a detector for inspecting the sheets for deviations;
- a reject collector positioned along the transport path, so that it can receive sheets determine to comprise deviations, thereby preventing said sheets from arriving at the stacker assembly;
- a controller configured to:

- perform a protective action to prevent a sheet determined to comprise a deviation from contacting the print assembly, during which protective action at least one sheet passes the print assembly without printing thereon and is directed to the reject collector;
- direct sheets upstream of the at least one non-printed sheet to the stacker assembly to be stacked on the first stacker holder according to a predetermined image order;
- direct sheets downstream of the at least one non-printed sheet to the stacker assembly to be stacked on the second stacker holder according to a predetermined image order;
- re-assign images originally the at least one non-printed sheet are printed to at least one re-print sheet, which is directed to the first stack holder to be stacked on the sheets thereon according to the image order.

[0028] The printer comprises a detector for inspecting the sheets for deviations and if a sheet is determined to be sufficiently deviating, then that sheet is directed to a reject collector. Additionally, a protective action is taken to prevent the deviating sheet from coming into contact with the print assembly. The protective action prevents printing on the deviating sheet and, dependent on the action, one or more sheets trailing the deviating sheet. If one of the sheets being prevented from being printed on already comprises a printed front side image, then that front side printed image taken out of the stream of images and directed to the reject collector. This however results in a gap in stream of sheets where according to the image order, the image(s) originally assigned to the that front side printed sheet would have been. If the print job is continued, then one or more images would be missing from the stack formed at the stacker assembly. Completely printed sheets upstream of the non-printed front side printed sheet were directed to a first stack holder and were stacked there into a first portion of the final stack. The front side printed sheets trailing the non-printed front side printed sheet at the time of the protective action are directed to a different, second stack holder for forming a second portion of the final stack. In addition, images may be re-scheduled to any blanks sheets present on the transport path, so that these sheets are directed to the stack with front and back images in the image order. The images originally assigned to the non-printed front side printed sheet are printed on a blank re-print sheet that has been inserted onto the transport path. The re-print sheet is directed to the first stack holder, where it is stacked on the first portion. The second portion can then be transferred from the second stack holder to the first stack holder to form a stack with images according to the image order.

[0029] In an embodiment, the printer further comprises an actuator for moving the second stack holder with respect to the first stack holder for transferring sheets from the second stack holder to the first stack holder, so that a combined stack of sheets corresponding to the image order is formed. The second stack holder is preferably a buffer that is arranged to move into the working position of the stacker, when the first stack holder has been removed from that position. The first stack holder for example may be movable in the during use vertical direction and is lowered out of the working position with the first portion of the stack on it. The second stack holder is then inserted into the working position, for example from above, below, or sideways. The first stack holder when in its inactive position defines a space sufficiently large to allow a large number of sheets to be stacked on the second stack holder in the working position.

[0030] In an embodiment, the stacker assembly comprises a retention element configured to support the second stack portion during transfer to the first stack holder. The retention element prevents during horizontal movement of the second portion, as the second stack holder is pulled out from under it. Thereby, the second portion can be controllably transferred onto the portion of the stack on the first stack holder. The retention element may a stop element, such as a plate.

[0031] In an embodiment, the printer further comprises a duplex loop for returning front side printed sheets to the print assembly for printing a back side image thereon, wherein the at least one non-printed sheet is at least one front side printed sheet, and wherein the controller is configured for:

- printing the corresponding back side images on front side printed sheets trailing the non-printing sheets on the transport path during the protective action and directing these to the second stack holder for stacking them according to the image order; and
- re-scheduling to be printed front side images to blanks sheet trailing the non-printing sheets on the transport path during the protective action and directing these to the second stack holder for stacking them according to the image order.

[0032] The print job defines N_{total} sheets to be printed in the image order. N_{total} may be the total number sheets for the entire print job or a subset thereof, e.g. the total or maximum number of sheets that can held by the transport path at a time. A deviating sheet is directed and in consequence of the protective action, N_{reject} sheet(s) are not printed and removed to the reject holder. The N_{reject} sheet(s) comprise at least one image already printed. At the moment of detection of the deviating sheet, $N_{leading}$ front side printed sheets are upstream of the N_{reject} sheet(s) returning to the print assembly, while $N_{trailing}$ blank sheets are a trailing the N_{reject} sheet(s). In this example $N_{total} = N_{leading} + N_{trailing} + N_{reject}$. The controller schedules the back side images for the $N_{leading}$ sheets to be printed on these sheets in the image order and direct these $N_{leading}$ sheets to the second stack holder. The respective front and back side image originally assigned

to the $N_{trailing}$ sheets are re-scheduled, so that these are printed in the image order and follow the last of the $N_{leading}$ sheets when being passed to the second stack holder. A number $N_{reprint}$ of re-print sheet(s) equal to N_{reject} are added to the transport and the images for the N_{reject} sheet(s) are re-scheduled for printing on the $N_{reprint}$ re-print sheet(s). The $N_{reprint}$ re-print sheet(s) preferably follow the $N_{trailing}$ sheets on their way to the stack assembly and are directed to the first stack holder, where the $N_{reprint}$ re-print sheet(s) are stacked on the $N_{upstream}$ sheets on. The $N_{trailing}$ sheets are then added onto the $N_{reprint}$ re-print sheet(s), so that a stack of N_{total} sheets is formed.

[0033] In an embodiment, the controller is further configured for:

- inserting blank sheets onto the transport path proportional to a number of sheets directed to the reject collector;
- and re-scheduling a front and a back side image originally assigned to a non-printed front side printed sheet to a blank sheet and directing it to the second stack holder to be stacked thereon in the image order.

[0034] The present invention further relates to a computer program comprising instructions which, when the program is executed by any embodiment of a printer as described herein cause the printer to carry out any embodiment of the method as described herein.

[0035] Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the present invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the present invention will become apparent to those skilled in the art from this detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] The present invention will become more fully understood from the detailed description given herein below and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention, and wherein:

Fig. 1 is a schematic side view of a first embodiment of a sheet printer according to the present invention with the detector configured as a sheet deformation or height detector;

Figs. 2 to 8 are schematic side views of a transport path of the printer in Fig. 1 in different steps of forming a stack while detecting a deviation on a sheet;

Fig. 9 to 17 are a schematic representations of different steps during a re-scheduling of front and back side images when a deviation in a sheet is detected when forming a stack in the printer in Fig. 1;

Fig. 18 is a schematic side view of a second embodiment of a sheet printer with the detector configured as an image quality detector;

Figs. 19 to 21 are schematic representations of the transfer of a portion of a stack from one stack holder to the other; and

Fig. 22 is a schematic representation of a user interface.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0037] The present invention will now be described with reference to the accompanying drawings, wherein the same reference numerals have been used to identify the same or similar elements throughout the several views.

Printer

[0038] FIG. 1 shows schematically an embodiment of a printing system 1 according to the present invention. The printing system 1, for purposes of explanation, is divided into an output section 5, a print engine and control section 3, a local user interface 7 and an input section 4. While a specific printing system is shown and described, the disclosed embodiments may be used with other types of printing system such as an ink jet print system, an electrographic print system, etc.

[0039] One or supplies of recording material are located in the input section 4. Marking material located in a reservoir 39 near or in the print head or print assembly 31 of the print engine to print on the recording material. Printed recording material is output in the output section 5 in the form of stacks of printed sheets.

[0040] The input section 4 may include one or more sheet feeding modules, which each comprise at least one input stack holders 41, 44, 45 for holding the image receiving material before transporting the sheets of image receiving material to the print engine and control section 3. The sheets are stored as stacks 46 on their respective input stack holders 41, 44, 45. Sheets of image receiving material are separated by a sheet separating module from an input stack holder and guided by guiding means 42, 43, 47 to the print engine and control section 3.

[0041] The paper path of the printer 1 comprises a plurality of paper path sections 32, 33, 34, 35 for transporting the image receiving material from an entry point 36 of the print engine and control section 3 along the print head or print assembly 31 to the stacker 53 of the output section 5. The paper path sections 32, 33, 34, 35 form a loop. The duplex loop enables the printing of a duplex print job and/or a mix-plex job, i.e. a print job comprising a mix of sheets intended to be printed partially in a simplex mode and partially in a duplex mode.

[0042] While an image receiving material is trans-

ported along the paper path section 34 in a first pass in the loop, the image receiving material receives the marking material through the print head or print assembly 31. A next paper path section 32 is a flip unit 32 for selecting a different subsequent paper path for simplex or duplex printing of the image receiving material. The flip unit 32 may be also used to flip a sheet of image receiving material after printing in simplex mode before the sheet leaves the print engine and control section 3 via a curved section 38 of the flip unit 32 and via the inlet 53 to the output section 5. The curved section 38 of the flip unit 32 may not be present and the turning of a simplex page has to be done via another paper path section 35.

[0043] In case of duplex printing on a sheet or when the curved section 38 is not present, the sheet is transported along the loop via paper path section 35A in order to turn the sheet for enabling printing on the other side of the sheet. The sheet is transported along the paper path section 35 until it reaches a merging point 34A at which sheets entering the paper path section 34 from the entry point 36 interweave with the sheets coming from the paper path section 35. The sheets entering the paper path section 34 from the entry point 36 are starting their first pass along the print head or print assembly 31 in the loop. The sheets coming from the paper path section 35 are starting their second pass along the print head or print assembly 31 in the loop. When a sheet has passed the print head or print assembly 31 for the second time in the second pass, the sheet is transported to the inlet 53 of the output section 5.

[0044] The print head or print assembly 31 is suitable for ejecting and/or fixing marking material to image receiving material. The print head or print assembly 31 is positioned near the paper path section 34. The print head or print assembly 31 may be an inkjet print head, a direct imaging toner assembly or an indirect imaging toner assembly. The print assembly 31 further comprises a detector 50 in this example provided adjacent and upstream of the printheads. The detector 50 is configured to detect deformation in a sheet, so that it can be determined whether there is a risk of the sheet coming into direct contact with the printheads. The detector 50 may be an acoustic or optical detector, such as a camera, 3D scanner, line scanner, etc. and/or a contact sensor. If the controller 37 determines that a the deformation of a sheet exceeds a predetermined threshold (e.g. the print gap or a parameter proportional thereto), the deformed sheet can be ejected from the transport path. In this example, the deformed is ejected on the duplex pass sheet in the paper path section 35A to the reject collector 60. Other or multiple reject locations may be applied as well.

[0045] The output section 5 comprises an first stack holder 54 for holding printed sheets of image receiving material, for example a plurality of sheets. The output section 5 may comprise further stack holders 70. The printed image receiving material is transported from the print assembly 31 and control section 3 to a stacker 53 positioned along the output transport path 52, which stacks the sheets on top of one another at the first stack holder 54. The first stack holder 54 with a stack on it can be ejected from the output section 5 to a pick-up position 51. The first stack holder 54 may be equipped to hold a stack directly on it or to hold a stack on a suitable carrier, such as a pallet or other support device.

[0046] The print engine and control section 3 comprises a print engine and a controller 37 for controlling the printing process and scheduling the plurality of sheets in a printing order before they are separated from a stack at the input section 4.

[0047] The controller 37 is a computer, a server or a workstation, connected to the print engine and connected to the digital environment of the printing system, for example a network N for transmitting a submitted print job to the printing system 1. In FIG. 1 the controller 37 is positioned inside the print engine and control section 3, but the controller 37 may also be at least partially positioned outside the print engine and control section 3 in connection with the network N in a workstation N1.

[0048] The controller 37 comprises a print job receiving section 371 permitting a user to submit a print job to the printing system 1, the print job comprising image data to be printed and a plurality of print job settings. The controller 37 comprises a print job queue section 372 comprising a print job queue for print jobs submitted to the printing system 1 and scheduled to be printed. The controller 37 comprises a sheet scheduling section 373 for determining for each of the plurality of sheets of the print jobs in the print job queue an entrance time in the paper path of the print engine and control section 3, especially an entrance time for the first pass and an entrance time for the second pass in the loop in the paper path according to the present invention. The sheet scheduling section 373 will also be called scheduler 373 hereinafter.

[0049] The sheet scheduling section 373 takes the length of the loop into account. The length of the loop corresponds to a loop time duration of a sheet going through the loop dependent on the velocity of the sheets in the loop. The loop time duration may vary per kind of sheet, i.e. a sheet with different media properties.

[0050] The local user interface 7 is suitable for displaying user interface windows for controlling the print job queue residing in the controller 37. In another embodiment a computer N1 in the network N has a user interface for displaying and controlling the print job queue of the printing system 1.

Stacking order and sheet rejection

[0051] Fig. 2 schematically illustrates the transport path of the printer in Fig. 1 with the input stack holder 46, the first stack holder 54, the second stack holder 70, and the reject collector 60. A plurality of sheets A1-A7 are present on the transport path. In this basic example, all sheets A1-A7 have been printed on on at least one side. It will be appreciated that additional sheets may be interwoven or inserted between the sheets A1-A7, but these

have been omitted for the sake of clarity.

[0052] The sheets A1-A7 correspond to single print job requiring the duplex printing of each sheet A1-A7. Fig. 1, the leading sheet A1 has been printed on both sides, while the double sided printing of the second sheet A2 is being finalized. The third sheet A3 has been successfully printed on a first side, but has become deformed when on its return pass through the loop back towards the print assembly 31.

[0053] When the deformed sheet A3 reaches the detector 50, its deformation is detected and transmitted to the controller 37. The controller 37 determines that the detected deformation exceeds the predetermined threshold, in this example a print gap distance between the print assembly 31 and the transport path section 33. The deformed sheet A3 is then flagged for ejection from the transport path without printing on its second side. Additionally, measures may be taken to prevent the deformed sheet A3 from contacting the print assembly 31, for example by flattening the sheet A3 (by pressing on the sheet or increasing a negative pressure sucking it down) and/or by raising the print assembly 31. The controller 37 directs the deformed sheet A3 towards the reject collector 60. The upstream sheets A1, A2 have been successfully printed without excessive deformation, so these are transported to the first stack holder 54. There the sheets A1, A23 are stacked by the stacker 53.

[0054] The sheets A4-A7 trailing the deformed sheet A3 are not significantly deformed, so these are printed as scheduled, as illustrated in Fig. 4. To prevent the trailing sheets A4-A7 to be stacked directly on the upstream sheets A1-A2, the second stack holder 70 in the form of a buffer is inserted at the working position of the stacker 53. The first stack holder 54 in therein moved away from the working position of the stacker 53 to make space for inserting the second stack holder 70. The trailing sheets A4-A7 are then stacked on the second stack holder 70 in the order as present on the transport path.

[0055] Fig. 5 illustrates the insertion of a reprint sheet A3' from the input stack holder 46. The reprint sheet A3' is of the same material and dimensions as the rejected sheet A3. In this example, the reprint sheet A3' is inserted so that its double-sided printing will be completed after completing the printing of the last sheet A7. While in Fig. 5 the re-print sheet A3' is inserted following the last A7, it may also be interwoven into the stream of trailing sheets A4-A7. The images originally scheduled to be printed on the rejected sheet A3 are re-scheduled, so that these are printed on the reprint sheet A3'.

[0056] As shown in Fig. 6, the first stack holder 54 is moved back to the working position of the stacker 53 before the reprint sheet A3' reaches the stacker 53. The second stack holder 70 with the trailing sheets A4-A7 on it is moved away from the working position, so that its position can be taken up by the first stack holder 54. The reprint sheet A3' is then stacked on the upstream sheets A1-A2, as shown in Fig. 7. In consequence, the sheets A1-A3 on the first stack holder 54 are stacked in the corrected order as defined by the print job.

[0057] In Fig. 8, the second stack holder 70 transfers the stack of trailing sheets A4-A7 onto the stack of sheets A1-A3 on the first stack holder 54. The second stack holder 70 is for example positioned over the first stack holder 54. The second stack holder 70 is then retracted, wherein the stack of trailing sheets A4-A7 is prevented from moving in the retraction direction. Thus, the trailing sheets A4-A7 are transferred onto the upstream sheets A1-A2, A3'. Thereby, a stack of sheets A1-A7 is formed in the correct order as pre-defined by the print job. The final stack can then be moved to the pick-up position 51, where it can be picked for processing the stack into a print product. No operator interference is required to ensure the correct sheet order. The amount of rejected sheets can be minimized.

Scheduling

[0058] Fig. 9 illustrate a graphical representation of a print job schedule in the form of an image queue. The larger row represents a stream of sheets A1-A12 relative to the detector 50 (which in this example also corresponds to the position of the print assembly 31). The middle row represent the front side images F8-F12 that are scheduled to be printed. The top row represents the back side images B2-B12 that are to be printed. In Fig. 9, the print job has been partially processed to the point that a leading sheet A1 has successfully been printed on both sides. It will be appreciated that the sheet A1 in this example may be any sheet in a stream of sheets for a print job. A portion of the sheets A2-A7 on the transport path have been printed on a first side only and are returning on the loop back to the print assembly 31 for printing on their second side. Interwoven between these single-side printed sheets A2-A7 are blank sheets A8-A9 that are inserted from the input stack holder 46, so that on the transport path section 33, blank sheets A8-A9 alternate with single-side printed sheets A2-A7. While this example shows only double side printed sheets, single side only printed sheets may be accordingly be present within the print job as well.

[0059] Fig. 10 illustrates the detector 50 determining that the sheet A8 is deformed beyond the allowed threshold, as indicated by the black cross. The controller 37 then performs a protection action that prevents the deformed sheet A8 from contacting the print assembly 31. Such protection action may comprise inserting a shield over the print assembly 31, flattening the deformed sheet A8 by pressing a press onto it, lowering the transport path section 33, and/or raising the print assembly 31. In practice, a restoring action is required to return the print assembly 31 and/or the transport path section 33 to its printing state. The time require to perform the restoring action may prevent the print assembly from printing on one or more sheets A2 trailing the deviating sheet A8, as indicated by the dashed box in Fig. 10. In consequence,

these trailing sheet(s) A2 are also not printed on as scheduled by the printjob. In the example in Fig. 10, the images F8, B8, B2 within the non-printing period of the dashed box are not printed. The deformed sheet A8 is flagged for removal via the reject collector 60, as well as any other sheet(s) A2 that fall within the non-printing period illustrated by the dashed box. In another example, the sheet A2 could have been a blank sheet, so it could alternatively have been sent back to the print assembly via the duplex loop.

[0060] As shown in Fig. 11, the first sheet A1 is directed to the first stack holder 54 after double sided printing. The deformed sheet A8 and any following sheet A2 falling within the non-printing period are not printed and preferably directed to the reject collector 60. After the first sheet A1 has been stacked on the first stack holder 54, the first stack holder 54 is moved out of the working position of the stacker 53. The second stack holder 70 in the form of the buffer is then inserted at this working position. In addition, two new blank sheets A13, A14 are inserted onto the transport path. The new blank sheets A13, A14 may be interwoven in between single-side printed images A3-A7 returning via the duplex loop.

[0061] Fig. 11, also illustrates a re-scheduling in the image queue with respect to the sheets A9-A14, as illustrated by the thicker boxes in the image queue. The front and back images F8, A8 that fell within the non-printing period are re-assigned to blank sheets A9 trailing the sheets A2, A8 that fell within the non-printing period. In consequence, the image queue for front and back images F8-F12, B8-B12 are shifted to trailing sheets: images F8, B8 shift from sheet A8 to sheet A9, images F9, B9 shift from sheet A9 to sheet A10, etc. The final image F12, B12 is re-assigned to one of the newly inserted blank sheets A13 in the order as defined by the print job. It will be appreciated that if more than one blank sheet A8 falls with the non-printing period, the shifting of the images will be proportional to the number of said blank sheets.

[0062] For any single-side printed sheets A2 falling with the non-printing period, the front and back images F2, B2 are scheduled for being printed on one of the newly inserted sheets A14 in the image order as defined by the print job. Preferably, the front and back images F2, B2 are scheduled to complete their printing after completing the printing of the final images F12, B12 in the image queue as originally defined by the print job. The back side image B2 of the re-print sheet A14 preferably follows the last back side image B12, so that the re-print sheet A14 with the images F2, B2 originally assigned to the deformed sheet A2 arrives at the stacker 53 after the last sheet A13 with the last images F12, B12 as in the original image queue.

[0063] Fig. 12 shows the sheets A3-A14 having passed the detector 50 and print assembly 31 once more. The sheets A3-7 that were front side printed in Fig. 11 have been back side printed with their respective images B3-B7, while the blank sheets A9-A14 in Fig. 11 have been provided with a front side image F2, F8-F12. Therein, the front side images F8-F12 that either fell within the non-printing period or were scheduled upstream of the non-printing period have been re-scheduled to be printed on the blank sheets A8-A13 following the non-printing period. The printing of these front side images F8-F12 is basically delayed to later blank sheets A9-A13 by the number of blank sheets A8 falling within the non-printing period, therein taking into account the interwoven composition of the stream. The front side image F8 is re-scheduled from blank sheet A8 to blank sheet A9, front side image F9 from sheet A9 to A10, etc. In a different example, wherein e.g. two sheets would have fallen within the non-printing period the front side image F8 would have shifted from sheet A8 to a blank sheet A10, which is two blank sheets removed from the original sheet A8. The back side images B8-B12 are correspondingly re-scheduled with their respective front side images F8-F12.

[0064] The re-print sheet A14 is inserted for printing the images F2, B2 of the ejected sheet A2 thereon. The re-print sheet A14 is inserted, so that it follows the sheet A13 with the final images F12, B12. The back side image B2 is thus printed on the re-print sheet A14 after the final image B12 has been printed on the respective sheet A13.

[0065] After the printing in Fig. 12, the double side printed sheets A3 to A7 are directed to the second stack holder 70. As explained above, preferably the second stack holder 70 has taken over the position of the first stack holder 54 at the stacker 53. Alternatively, the second stack holder 70 may remain at a different location, for example one where it has been provided with its own respective stacker. The double side printed sheets A3-A7, that were already front side printed at the moment of the non-printing period, but were not directed to the reject collector 60, are directed towards the second stack holder 70, as shown in Fig. 13. These sheets A3-A7 are stacked on the second stack holder 70 in the order as defined by the print job, which is the order of the original image queue F3-F7.

[0066] Fig. 14 illustrates the step of the back side printing of the sheets A9 to A13 with the back side images B8-B12, which images B8-B12 were re-scheduled as a consequence of the non-printing period. This completes the printing of these sheets A9-A13. Consequently, as shown in Fig. 15, these sheets A9-A13 are directed towards the second stack holder 70. There, these sheets A9-A13 are stacked on the existing stack with the sheets A3-A7. It is noted that the images F8-F12 have been re-scheduled to the sheets A9-A13, so that the image order of these sheets A9-A13 is F8-F12. The stacking step in Fig. 15 thus results in a stack with the image order as defined in the original print job: in the order of images F3-F12. The order of the back side images B3-B12 is in the corresponding order.

[0067] Fig. 15 further illustrates the double sided printing of the reprint sheet A14. The re-print sheet A14 thus holds the images F2, B2 originally assigned to the re-

jected sheet A2. As shown in Fig. 16, the re-print sheet A14 with the images F2, B2 is direct towards the first stack holder 54. The first stack holder 54 may therein have replaced the second stack holder 70 at the working position of the stacker 53, though as explained above the first stack holder 54 and the second stack holder 70 may remain at separate locations during the above steps. The re-print sheet A14 is stacked in the first sheet A1. The image order in this stack on the first stack holder 54 corresponding to the original image queue, since the re-print sheet A14 comprises the images F2, B2 originally assigned to the second sheet A2. Consequently, the image order on the first stack holder 54 is: F1, B1, F2 (shortened to F1-B2).

[0068] In Fig. 17, the stack with the images F3-B12 on the second stack holder 70 is transferred onto the stack with the images F1-B2 on the first stack holder 54. This results in a stack with the image order F1-B12 as defined by the print job. The sheets are in the order A1, A14, A3-A13, since the re-print sheet A14 has been effectively inserted at the position of the second sheet A2.

[0069] Fig. 18 illustrates a different configuration of a sheet printer, wherein the detector 150 is configured for image quality detection. The detector 150 comprises e.g. a camera or (line) scanner arranged to obtain image data of images printed on the sheet. The detected image data is compared to the original image data as provided in the print job. In this manner graphical deviations, such as print artifacts or other indicators of low print quality can be determined. In a basic example, the controller is arranged for a pixel-to-pixel color comparison of the printed image with respect to its image data as defined by the print job. Deviating prints can be re-directed to the reject collector 60, while the image order in the final stack can be maintained by sending the corresponding images trailing deviating sheet to the second stack holder 70. The images for deviating sheet are then printed on a blank sheet, which is effectively inserted between the first and second portions of the stack in any of the above described embodiments.

[0070] It will be appreciated that in this example, the blank sheets within the non-printing period are directed to the reject tray 60. In another example, blank sheets within the non-printing period are returned via the duplex loop to the print assembly for printing a front side image thereon. The returned blank sheet then effectively takes the place on the transport path section 33 where otherwise a blank sheet would have been inserted from the input section 4. This reduces media waste even further.

[0071] It will further be appreciated that in the above example the first sheet A1 need not be the last sheet in a print job, just as the last sheet A12 need not be the last sheet. The sheet A1 directly upstream of the non-printing period in Fig. 10 can be any sheet in a stream of sheets for a print job. For example, the number of sheets to be stacked on the second stack holder 70 may be limited or restricted to a predefined, so that after transferring the stack from the second stack holder 70 to the first stack holder 54, stacking on the joint stack on the first stack holder 54 is continued.

[0072] Fig. 19 illustrates the transfer of the second portion of the stack from the second stack holder 70 to the first stack holder 54. The second stack holder 70 is positioned over the first stack holder 54. The second stack holder 70 comprises the trailing portion of the stack with images in the image order. The first stack holder 54 comprises the upstream sheets of the stack with the image arranged according to the image order. On top of the first portion of the stack on the first stack holder 54 are one or more re-print sheets, which comprise one or more images that were removed with their respective sheet(s) to the reject collector 60. The retention element 72 s positioned against a bottom portion of the second portion on the second stack holder 70. The retention element 72 is on the side of the second portion, from which side the second stack holder 70 will be withdrawn. Preferably, the second stack holder 70 is positioned close or to in contact with the top re-print sheet. Optionally, a further retention element 73 may be positioned against the first portion of the stack, at least at or near the top, similar to the retention element 72.

[0073] Fig. 20 illustrates the second stack holder 70 being retracted from in between the first and second portions of the stack. The retention elements 72, 73 prevents the portions of the stack from moving horizontally, so that these remain overlapping. The second stack holder 70 passes by the retention elements 72, 73 until it has been fully retracted from the stack, as shown in Fig. 21. Thereby, the portions of the stack can be joined into a stack comprising all images in the correct image order due to the effective insertion of the re-print sheets.

[0074] Fig. 22 illustrates a user interface 7. The user interface 7 is configured to display a print job indicator 91. Relative to the print job indicator 91, the user interface 7 is arranged to show a reject indicator 92. The reject indicator 92 is designed to show whether sheets have been selected for re-direction to the reject collector 60. The reject indicator 92 may further indicate which sheets and/or images have been re-directed. Additionally, a reject action or information indicator 93 may be displayed to inform an operator of relevant information regarding the re-directed sheets. The reject action or information indicator 93 may inform the operator e.g. to add additional blank sheets to the input stack holder 46, indicate a root cause for the re-direction of the sheets, or suggest any other relevant action for the operator.

[0075] Although specific embodiments of the invention are illustrated and described herein, it will be appreciated by those of ordinary skill in the art that a variety of alternate and/or equivalent implementations exist. It should be appreciated that the exemplary embodiment or exemplary embodiments are examples only and are not intended to limit the scope, applicability, or configuration in any way. Rather, the foregoing summary and detailed description will provide those skilled in the art with a convenient road map for implementing at least one

exemplary embodiment, it being understood that various changes may be made in the function and arrangement of elements described in an exemplary embodiment without departing from the scope as set forth in the appended claims and their legal equivalents. Generally, this application is intended to cover any adaptations or variations of the specific embodiments discussed herein.

[0076] It will also be appreciated that in this document the terms "comprise", "comprising", "include", "including", "contain", "containing", "have", "having", and any variations thereof, are intended to be understood in an inclusive (i.e. non-exclusive) sense, such that the process, method, device, apparatus or system described herein is not limited to those features or parts or elements or steps recited but may include other elements, features, parts or steps not expressly listed or inherent to such process, method, article, or apparatus. Furthermore, the terms "a" and "an" used herein are intended to be understood as meaning one or more unless explicitly stated otherwise. Moreover, the terms "first", "second", "third", etc. are used merely as labels, and are not intended to impose numerical requirements on or to establish a certain ranking of importance of their objects.

[0077] The present invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the present invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

Claims

1. A method of stacking sheets (A1-A14), comprising the steps of:

   - removing at least one selected sheets (A1-A14) from a stream of sheets (A1-A14) designated for forming a stack with a queue of images (F1-F12, B1-B12) thereon in a predetermined image order, **characterized by**:
   - directing sheets (A1-A14) upstream of the at least one selected sheet (A1-A14) in the stream to a first stack holder (54) to stack these according to predetermined image order;
   - directing sheets (A1-A14) downstream of the at least one selected sheet (A1-A14) in the stream to a second stack holder (70) different from the first stack holder (54) to stack these according to the predetermined image order;
   - printing the one or more images for the selected sheets (A1-A14) on at least one re-print sheet (A1-A14) added to the stream and directing the printed at least one re-print sheet (A1-A14) to the first stack holder (54), so that the at least one re-print sheet (A1-A14) is stacked on the previously stacked sheet (A1-A14) according to the image order.

2. The method according to any of the previous claims, further comprising the step of:

   - transferring the sheets (A1-A14) from the second stack holder (70) onto the sheets (A1-A14) on the first stack holder (54), so that the sheets (A1-A14) in the joint stack on the first stack holder (54) are in the image order.

3. The method according to any of the previous claims, further comprising the step of the second stack holder (70) moving into a working position of a stacker (53) after the first stack holder (54) has moved away from said working position.

4. The method according to any of the previous claims, further comprising the steps of:

   - inspecting the sheets (A1-A14) for deviations; and
   - if a sheet is determined to comprise a deviation, selecting said sheet (A1-A14) for removal from the transport path and directing it to a reject collector different (60) from the first and second stack holders (54, 70).

5. The method according to claim 4, wherein the at least one selected sheet (A1-A14) comprises at least one front side printed sheet (A1-A14) on a second pass towards the print assembly (31) for printing a back side image on it.

6. The method according to claim 5, further comprising the steps of:

   - returning front side printed sheets (A1-A14) upstream of the selected front side printed sheet (A1-A14)to the print assembly (31) for back side printing; and
   - re-scheduling front side images (F1-F12) scheduled for printing on blank sheets (A1-A14) in the stream to blank sheets (A1-A14) trailing the at least one selected sheet (A1-A14) in the image order.

7. The method according to claim 5 or 6, further comprising re-scheduling front side images (F1-12) and back side images (B1-B12) initially assigned to the at least one selected sheet (A1-A14) to a blank sheet (A1-A14) added to the stream, so that it trails at least the last of the returning front side printed sheets (A1-A14).

8. The method according to any of the previous claims, wherein blank and front side printed sheets (A1-A14) are interwoven in the stream upstream of a print

assembly (31).

9. The method according to claim 8, wherein the at least one selected sheet (A1-A14) comprises at least two subsequent sheets (A1-A14).

10. A sheet printer (1) comprising:

- a stacker assembly comprising at least one stacker (53) and a first and second stack holder (54, 70) for forming a stack of sheets (A1-A14) thereon;
- a print assembly (31) positioned along a transport path comprising a loop (35) for returning front side printed sheets (A1-A14) to the print assembly (31);
- a detector (15; 150) for inspecting the sheets (A1-A14) for deviations;
- a reject collector (60) positioned along the transport path;
- a controller (37) configured to:

  - direct at least one sheet (A1-A14) determined to comprise a deviation to the reject collector (60), thereby preventing said at least one deviating sheet (A1-A14) from being stacked by the stacker assembly,

characterized in that the controller (37) is further configured to:

  - direct sheets (A1-A14) upstream of the at least one deviating sheet (A1-A14) to the stacker assembly to be stacked on the first stacker holder (54) according to a predetermined image order;
  - direct sheets (A1-A14) downstream of the at least one deviating sheet (A1-A14) to the stacker assembly to be stacked on the second stacker holder (70) according to a predetermined image order;

- re-assign images (F1-B12) originally to be printed the at least one deviating sheet (A1-A14) to at least one re-print sheet (A1-A14) for printing thereon, which at least one re-print sheet (A1-A14) is directed to the first stack holder (54) to be stacked on the sheets (A1-A14) thereon according to the image order.

11. The printer (1) according to claim 10, further comprising an actuator for moving the second stack holder (70) with respect to the first stack holder (54) for transferring sheets (A1-A14) from the second stack holder (70) to the first stack holder (54), so that a combined stack of sheets (A1-A14) corresponding to the image order is formed.

12. The printer (1) according to claim 10 or 11, wherein the controller (37) is further configured to perform a protective action to prevent contact between a sheet (A1-A14) determined to comprise a deviation and the print assembly (31), during which protective action at least one sheet (A1-A14) passes the print assembly (31) without printing on it.

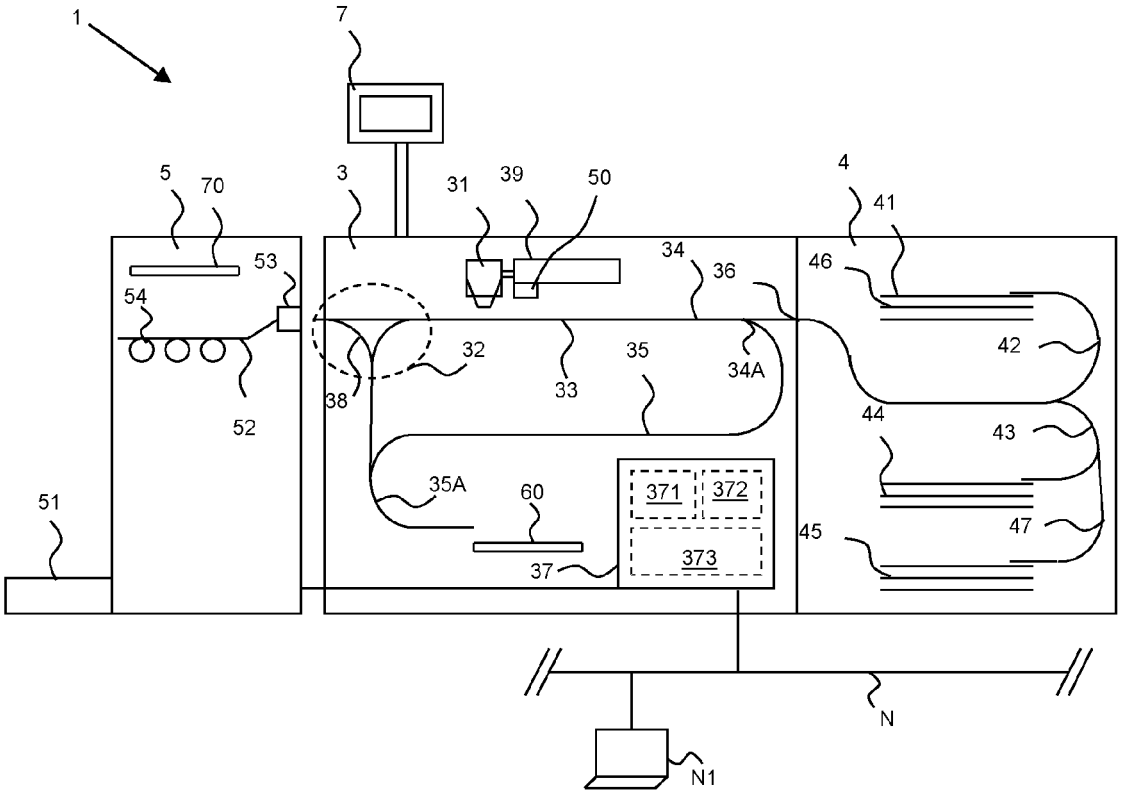
13. The printer (1) according to claim 12, wherein the printer (1) comprises a duplex loop (35) for returning front side printed sheets (A1-A14) to the print assembly (31) for printing a back side image (B1-B12) thereon, wherein the at least one non-printed sheet (a1-A14) is at least one front side printed sheet (a1-A14), and wherein the controller (37) is configured for:

- printing the corresponding back side images (B1-B12) on front side printed sheets (A1-A14) trailing the non-printed sheets (A1-A14) on the transport path during the protective action and directing these to the second stack holder (70) for stacking them according to the image order; and
- re-scheduling to be printed front side images (F1-F12) to blanks sheets (A1-A14) trailing the non-printed sheets (A1-A14) on the transport path during the protective action and directing these to the second stack holder (70) for stacking them according to the image order.

14. The printer (1) according to claim 12 or 13, wherein the controller (37) is further configured for:

- inserting blank sheets onto the transport path proportional to a number of sheets directed to the reject collector;
- and re-scheduling a front and a back side image originally assigned to a non-printed front side printed sheet to a blank sheet and directing it to the second stack holder to be stacked thereon in the image order.

15. A computer program comprising instructions which, when the program is executed by a printer according to any of the claims 10 to 14, cause the printer (1) to carry out the method according to any of the claims 1 to 9.


1
7
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39
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4
41
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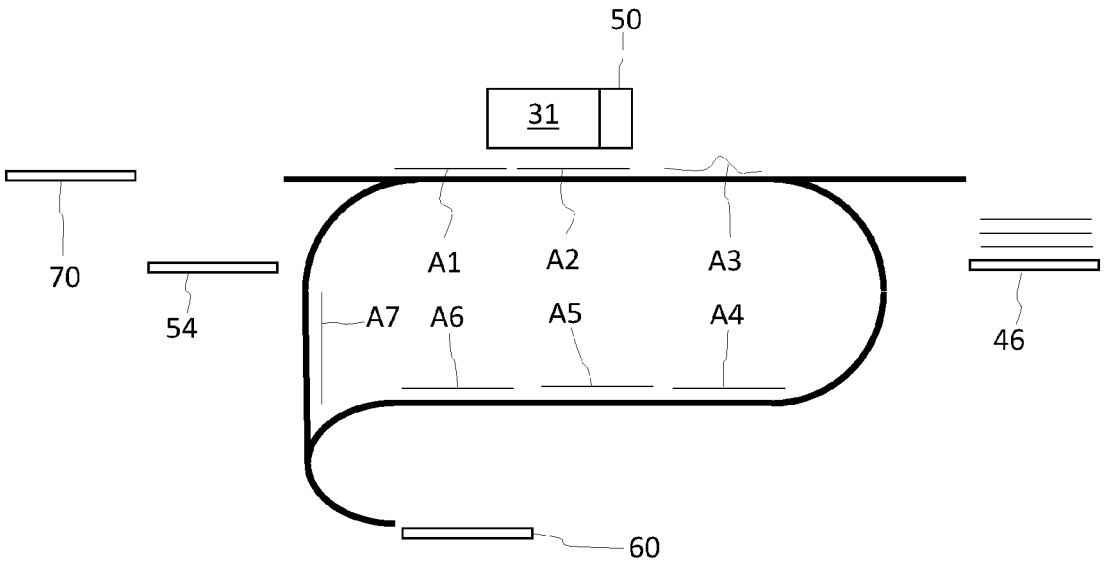
46
32
33
35
34A
42
38
52
44
43
35A
60
371
372
51
45
47
373
37
N
N1

Fig. 1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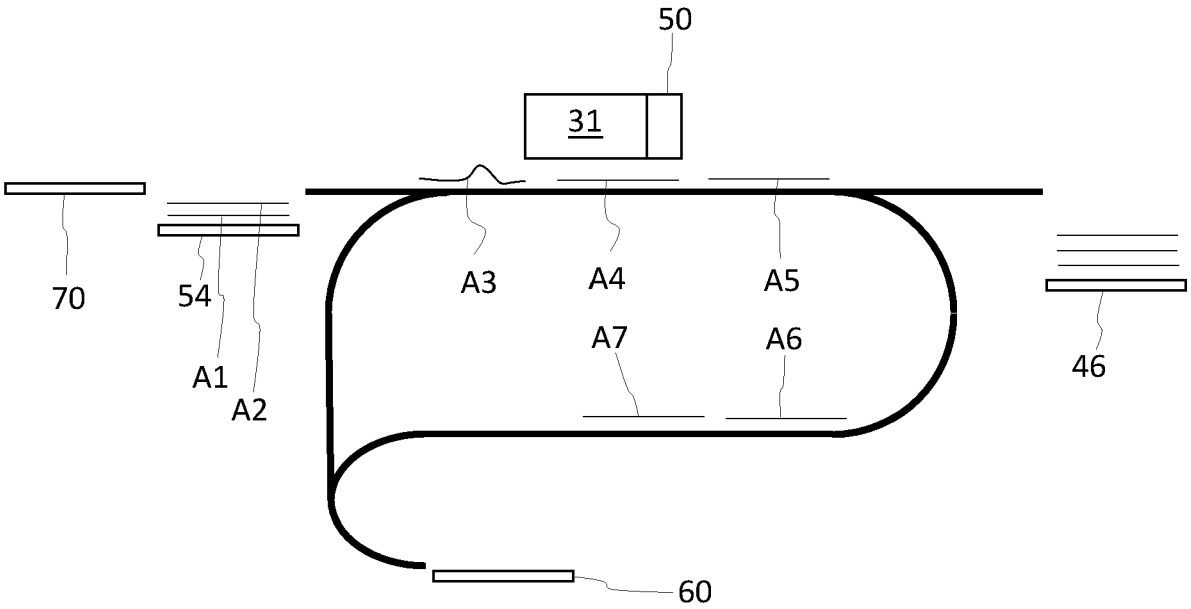
A7
A6
A5
A4
46
60

Fig. 2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A1
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A3
A4
A5
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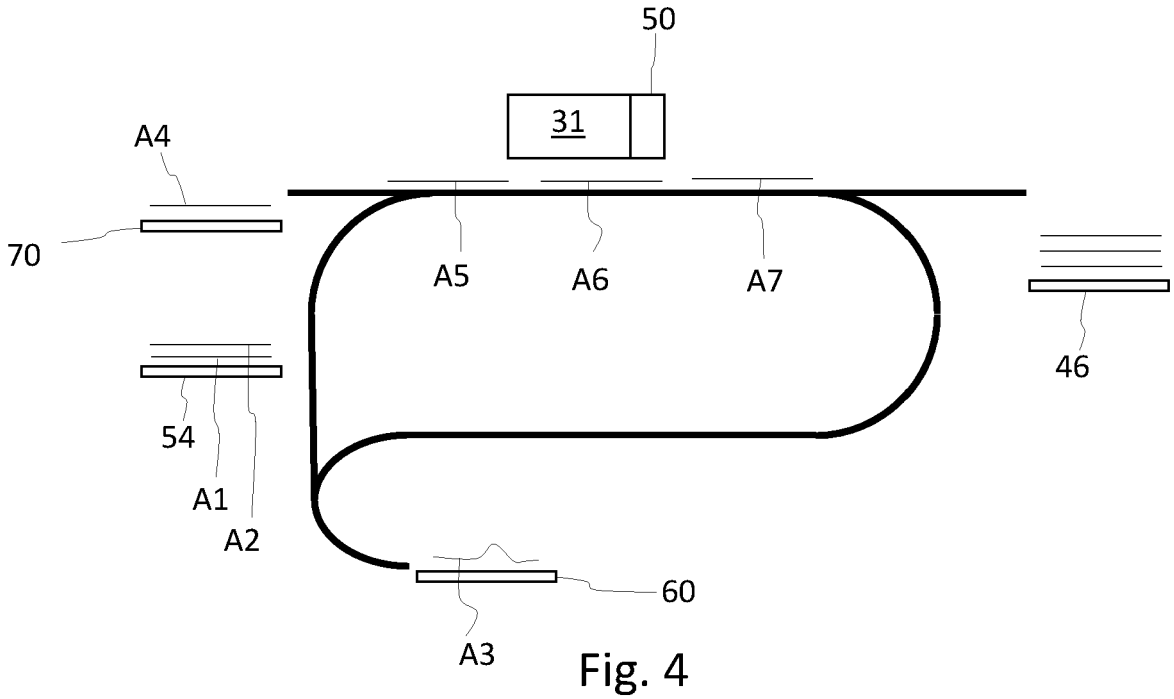
A7
46
60

Fig. 3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A4
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A5
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A7
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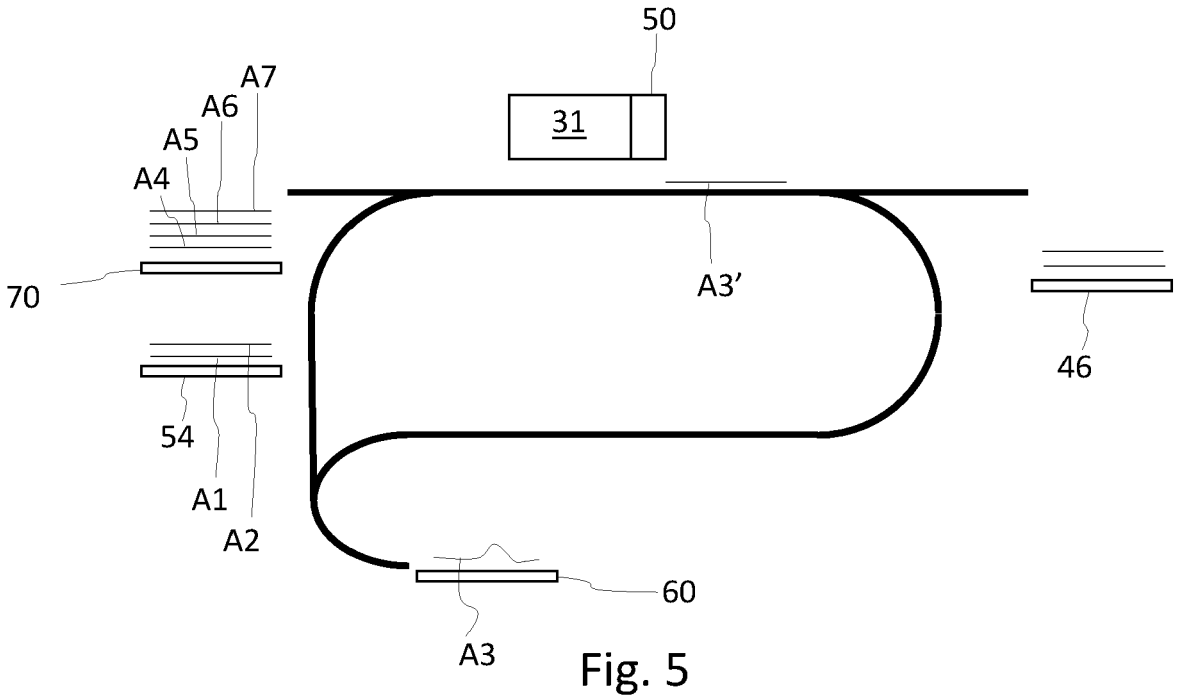
54
A1
A2
60
A3

Fig. 4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A6
A5
A4
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A3'
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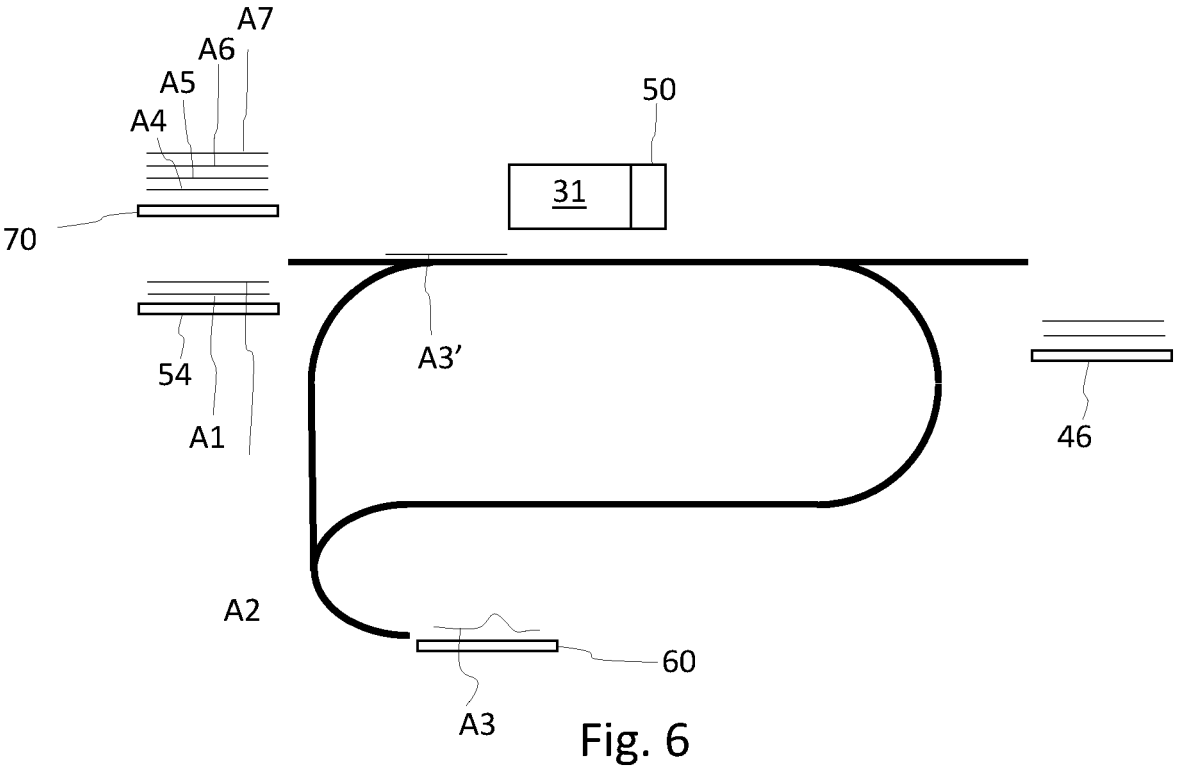
A1
A2
60
A3

Fig. 5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A4
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A3'
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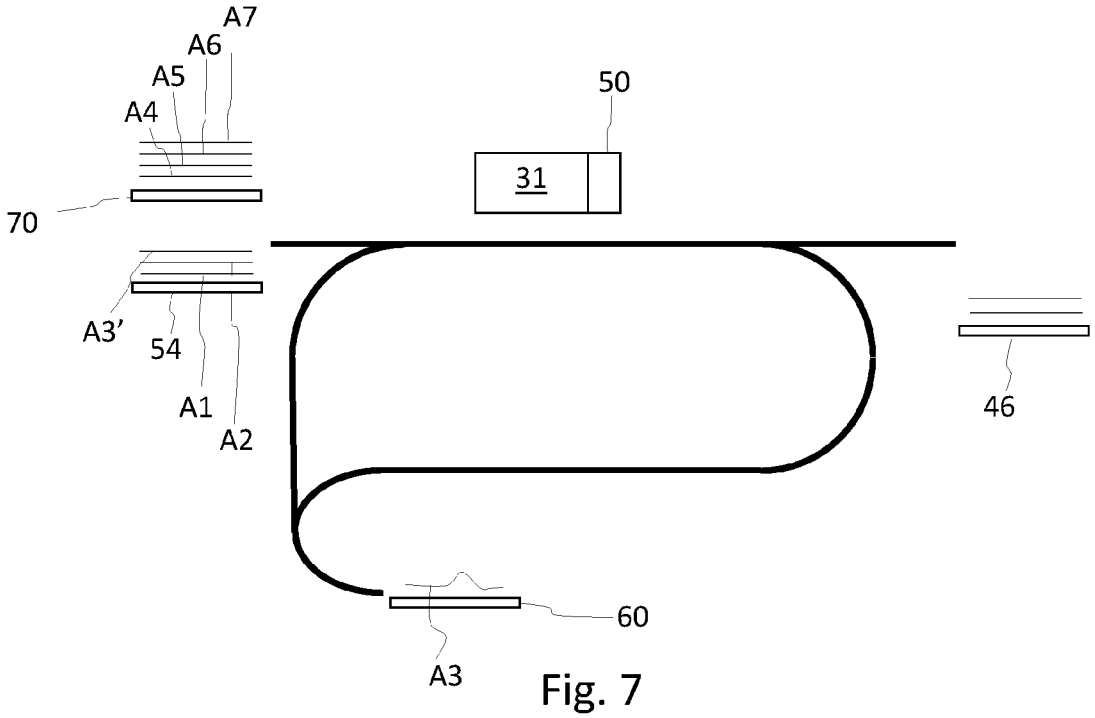
A1
A2
60
A3

Fig. 6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50
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A3'
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A1
A2
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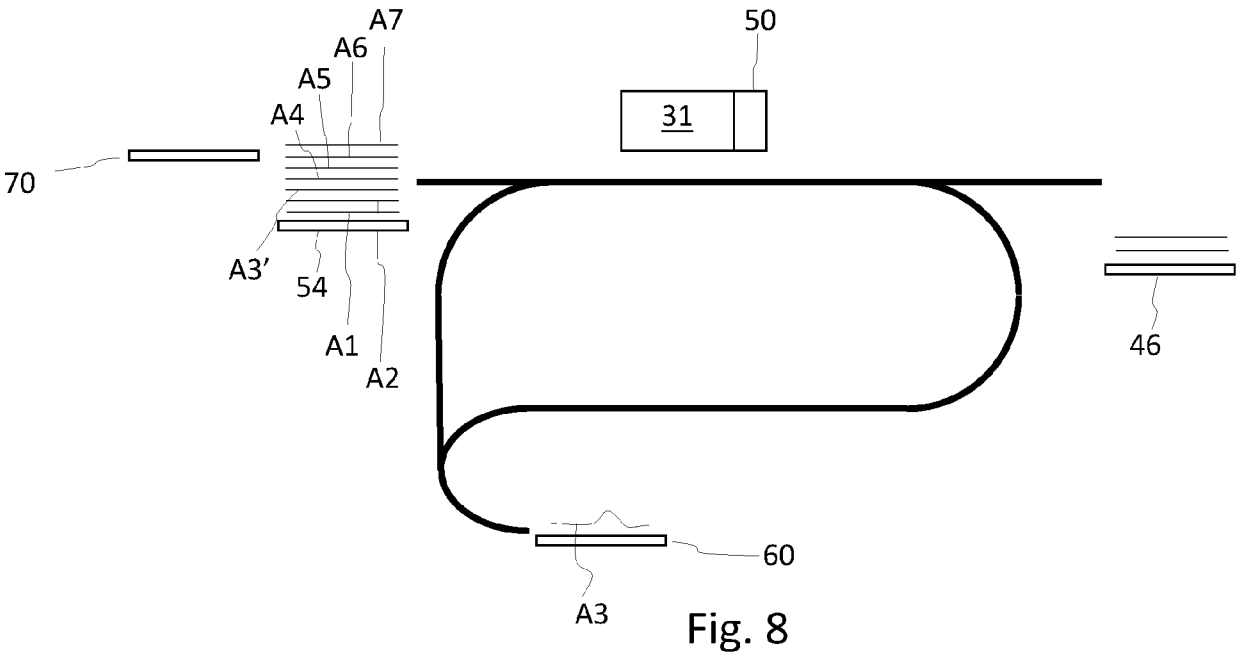
60
A3

Fig. 7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A4
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A3'
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A1
A2
46
60
A3

Fig. 8

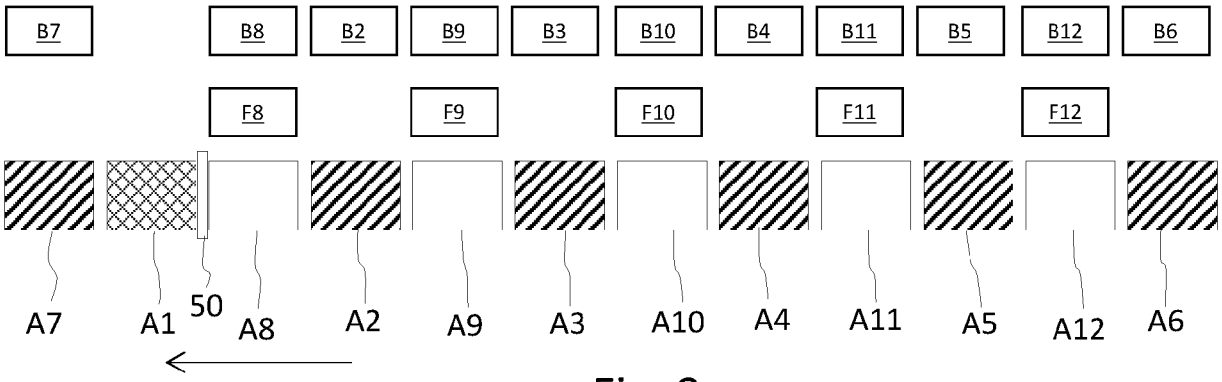


Fig. 9

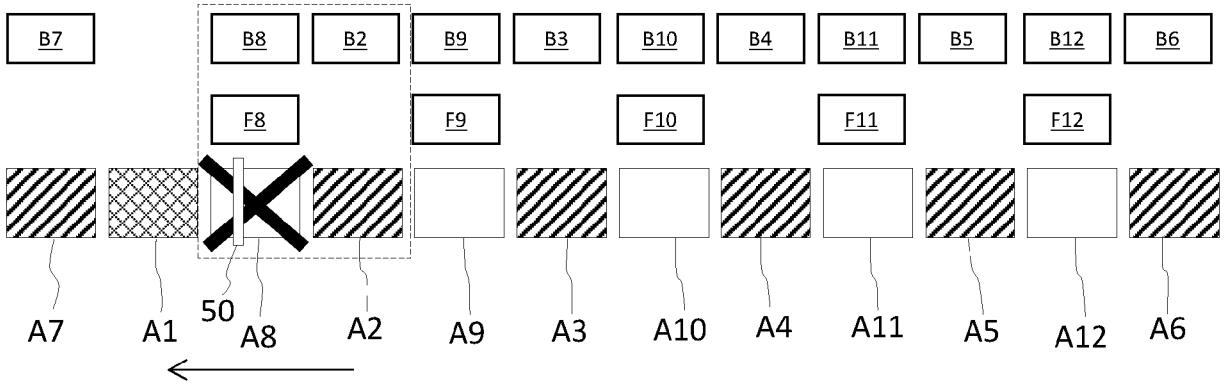


Fig. 10

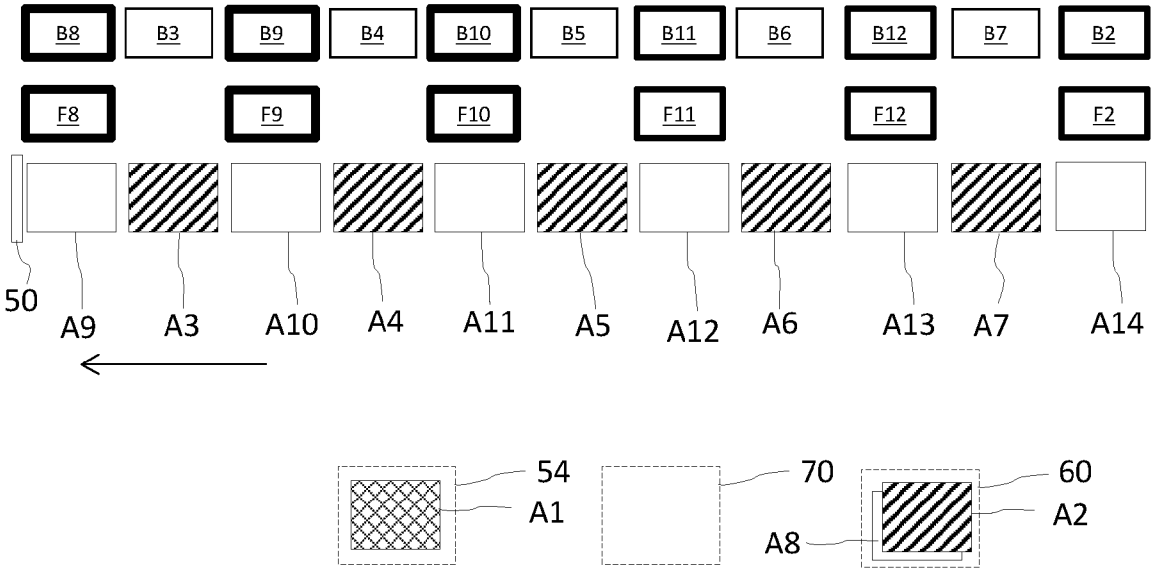
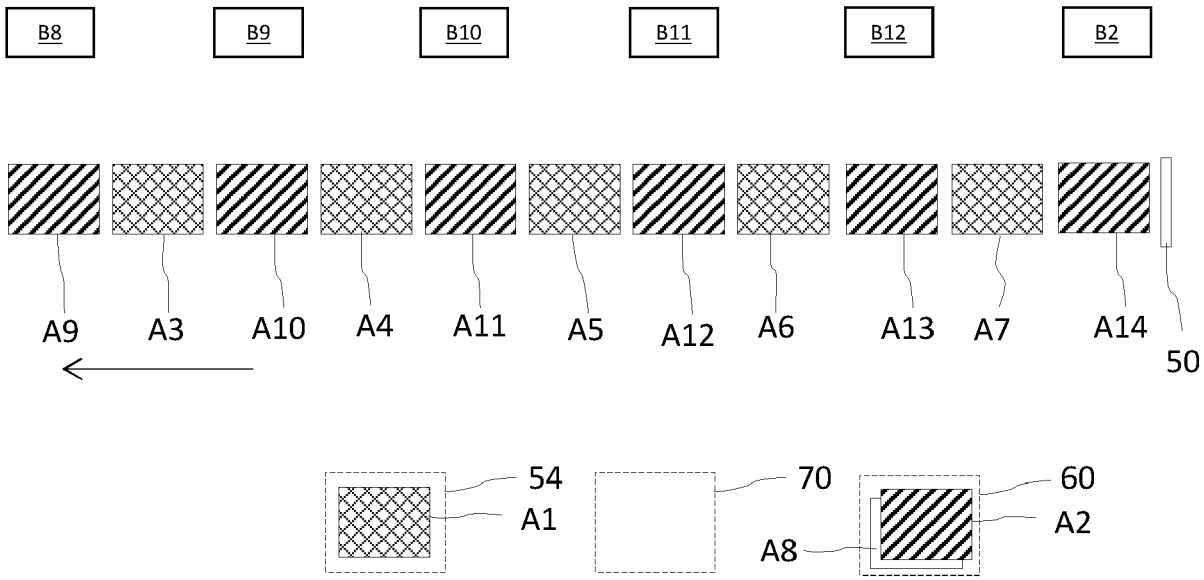


Fig. 11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B11
B12
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A3
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A11
A5
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A6
A13
A7
A14
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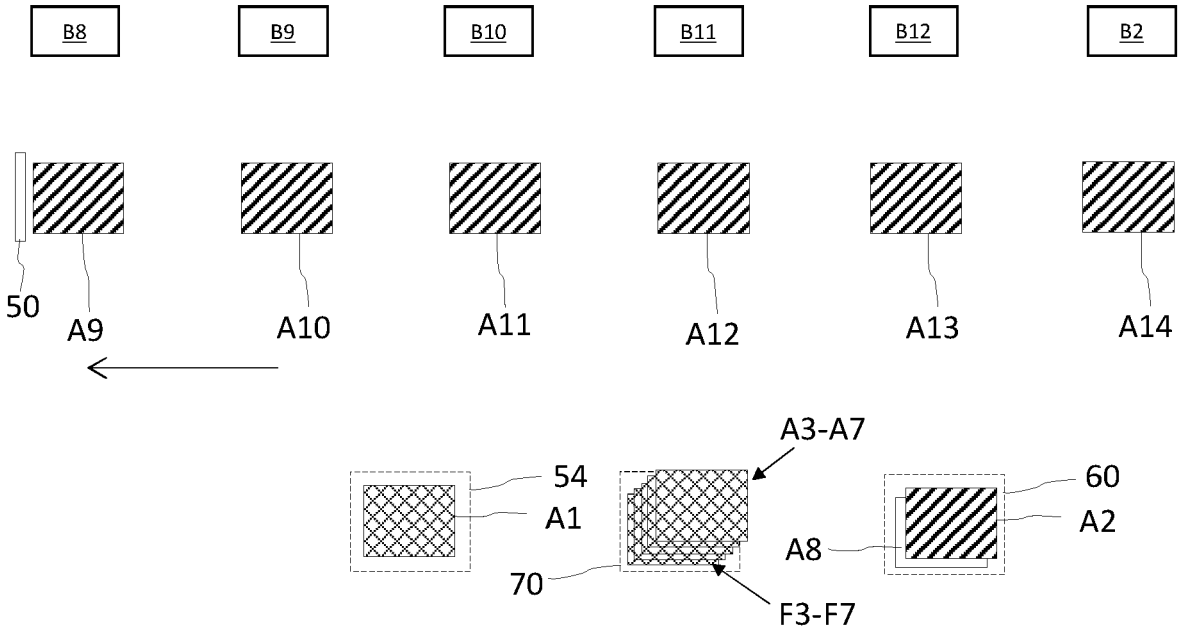
54
A1
70
A8
60
A2

Fig. 12


B8
B9
B10
B11
B12
B2
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A9
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A11
A12
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A14
A3-A7
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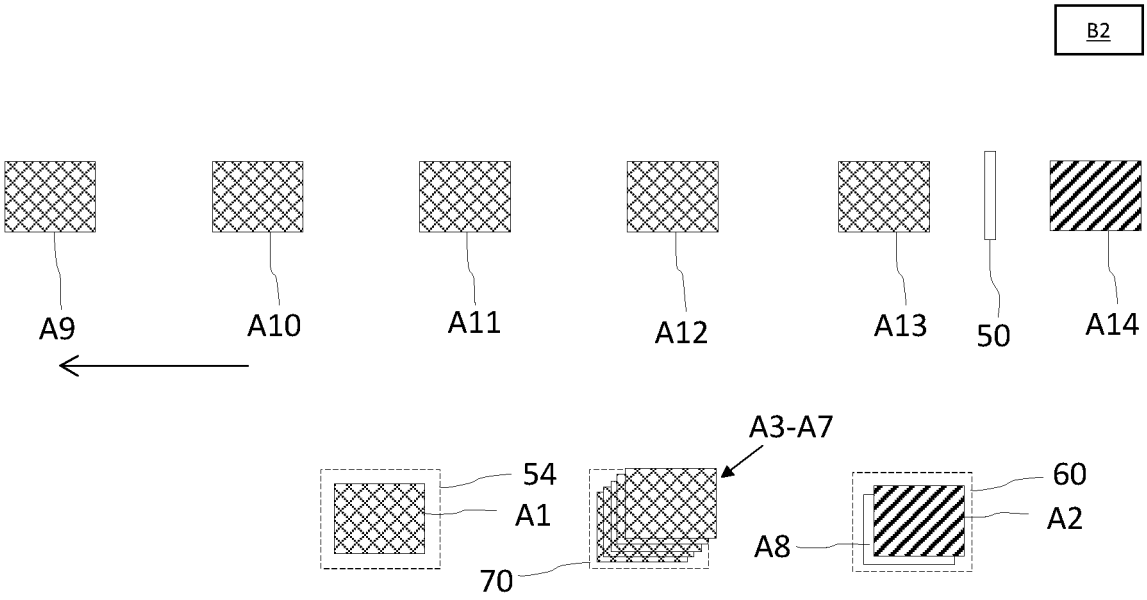
A1
70
F3-F7
A8
60
A2

Fig. 13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A14
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A1
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A2
A8
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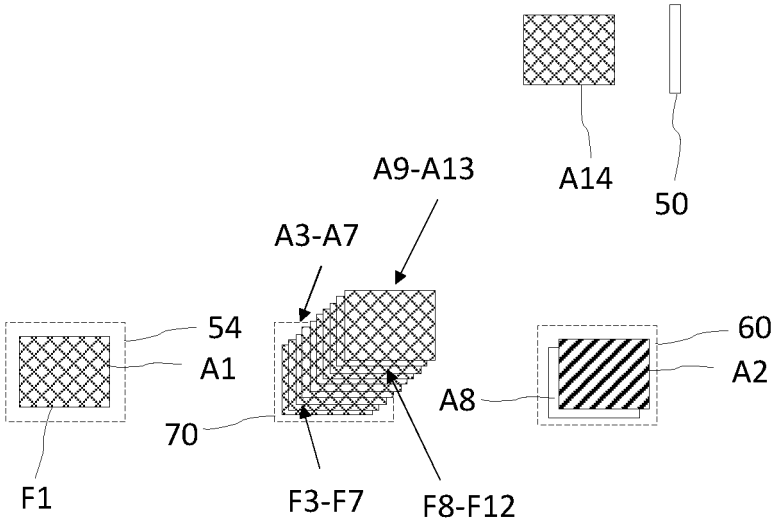
Fig. 14


A14
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A9-A13
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A2
A8
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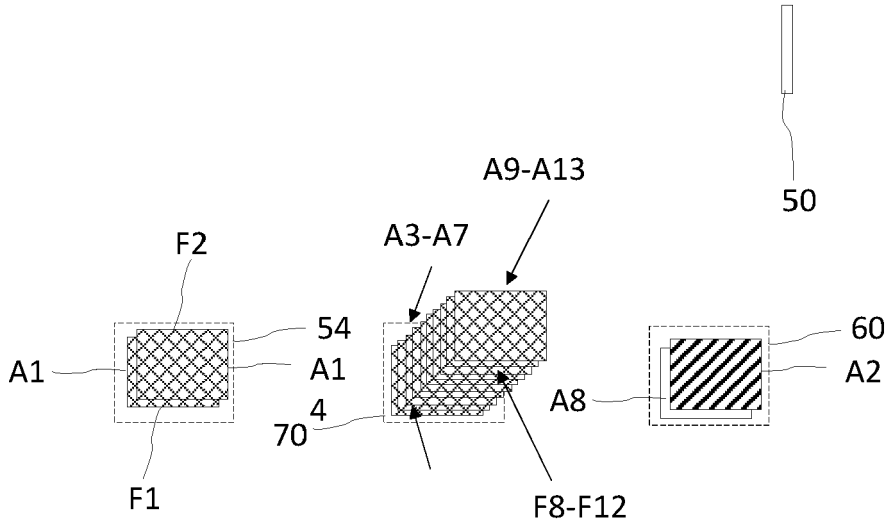
F1
F3-F7
F8-F12

Fig. 15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A9-A13
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F2
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A8
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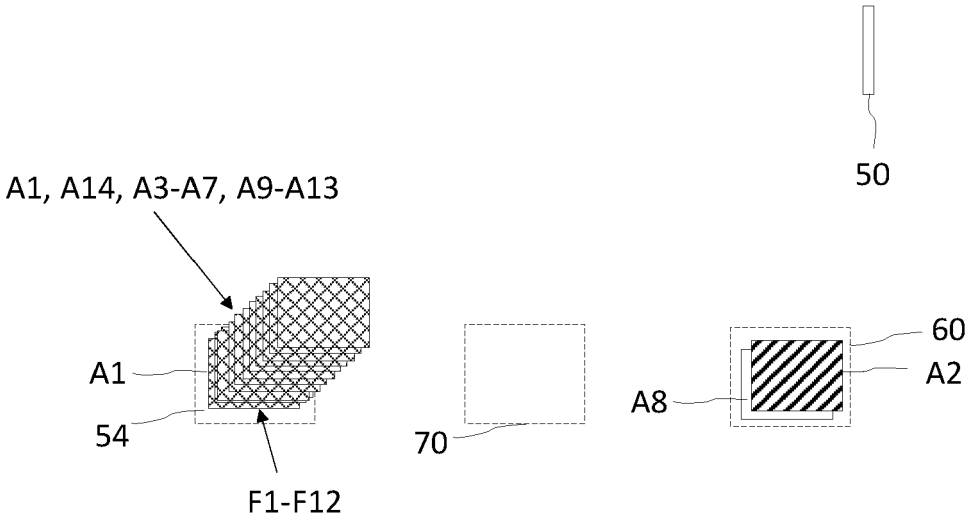
A2
F1
F8-F12

Fig. 16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F1-F12
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A8
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A2

Fig. 17

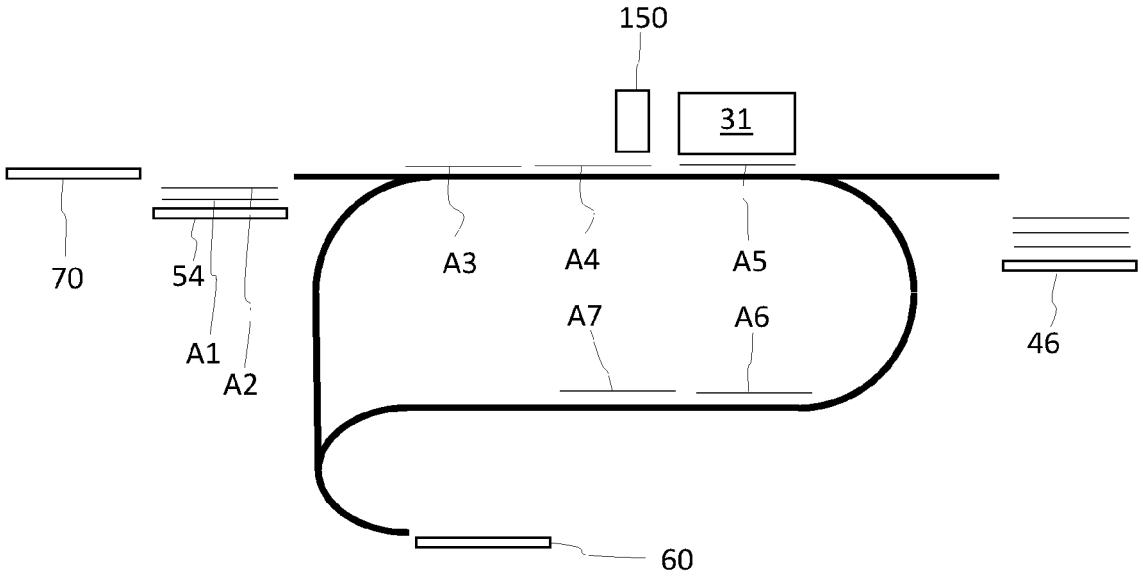

Fig. 18

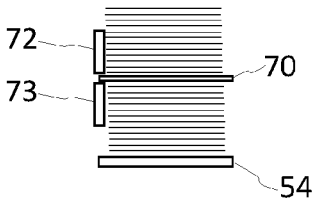

Fig. 19

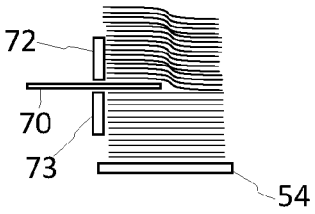

Fig. 20

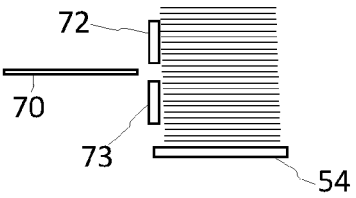

Fig. 21

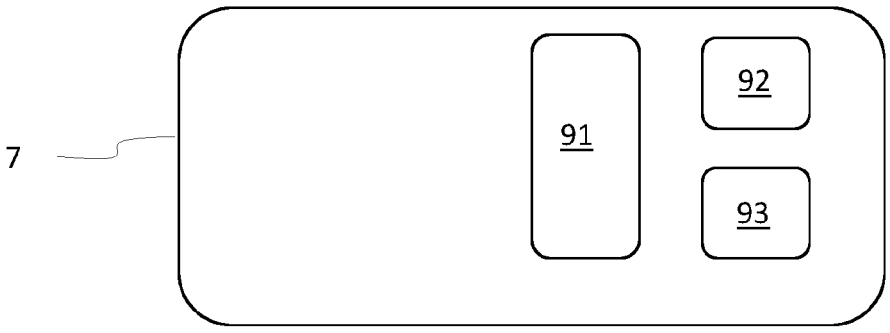

Fig. 22

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EUROPEAN SEARCH REPORT

Application Number
EP 24 15 0578

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	21 June 2024	Ureta, Rolando

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21-06-2024

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		US 2022234346 A1	28-07-2022

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