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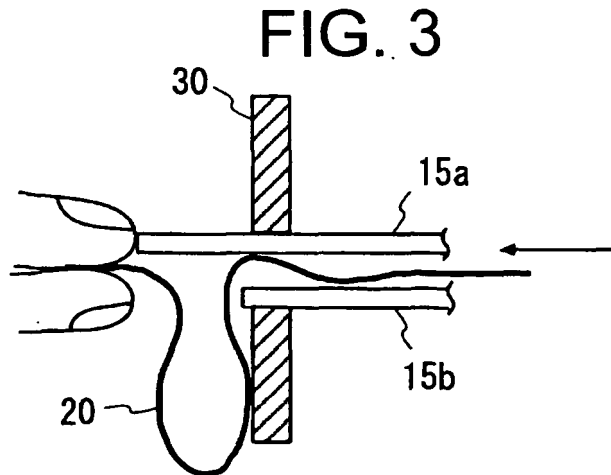
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(54) **Printer and issuing apparatus**

(57) In order to provide a printer and an issuing apparatus for effectively preventing occurrence of jam even when a user picks a leading end of a printed sheet discharged from a discharge port, a leading end of a guide plate (15b) disposed below the discharge port for dis-

charging the printed sheet is formed to be shorter than that of a guide plate (15a) disposed thereabove such that a space can be formed in which the sheet is allowed to deflect downward when advancement of the leading end of the printed sheet discharged from the discharge port (15) is interfered with.



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Description

[0001] The present invention relates to a technology effectively used for a printer which performs printing on a roll sheet before discharge thereof, and more particularly, to a technology effectively used for a structure of a discharge portion in which printing can be performed without causing sheet jam even in a state where a discharge port is blocked.

[0002] There is provided a printer in which a roll sheet accommodated in a predetermined accommodating portion is drawn out, a desired printing is performed thereon by a thermal printer or the like, and thereafter, a printed sheet is sent out by conveying rollers to be discharged. Further, there is also provided an issuing apparatus having the printer as described above built-in, and issuing receipts, tickets, or the like.

[0003] While a discharge port for discharging the printed sheet is provided on a front surface panel of the apparatus, there is a risk that the sheet causes a jam on a conveying path when the discharge port is blocked mistakenly or intentionally. Conventionally, in order to prevent the occurrence of jam as described above, there is suggested an invention in which a space for tolerating a deflection of the sheet is willingly provided upstream of the discharge port (refer to Patent Document 1 (JP 10-119375 A), for example).

[0004] In the invention disclosed in Patent Document 1, it is possible to prevent occurrence of jam when the sheet is deflected owing to blocking of the discharge port by hand. Further, in the invention disclosed in Patent Document 1, the prevention of jam is centered which is caused by a user who waits while picking the leading end of the sheet in the state where the leading end of the sheet protrudes somewhat from the outlet of the discharge port. The embodiment is described therein in which, in order to prevent occurrence of such situation, the leading end of the guide plate disposed below the discharge port is formed to be shorter than that of the guide plate disposed thereabove so that it is difficult for a user to pick the leading end of the sheet, whereby interference of discharge is avoided (refer to FIG. 7 of Patent Document 1).

[0005] It is an object of the present invention to provide a printer and an issuing apparatus for effectively preventing occurrence of jam even when a user holds, while picking the same, a leading end of a printed sheet discharged from a discharge port.

[0006] In order to achieve the above-mentioned object, the present invention provides a printer or an issuing apparatus having the printer built-in, in which a leading end of a guide plate disposed below the discharge port for discharging a printed sheet is formed to be shorter than that of a guide plate disposed thereabove such that a space can be formed in which the sheet is allowed to deflect downward when advancement of the leading end of the printed sheet discharged from the discharge port is blocked.

[0007] More specifically, in a printer including: an accommodating portion for accommodating a (preferably pre-printed) sheet; a printing means for printing on the sheet drawn out of the accommodating portion; a conveyance means for conveying the sheet toward a discharge port; and a conveyance guide means for guiding the sheet printed by the printing means to the discharge port, the conveyance guide means includes an upper conveyance guide member and a lower conveyance guide member which are disposed with a predetermined gap therebetween, the lower conveyance guide member including a leading end which is formed to be shorter than a leading end of the upper conveyance guide member such that a space can be formed in which the sheet is allowed to deflect downward when advancement of the leading end of the sheet discharged from the discharge port is blocked.

[0008] According to the above-mentioned means, even when advancement of the leading end of the sheet discharged from the discharge port is blocked, occurrence of jam on a conveyance path can be prevented because the lower conveyance guide member is made shorter than the upper conveyance guide member so as to deflect the sheet downward.

[0009] In this context, it is desirable that a cutout with which the leading end of the discharged sheet is facilitated to be picked be provided at the leading end of the guide plate disposed above the discharge port. As a result, even when a user holds the leading end of the sheet while picking the same, it is possible to prevent the sheet from causing jam on the conveyance path owing to downward deflection of the sheet. Further, the leading end of the guide plate disposed above the discharge port is preferably curved or inclined downward such that the leading end of the discharged sheet becomes less visible. As a result, it is possible to avoid occurrence of such situation in which discharge of the sheet is interfered with by a user intentionally or mistakenly blocking the outlet of the discharge port.

[0010] Yet further, it is desirable that a cutting mechanism for cutting the printed sheet to a desired length be provided between the printing means and the conveyance guide means. Instead of providing the cutting mechanism in the printer, saw-like teeth may be provided at the outlet of the discharge port so that a user presses the sheet onto the teeth for tearing the sheet. However, with the provision of the cutting mechanism, it is possible to reduce the burden on the user and to prevent the sheet from being drawn out carelessly long.

[0011] The present invention has the following effect: a printer and an issuing apparatus can be realized in which there is no risk of causing a jam even when a user blocks the discharge port of the tickets or the like, and in which the occurrence of sheet jam can be effectively prevented, whereby reduction in operation rate due to breakdown of the apparatus can be avoided, and time and cost required for repair is substantially reduced.

[0012] Embodiments of the present invention will now

be described by way of further example only and with reference to the accompanying drawings, in which:

FIG. 1 is a schematic structural view of a preferred embodiment of a printer to which the present invention is applied;

FIG. 2 is a side view of a more detailed structure of a discharge port of the printer of the embodiment;

FIG. 3 is a side view illustrating an operation of the discharge port of the printer of the embodiment;

FIG. 4 is a side view illustrating a structure of a conventional discharge port and a situation in which jam occurs;

FIG. 5 is a plan view illustrating a state where a leading end of the discharge port of the embodiment is seen from the above;

FIG. 6 is a side view of a structure of a discharge port of another embodiment of the present invention; and

FIG. 7 is a perspective view of a ticket-vending machine as an example of an issuing apparatus having the printer according to the present invention built-in.

[0013] In the following, a preferred embodiment of the present invention is described with reference to the drawings.

[0014] FIG. 1 is a schematic structural view of a preferred example of a printer to which the present invention is applied. A printer 10 illustrated in FIG. 1 includes an accommodating portion 11 for accommodating a roll sheet 20 obtained by winding a recording sheet such as a thermosensitive sheet into a roll shape, a thermal printer unit 12 for printing on the roll sheet drawn out of the accommodating portion 11, a cutter unit 13 as a cutting mechanism for cutting the printed sheet into a piece of sheet of a desired length, a bezel 14 as a component of an outlet for discharging the cut piece of sheet to the exterior, and a discharge port 15 constituted by a pair of guide plates 15a, 15b vertically provided so as to protrude from the bezel 14.

[0015] The thermal printer unit 12 includes a thermal head 12a formed of a plurality of heating elements arranged in rows, a platen roller 12b disposed such that the outer periphery thereof is brought into contact with the thermal head 12a, and a motor (not shown) for rotatably driving the platen roller 12b. The roll sheet is inserted between the thermal head 12a and the platen roller 12b, the platen roller 12b is rotated, and the heating elements of the thermal head are selectively heated while the roll sheet is transferred in the direction of an arrow, whereby printing on the roll sheet is performed.

[0016] The cutter unit 13 includes a cutter blade of a rotational type or a sliding type and a motor for rotating or moving the cutter blade, in which cutting of the roll sheet is performed by moving the cutter blade in the direction orthogonal to the transfer direction of the roll sheet.

[0017] The bezel 14 has an opening portion 14a which

is formed to be larger upstream in opening area, that is, larger on the side facing the cutter unit 13, and to be narrower on the side of the outlet. The bezel 14 is formed of a synthetic resin or the like. The reason the opening portion 14a is formed to be larger upstream in opening area is that the leading end of the roll sheet having been transferred is facilitated to lead toward the relatively narrow outlet.

[0018] FIG. 2 illustrates a more detailed structure of the discharge port 15. Note that, in FIG. 2, a front surface panel 30 of a main body of an issuing apparatus having the printer of the embodiments of the present invention built-in is illustrated.

[0019] As illustrated in FIG. 2, the discharge port 15 includes the upper guide plate 15a and the lower guide plate 15b which face each other with a predetermined gap therebetween so as to constitute the conveyance path of the sheet. On each side of the upper guide plate 15a and lower guide plate 15b, a side wall for blocking the side of the conveyance path may be provided, or may be omitted. In this embodiment, the leading end of the lower guide plate 15b is formed to be smaller in protruding amount than the leading end of the upper guide plate 15a.

[0020] With this structure, as illustrated in FIG. 3, owing to downward deflection of the sheet occurring when a user picks the leading end of the printed sheet discharged from the discharge port 15 or interferes with discharge of the sheet, it is possible to prevent occurrence of jam in the discharge port 15 as illustrated in FIG. 4. The difference in length between the leading end of the upper guide plate 15a and the leading end of the lower guide plate 15b is appropriately determined in accordance with elasticity of the sheet to be used. The point is that the difference in length between the leading ends is determined such that the space can be formed in which the sheet is allowed to deflect downward when advancement of the leading end of the printed sheet discharged from the discharge port is interfered with.

[0021] Further, in the printer of the embodiments of the present invention, as illustrated in FIG. 5, a semicircular cutout 15c is provided at a leading end portion of the upper guide plate 15a constituting the discharge port 15, with which the leading end of the discharged sheet is facilitated to pick. In the embodiments of the present invention, the difference in length between the leading ends is determined such that the space can be formed in which the sheet is allowed to deflect downward even when a user picks the leading end of the sheet discharged from the discharge port at the part of the cutout 15c.

[0022] In the second embodiment of Patent Document 1 as well, the leading end of the lower guide plate is shorter than the leading end of the upper guide plate. The leading end of the lower guide plate is made shorter in the second embodiment of Patent Document 1 for the purpose of making it difficult for a user to pick the leading end of the discharged sheet as described in paragraph [0026], and not for the purpose of preventing occurrence of jam.

[0023] In the second embodiment of Patent Document 1, this is apparent from the sheet storing portion for allowing deflection of the sheet, which is provided upstream of the discharge port and in which the sheet is deflected. As described above, the subject invention and the invention disclosed in Patent Document 1 are different from each other in purpose of making the leading end of the guide plate disposed below the discharge port shorter than the leading end of the guide plate disposed thereabove. That is, both the inventions are based on technical ideas completely different from each other.

[0024] Further, in the invention disclosed in Patent Document 1, the sheet is deflected upward when discharge is interfered. Meanwhile, the sheet is deflected downward in the subject invention. In this regard as well, both the inventions are different from each other. In the subject invention as well, it is possible to deflect the sheet upward, for example, by forming the leading end of the upper guide plate 15a to be shorter than the leading end of the lower guide plate 15b. However, in the case where the leading end of the lower guide plate 15b is formed to be shorter as in the embodiments, the sheet can be deflected by utilizing the dead weight thereof. Therefore, there is an advantage in that the deflection is more likely to occur than that - in the invention disclosed in Patent Document 1.

[0025] FIG. 6 illustrates another embodiment of the present invention. In this embodiment, the leading end of the lower guide plate 15b constituting the discharge port 15 is made shorter than the leading end of the upper guide plate 15a, and the leading end of the upper guide plate 15a is curved downward. As a result, in this embodiment, there is an advantage in that the leading end of the discharged sheet becomes less visible to a user, and hence interference with discharge of the sheet from the discharge port is reduced. This embodiment is particularly effective in the case of preventing the prank of intentional interference of discharge of the sheet.

[0026] Note that, in this embodiment as well, the difference in length between the leading end of the upper guide plate 15a and the leading end of the lower guide plate 15b is determined such that the space can be formed in which the sheet is allowed to deflect downward when advancement of the leading end of the sheet discharged from the discharge port is interfered. The leading end of the upper guide plate 15a may be formed to be inclined downward instead of being curved.

[0027] FIG. 7 illustrates a ticket-vending machine as an example of an issuing apparatus having a printer according to the present invention built-in. An issuing apparatus 100 of FIG. 7 has a printer and a card reader built-in, and the front surface thereof is provided with a display portion 110, a card insertion/discharge port 120, the discharge port 15 for discharging tickets printed by the printer described above, operation buttons 130, and the like. As illustrated in FIG. 7, when the discharge port 15 is provided near the card insertion/discharge port 120, there is a risk that a user mistakenly blocks the discharge

port 15 of the tickets by fingers upon reception of a card. Thus, the present invention is particularly effective when applied to the issuing apparatus as described above.

[0028] While the inventions made by the inventors of the present invention have been described in detail with reference to the embodiments, it is needless to say that the present invention is not limited to the above-mentioned embodiments, and various modifications can be made without departing from the scope of the present invention. For example, the embodiment of FIG. 5 and the embodiment of FIG. 6 can be combined with each other. Further, throughout the embodiments, the description is made of the discharge port constituted by a pair of guide plates. However, the discharge port may be constituted by a plurality of rails arranged in parallel.

[0029] Further, in the embodiments, the discharge port 15 is provided directly next to the cutter unit 13. However, the present invention may be applied to a printer provided with a conveyance means formed of an upper roller and a lower roller between the cutter unit 13 and the discharge port 15. Further, while the embodiment illustrates the issuing apparatus in which a thermal printer is used as a printing means, the issuing apparatus may be applied to a printer except the thermal printer.

[0030] While the above description mainly describes an example in which the inventions made by the inventors of the present invention are applied to the ticket-vending machine which belongs to the application field providing the background thereof, the present invention is not limited thereto, but can be widely used in an ATM (automated teller machine) in the financial institution, a cash register in the store, and the other apparatuses having the printer and, preferably, the card reader built-in.

Claims

1. A printer (10) comprising:

an accommodating portion (11) for accommodating a sheet (20);
a printing means (12) for printing on the sheet drawn out of the accommodating portion; and
a conveyance guide means (15) for guiding the sheet printed by the printing means to a discharge port,

wherein the conveyance guide means comprises an upper conveyance guide member (15a) and a lower conveyance guide member (15b) which are disposed with a predetermined gap therebetween, the lower conveyance guide member (15b) comprising a leading end which is formed to be shorter than a leading end of the upper conveyance guide member (15a) such that a space can be formed in which the sheet is allowed to deflect downward when advancement of the leading end of the sheet (20) discharged from the discharge port is blocked.

2. A printer according to claim 1, wherein the upper conveyance guide member (15a) is provided with a cutout (15c) at a front end thereof such that the sheet discharged from the discharge port can be picked. 5
3. A printer according to claim 1 or claim 2, wherein the front end of the upper conveyance guide member (15a) is curved or inclined downward. 10
4. A printer according to any one of the preceding claims, further comprising a cutting mechanism for cutting the printed sheet to a desired length, which is provided between the printing means and the conveyance guide means. 15
5. An issuing apparatus, comprising:
the printer according to any one of the preceding claims and a card reader which are built therein; and 20
a front surface panel on which an outlet of a discharge port (15) for discharging the sheet printed by the printer and a card insertion/discharge port (120) corresponding to the card reader are provided. 25

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FIG. 1

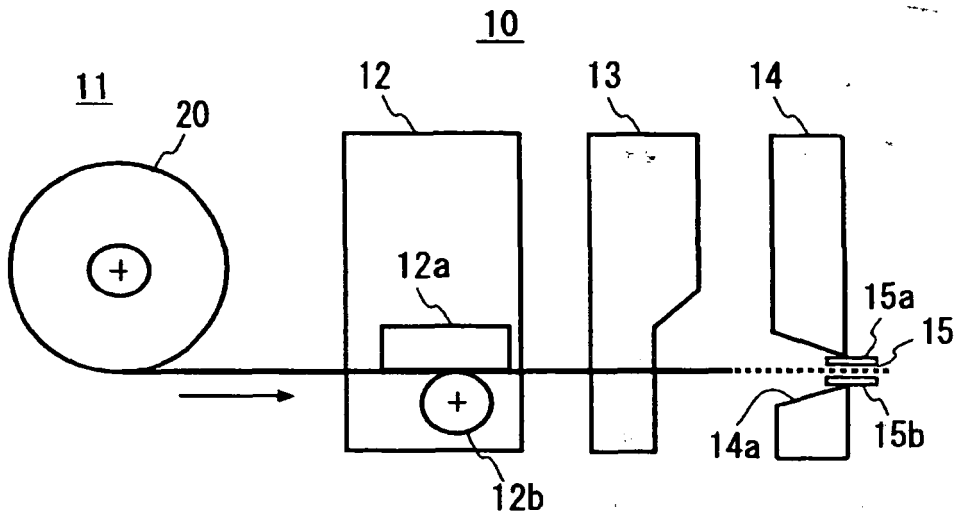


FIG. 2

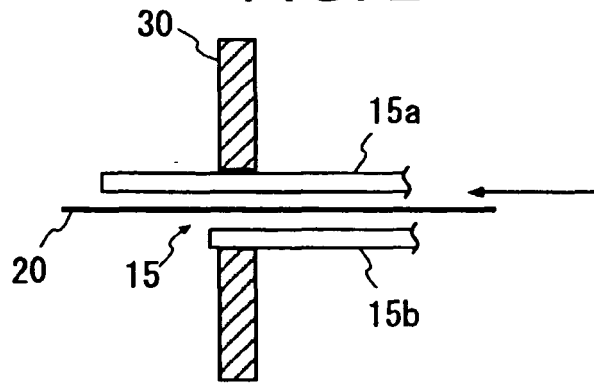


FIG. 3

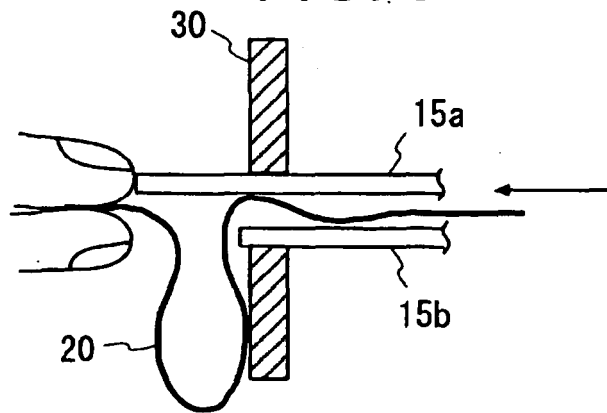


FIG. 4

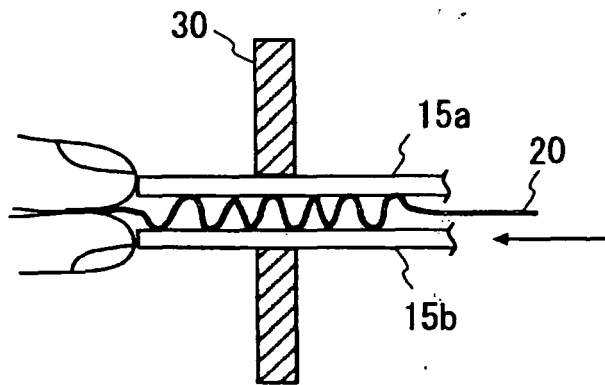


FIG. 5

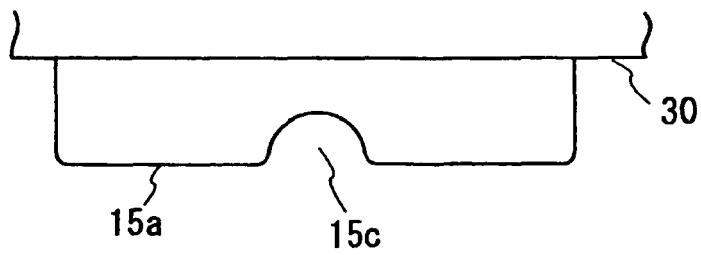


FIG. 6

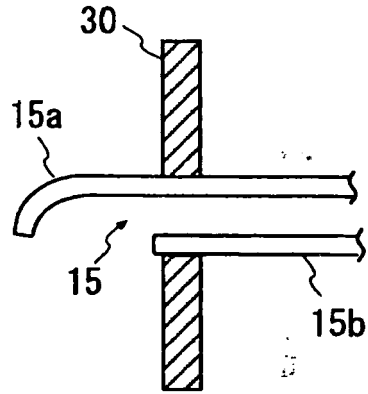
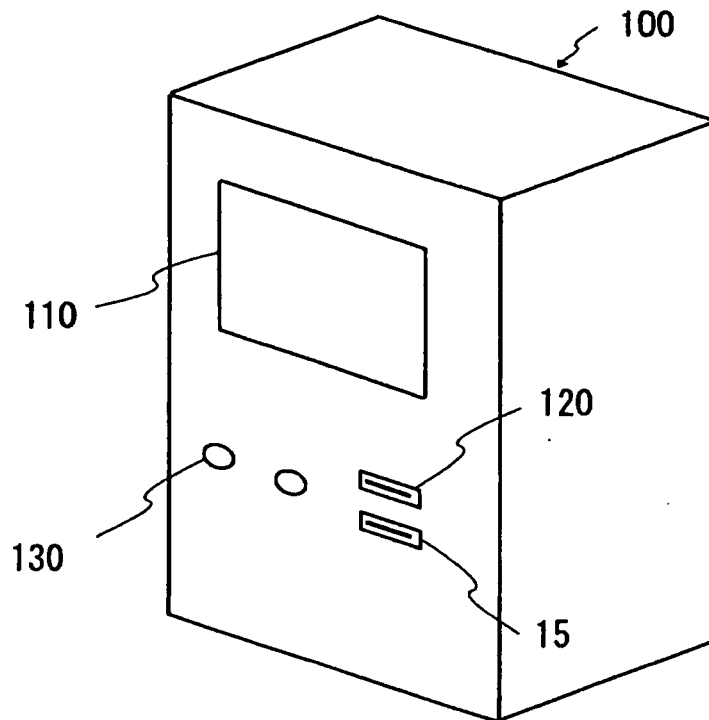


FIG. 7





EUROPEAN SEARCH REPORT

Application Number
EP 08 25 3217

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
D,X	JP 10 119375 A (STAR MFG CO) 12 May 1998 (1998-05-12) * figure 6 * * abstract * * paragraphs [0001], [0002] * * claims * * paragraph [0026] - paragraph [0027] * -----	1-5	INV. B41J11/00
X	US 6 652 173 B1 (MARTINI CALVIN DUKE [CA] ET AL) 25 November 2003 (2003-11-25) * abstract * * figures *	1,4	
X	JP 08 153229 A (FUJITSU LTD) 11 June 1996 (1996-06-11) * abstract * * figures 1,3,6 * -----	1-5	
			TECHNICAL FIELDS SEARCHED (IPC)
			B41J G07B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		4 December 2008	Whelan, Natalie
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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04-12-2008

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
JP 10119375	A	12-05-1998	NONE	

US 6652173	B1	25-11-2003	NONE	

JP 8153229	A	11-06-1996	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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