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SHEET CONVEYOR APPARATUS

Abstract

A sheet conveyor apparatus includes an air turn bar and a hood. The air turn bar turns back a strip-shaped sheet conveyed along a predetermined conveyance passage. The hood includes an inner circumferential surface that opposes an outer circumferential surface of the air turn bar. The outer circumferential surface of the air turn bar includes ejection holes ejecting air toward one surface of the sheet. The inner circumferential surface of the hood includes suction holes sucking air from the other surface of the sheet.

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Background/Summary

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority from Japanese Patent Application No. 2024-024581 filed on Feb. 21, 2024, which is incorporated by reference herein in its entirety.

BACKGROUND

[0002] The present disclosure relates to a sheet conveyor apparatus.

[0003] JP 2023-003004 A discloses a dryer apparatus that dries a conveyed material by ejecting gas thereto. The dryer apparatus disclosed in the publication includes an air turn bar for changing the orientation of the conveyed material. The air turn bar includes a wall part and a flow guide part. The gas is ejected from the wall part. The flow guide part includes a flat surface that extends the wall surface of the wall part toward the upstream of the conveying direction. It is stated that such a dryer apparatus is able to prevent the conveyed material from forming wrinkles.

[0004] JP 2021-050051 A discloses a turn bar including a turn bar body and a backside support part. The turn bar body has an ejection face provided with a plurality of ejection ports. The turn bar body ejects a first gas, which is pumped from outside, from the plurality of ejection ports toward the surface of a base material and changes the conveying direction of the base material while causing the base material to float from the ejection face. The backside support part is provided on the opposite side across the floated portion of the base material that is floated from the ejection face. The backside support part supports the entire backside surface of the floated portion of the base material. It is stated that such a turn bar allows the amount of the floated base material to be uniform and to change the conveying direction of the base material in a stable manner.

SUMMARY

[0005] When a strip-shaped sheet is turned back by an air turn bar, there is a fear that the sheet may comes into contact with the air turn bar if the sheet is not stably turned back.

[0006] According to the present disclosure, a sheet conveyor apparatus includes an air turn bar and a hood. The air turn bar turns back a strip-shaped sheet conveyed along a predetermined conveyance passage. The hood includes an inner circumferential surface that opposes an outer circumferential surface of the air turn bar. The outer circumferential surface of the air turn bar includes ejection holes ejecting air toward one surface of the sheet. The inner circumferential surface of the hood includes suction holes sucking air from the other surface of the sheet. The sheet conveyor apparatus as described above allows turning back of the sheet to be stable.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. **1** is a schematic view of a sheet conveyor apparatus **10**.

[0008] FIG. **2** is a schematic cross-sectional view of an air turn bar **20** and a hood **30**.

[0009] FIG. **3** is a schematic plan view of the air turn bar **20**.

DETAILED DESCRIPTION

[0010] Hereinbelow, embodiments of the technology according to the present disclosure will be described with reference to the drawings. It should be noted, however, that the disclosed embodiments are, of course, not intended to limit the disclosure. The drawings are depicted schematically and do not necessarily accurately depict actual objects. The features and components that exhibit the same effects are designated by the same reference symbols as appropriate, and the description thereof will not be repeated as appropriate. In the following description, reference characters L, R, F, Rr, U and D in the drawings represent left, right, front, rear, up, and down, respectively. These directional terms are, however, merely provided for purposes in illustration and

are not intended to limit the present disclosure in any way.

[0011] FIG. **1** is a schematic view of a sheet conveyor apparatus **10**. FIG. **2** is a schematic cross-sectional view of an air turn bar **20** and a hood **30**. FIG. **3** is a schematic plan view of the air turn bar **20**. In FIGS. **1** to **3**, the direction in which a sheet A is conveyed is indicated by the arrows. In FIGS. **1** and **2**, the direction in which air is ejected is indicated by the white arrows.

Sheet Conveyor Apparatus **10**

[0012] The sheet conveyor apparatus **10** is an apparatus that conveys a strip-shaped electrode sheet (hereinafter also simply referred to as "sheet") A that is used for an electrode of electricity storage devices. In the present description, the term "electricity storage device" is meant to encompass any type of device in which charge-discharge reactions are caused by migration of charge carriers between a pair of electrodes (positive electrode and negative electrode). Accordingly, the electricity storage devices according to the technology disclosed herein are intended to encompass secondary batteries, such as lithium-ion secondary batteries, nickel-metal hydride batteries, and nickel-cadmium batteries, as well as capacitors, such as lithium-ion capacitors and electric double-layer capacitors.

[0013] As illustrated in FIG. **1**, the sheet A includes a current collector foil and a coated portion. The current collector foil is a strip-shaped metal foil. The coated portion is a layer containing an active material that is coated on one surface of the current collector foil. A coating device, not shown, that forms the coated portion on one surface of the current collector foil is provided upstream of the sheet conveyor apparatus **10**. For the coating device, it is possible to use any conventionally known device that is used for manufacturing an electrode sheet of electricity storage devices, so the detailed description thereof is not provided herein.

[0014] The sheet A includes a non-coated surface A**1**, on which the coated portion is not formed, and a coated surface A**2**, on which the coated portion is formed. Conventionally known materials may be used for the materials that form the current collector foil and the coated portion, so the detailed description thereof is not provided herein. In the sheet A, the coated portion is formed on the current collector foil and dried. In this embodiment, the sheet A containing the coated portion before being dried is dried while being conveyed by the sheet conveyor apparatus **10**. It is also possible that the sheet conveyor apparatus **10** may convey the sheet A containing the coated portion after being dried.

[0015] The sheet conveyor apparatus **10** includes an air turn bar **20** and a hood **30**. The sheet conveyor apparatus **10** includes free rollers **40** and **41**. The sheet conveyor apparatus **10** conveys the sheet A along a predetermined conveyance passage. The conveyance passage of the sheet A is defined by the air turn bar **20** and the free rollers **40** and **41**. The conveyance passage of the sheet A includes a first conveying section **11**, a first turn-back section **12**, a second conveying section **13**, a second turn-back section **14**, and a third conveying section **15**. The sheet A is conveyed in the following order, the first conveying section **11**, the first turn-back section **12**, the second conveying section **13**, the second turn-back section **14**, and the third conveying section **15**. The second conveying section **13** is provided lower than the first conveying section **11**. The third conveying section **15** is provided lower than the first conveying section **11** and the second conveying section **13**.

[0016] The first conveying section **11**, the second conveying section **13**, and the third conveying section **15** are each provided with a plurality of drying nozzles **50** that dry the coated surface A**2** of the sheet A. The plurality of drying nozzles **50** are provided intermittently along the conveying direction. The sheet A is dried by the drying nozzles **50** while being conveyed by the sheet conveyor apparatus **10**. Each of the drying nozzles **50** is configured to eject air toward the coated surface A**2**. Although the configuration of the drying nozzles **50** is not particularly limited, it is possible to provide a plurality of air ejection holes along a width axis of the sheet A so that air can be applied to substantially uniformly along the width axis (the axis orthogonal to the conveying direction) of the sheet A. A plurality of free rollers **40** are provided at corresponding positions to the

drying nozzles **50** across the sheet A. The sheet A is conveyed in a state in which the non-coated surface A**1** is along the plurality of free rollers **40**.

[0017] In the first conveying section **11**, the sheet A is conveyed substantially horizontally toward the front with the non-coated surface A**1** facing downward and the coated surface A**2** facing upward. At positions opposing the coated surface A**2** (above the coated surface A**2**), drying nozzles **50** are provided spaced apart from the sheet A. The coated surface A**2** is dried by the air ejected from the drying nozzles **50**. The non-coated surface A**1** is supported by the free rollers **40** that are provided on the opposite side to the drying nozzles **50** (i.e., below). Because the non-coated surface A**1** is supported by the free rollers **40**, the sheet A does not sag easily even when air is blown onto the coated surface A**2**. This serves to keep the levelness of the sheet A and reduce vibrations of the sheet A, which makes the product quality of the sheet A after being dried more likely to improve.

[0018] At the first turn-back section **12**, the sheet A is turned back by free rollers **41**. In the embodiment, the sheet A is turned back by two free rollers **41**. The sheet A is turned back with the non-coated surface A**1** being along the free rollers **41**. The two free rollers **41** are opposed in vertical directions. The upper end of the upper free roller **41** is set to be at substantially the same height as the upper ends of the free rollers **40** of the first conveying section **11** The lower end of the lower free roller **41** is set to be at substantially the same height as the lower ends of the free rollers **40** of the later-described second conveying section **13**. The sheet A that is conveyed toward the front is guided downward by the free rollers **41**. Thereafter, the sheet A is guided toward the rear by the free rollers **41**.

[0019] In the second conveying section **13**, the sheet A turned back by the first turn-back section **12** is conveyed substantially horizontally toward the rear with the non-coated surface A**1** facing upward and the coated surface A**2** facing downward. As in the first conveying section **11**, at positions opposing the coated surface A**2** (below the coated surface A**2**), drying nozzles **50** are provided spaced apart from the sheet A. The coated surface A**2** is dried by the air ejected from the drying nozzles **50**. The non-coated surface A**1** is supported by the free rollers **40** that are provided on the opposite side to the drying nozzles **50** (i.e., above). Providing the second conveying section **13** with the free rollers **40** serves to easily keep the levelness of the sheet A and easily reduce vibrations of the sheet A.

[0020] At the second turn-back section **14**, the sheet A is turned back by the air turn bar **20**. The sheet A is turned back with the coated surface A**2** facing inward and the non-coated surface A**1** facing outward so that the coated surface A**2** is opposed to the air turn bar **20**. In this embodiment, the sheet A is turned back in such a condition as to be spaced apart from the air turn bar **20**. In other words, the sheet A is turned back in such a condition as to be floated up from the air turn bar **20** so as not to come into contact with the air turn bar **20**. The sheet A that has been turned back is conveyed toward the front again.

[0021] In the third conveying section **15**, the sheet A turned back by the second turn-back section **14** is conveyed substantially horizontally toward the front with the non-coated surface A**1** facing downward and the coated surface A**2** facing upward. As in the first conveying section **11**, at positions opposing the coated surface A**2** (above the coated surface A**2**), drying nozzles **50** are provided spaced apart from the sheet A. The coated surface A**2** is dried by the air ejected from the drying nozzles **50**. The non-coated surface A**1** is supported by the free rollers **40** that are provided on the opposite side to the drying nozzles **50** (i.e., below). Providing the third conveying section **15** with the free rollers **40** serves to easily keep the levelness of the sheet A and easily reduce vibrations of the sheet A.

[0022] After drying the coated portion, the sheet A conveyed by the sheet conveyor apparatus **10** undergoes processes such as a pressing process and a tab-formation process, to be manufactured into an electrode sheet.

[0023] In the following, the air turn bar **20** and the hood **30** provided in the second turn-back section **14** will be described.

Air Turn Bar **20**

[0024] The air turn bar **20** turns back a strip-shaped sheet A conveyed along the above-described conveyance passage. In this embodiment, the air turn bar **20** turns back the conveyed sheet A in the opposite direction. The air turn bar **20** extends along a direction orthogonal to the direction in which the sheet A is conveyed (i.e., along a left-right direction) (see FIG. **3**). As illustrated in FIG. **2**, the air turn bar **20** includes a base part **21**, a protruding part **22**, and a side surface part **23**. The protruding part **22** protrudes in a circular arc-shaped cross section from the base part **21** toward the rear. An internal space **20***a*, which is surrounded by the base part **21**, the protruding part **22**, and the side surface part **23**, is formed inside the air turn bar **20**. In other words, the air turn bar **20** is configured to be hollow.

[0025] The base part **21** is a flat surface extending along a vertical direction and a left-right direction (see FIG. **3**). The base part **21** is in a substantially rectangular shape. An air inlet hole **21***a* is provided substantially at the center of the base part **21**. An air supply device **21***b* is connected to the air inlet hole **21***a*. The air supply device **21***b* is not particularly limited to any type of device as long as it can introduce air into the internal space **20***a*. For the air supply device **21***b*, it is possible to use, for example, a blower fan, a compressor, or the like. From the outer circumferential edge of the base part **21**, the protruding part **22** and the side surface part **23** extend toward the rear.

[0026] The protruding part **22** includes a portion (semi-circular portion) **22***a* that is formed in a semi-circular cross-sectional shape when viewed in plan along the direction in which the air turn bar **20** extends. The protruding part **22** also includes an upstream portion **22***b* extending from the semi-circular shaped portion **22***a* toward the upstream side of the conveying direction of the sheet A, and a downstream portion **22***c* extending from the semi-circular shaped portion **22***a* toward the downstream side of the conveying direction. The upstream portion **22***b* is substantially parallel to the conveying direction in the second conveying section **13**. The upstream portion **22***b* is connected to the upper end of the base part **21**. The downstream portion **22***c* is connected to the lower end of the base part **21**. Ejection holes **25** are formed in the outer circumferential surface of the air turn bar **20** that is within the protruding part **22**. The ejection holes **25** are holes for ejecting air toward one surface (the coated surface A**2** in this embodiment) of the sheet. The ejection holes **25** are opened in the protruding part **22** and are in communication with the internal space **20***a* of the air turn bar **20**. A plurality of ejection holes **25** are provided in the protruding part **22**.

[0027] The plurality of ejection holes **25** are provided in the semi-circular portion **22***a*. Each of the ejection holes **25** is a substantially circular shaped opening. Note that the shape of the ejection holes **25** is not limited to a circular shape but may be, for example, an elliptical shape, a polygonal shape, or the like. As illustrated in FIGS. **2** and **3**, the plurality of ejection holes **25** are provided intermittently in the direction in which the air turn bar **20** extends and in the direction in which the semi-circular portion **22***a* curves. From the viewpoint of uniformly applying the air to the sheet A, the plurality of ejection holes **25** may be provided substantially at a uniform pitch at positions in the semi-circular portion **22***a* that oppose the sheet A. From the ejection holes **25**, air is ejected toward the sheet A. From each ejection hole **25**, air is ejected in a direction that is substantially orthogonal to the outer circumferential surface of the semi-circular portion **22***a*. This allows air to be blown onto the coated surface A**2** of the sheet A. The sheet A may be turned back in a state such as to be floated from the outer circumferential surface of the air turn bar **20**. In addition, blowing air onto the coated surface A**2** may allow the coated surface A**2** to dry.

[0028] In this embodiment, the upstream portion **22***b* of the protruding part **22** includes an upstream ejection hole **26** formed therein. The upstream ejection hole **26** is in communication with the internal space **20***a* (see FIG. **2**) of the air turn bar **20**. As illustrated in FIG. **3**, the upstream ejection hole **26** is a slit-shaped opening extending along a direction in which the air turn bar **20** extends. In this embodiment, the upstream ejection hole **26** is longer than the width of the sheet A. The width of the upstream ejection hole **26** in the conveying direction of the sheet A is wider in its central portion than its widthwise end portions. Herein, the upstream ejection hole **26** is in a

substantially rectangular shape that is longer in its width axis of the sheet A when viewed in plan. However, the shape of the upstream ejection hole **26** is not limited to any particular shape but may be in various shapes, such as a polygonal shape, a rhombus shape, an oblong hole with its widthwise end portions having a substantially circular shape, and an elliptical shape. The upstream ejection hole **26** may not necessarily be a slit-shaped opening but may be a similar shape to that of the ejection holes **25**.

[0029] In this embodiment, the aperture ratio of the upstream portion **22***b*, which is configured by the upstream ejection hole **26**, is greater than the aperture ratio of the semi-circular portion **22***a*, which is configured by the plurality of ejection holes **25**. The aperture ratio may be calculated by the area of the openings per unit area. Making the aperture ratio of the upstream portion **22***b* greater may accordingly make the buoyant force resulting from the air ejected from the upstream portion **22***b* greater than the buoyant force resulting from the air ejected from the semi-circular portion **22***a*.

[0030] As illustrated in FIG. **2**, the inside of the air turn bar **20** is provided with a vane plate **27** that guides the air flowing toward the upstream ejection hole **26**. The vane plate **27** serves to set the direction of the air flowing toward the upstream ejection hole **26**. In this embodiment, the vane plate **27** extends downward from the upper end of the upstream portion **22***b*. The vane plate **27** extending downward from the upper end of the upstream portion **22***b* is inclined toward the front at its upper end portion. This sets the direction of the air ejected from the upstream ejection hole **26** to be obliquely upward (rearward and upward).

[0031] The side surface part **23** is a part that closes a side surface of the air turn bar **20**. The side surface part **23** is provided at each end portion of the air turn bar **20** along the direction in which the air turn bar **20** extends. The side surface part **23** is connected to the end portions of the base part **21** and the protruding part **22** in the direction in which the air turn bar **20** extends. The shape of the side surface part **23** is a shape that corresponds to the shapes of the base part **21** and the protruding part **22**. In this embodiment, the side surface part **23** is in a substantially semi-circular shape.

[0032] Supplying air into the internal space **20***a* of the air turn bar **20** increases the pressure in the internal space **20***a*, causing the air to be ejected from the ejection holes **25** and the upstream ejection hole **26**. By blowing air from the ejection holes **25** and the upstream ejection hole **26** provided in the outer circumferential surface (the protruding part **22**) of the air turn bar **20** toward the sheet A, the sheet A is turned back while the air is being blown thereto. This causes the sheet A to be turned back in such a condition as to be floated up from the outer circumferential surface of the air turn bar **20** so as not to come into contact with the air turn bar **20**. At the position at which the sheet A is turned back, the outside of the sheet A is covered by the hood **30**.

Hood **30**

[0033] The hood **30** includes an inner circumferential surface **31** that opposes the outer circumferential surface (the protruding part **22** in this embodiment) of the air turn bar **20**. The inner circumferential surface **31** of the hood **30** is in a shape that follows the protruding part **22** of the air turn bar **20**. The inner circumferential surface **31** of the hood **30** includes an opposing portion **31***b* that opposes the upstream portion **22***b* of the air turn bar **20**. The inner circumferential surface **31** of the hood **30** also includes a portion **31***a* that opposes the semi-circular portion **22***a* of the air turn bar **20** and a portion **31***c* that opposes the downstream portion **22***c*. In this embodiment, the portion **31***a* of the inner circumferential surface **31** of the hood **30** that opposes the semi-circular portion **22***a* is in a substantially semi-circular shape when viewed in a cross section along the direction in which the air turn bar **20** extends. The opposing portion **31***b* of the inner circumferential surface **31** of the hood **30** that opposes the upstream portion **22***b* is substantially flat. The portion **31***c* of the inner circumferential surface **31** of the hood **30** that opposes the downstream portion **22***c* is substantially flat. An internal space **30***a* is formed inside the hood **30**. In other words, the hood **30** is configured to be hollow.

[0034] The hood **30** is provided with a hose flange **32**. The hose flange **32** is provided with a suction hole formed therein and is connected to an air suction device **32***a*. The air suction device

32*a* reduces the pressure in the internal space **30***a* to be lower than that of the external space. The air suction device **32***a* is not particularly limited to any type of device as long as it can suck air from the internal space **30***a* of the hood **30**. For the air suction device **32***a*, it is possible to use, for example, a vacuum pump or the like.

[0035] The inner circumferential surface **31** of the hood **30** includes suction holes **35** formed therein. The suction holes **35** are holes for sucking air from the other surface (the non-coated surface A**1** in this embodiment) of the sheet A. A plurality of suction holes **35** are provided in the inner circumferential surface **31** of the hood **30**. In this embodiment, the suction holes **35** are formed in a region of the inner circumferential surface **31** of the hood **30** that opposes the outer circumferential surface (the protruding part **22**) of the air turn bar **20**. Each of the suction holes **35** is a substantially circular shaped opening. Note that the shape of the suction holes **35** is not limited to a circular shape but may be, for example, an elliptical shape, a polygonal shape, or the like. The plurality of suction holes **35** are provided intermittently in the widthwise direction and the direction in which the inner circumferential surface **31** curves. From the viewpoint of uniformly sucking the sheet A, the plurality of suction holes **35** may be provided substantially at a uniform pitch at positions in the inner circumferential surface **31** that oppose the sheet A.

[0036] In some cases, when a sheet is turned back by an air turn bar provided with ejection holes through which air is ejected, the blowing air may cause the sheet to flutter. When the sheet flutters, there is a fear that the sheet and the air turn bar may come into contact with each other. The contacting between the sheet and the air turn bar may cause damage to the contacted portion, reducing the product quality of the manufactured electrode sheet.

[0037] According to the above-described embodiment, the sheet conveyor apparatus **10** includes an air turn bar **20** and a hood **30**. The air turn bar **20** turns back a strip-shaped sheet A conveyed along a predetermined conveyance passage. The hood **30** includes an inner circumferential surface **31** that opposes the outer circumferential surface (the protruding part **22** in this embodiment) of the air turn bar **20**. In the outer circumferential surface of the air turn bar **20**, ejection holes **25** are formed that eject air toward one surface (the coated surface A**2** in this embodiment) of the sheet A. In the inner circumferential surface **31** of the hood **30**, suction holes **35** are formed that suck air from the other surface (the non-coated surface A**1** in this embodiment) of the sheet A. Such a sheet conveyor apparatus **10** ejects air from the ejection holes **25** of the air turn bar **20**, so that the coated surface A**2** of the sheet A is less likely to come into contact with the air turn bar **20**. Moreover, because air is sucked through the suction holes **35** of the hood **30**, the sheet A is also sucked from the non-coated surface A**1** side. This causes the coated surface A**2** of the sheet A to be even less likely to come into contact with the air turn bar **20**. In addition, by blowing air onto the sheet A from the coated surface A**2** side and also sucking air from the non-coated surface A**1** side, the volume of the air blown from the air turn bar **20** can be reduced. This reduces fluttering of the sheet A. Because the coated surface A**2** of the sheet A is less likely to come into contact with the air turn bar **20**, the coated surface A**2** of the sheet A is less likely to be damaged, and the product quality of the manufactured electrode sheet improves.

[0038] In the above-described embodiment, the outer circumferential surface of the air turn bar **20** includes a semi-circular cross-sectional shaped portion (semi-circular portion) **22***a*. The air turn bar **20** turns back the conveyed sheet A in an opposite direction. Turning back the sheet A in an opposite direction allows the conveyance passage of the sheet A to be longer in a limited space. This may reduce the size of the equipment that processes the sheet A. It should be noted that the sheet A does not need to be turned back in an opposite direction but may be turned back at any desired angle. The outer circumferential surface of the air turn bar **20** may not necessarily be in a semi-circular cross-sectional shape, but may be in a fan-shaped cross-sectional shape or the like, for example.

[0039] In the above-described embodiment, the outer circumferential surface of the air turn bar **20** includes an upstream portion **22***b* extending from the semi-circular cross-sectional shaped portion

22*a* toward the upstream of the conveying direction of the sheet A. In the upstream portion **22***b*, an upstream ejection hole **26** is formed that eject air toward one surface of the sheet A. To the knowledge of the present inventors, negative pressure is likely to produce in the upstream of the air turn bar **20** at which the sheet A starts to be turned back. This tends to cause the sheet A to be pulled downward toward the air turn bar **20**. Provision of the upstream ejection hole **26** in the upstream portion **22***b* of the air turn bar **20** may cause the buoyant force to be greater at the position at which the sheet A starts to be turned back. As a result, the position at which the sheet A starts to be turned back is less likely to come into contact with the air turn bar **20**.

[0040] In the above-described embodiment, the suction holes **35** are formed in a region of the inner circumferential surface **31** of the hood **30** that opposes the outer circumferential surface (the protruding part **22**) of the air turn bar **20**. The suction holes **35** may be formed in at least a region of the inner circumferential surface **31** of the hood **30** that opposes a turn end portion **22***d* of the outer circumferential surface (the protruding part **22**) of the air turn bar **20**. Due to the tension or the like in conveying the sheet A, the sheet A is likely to come into contact with the turn end portion **22***d* of the air turn bar **20**. Forming the suction holes **35** in the region that opposes the turn end portion **22***d* allows the air turn bar **20** and the sheet A to be less likely to come into contact with each other.

[0041] It should be noted that, as illustrated in FIG. **2**, the sheet conveyor apparatus **10** includes a plurality of guide rollers **60**. Each of the plurality of guide rollers **60** is a cylindrical roller the rotational axis of which is set along the width direction of the sheet A. The plurality of guide rollers **60** are not connected to a drive device or the like, so they rotate in a driven manner. The plurality of guide rollers **60** are provided between the outer circumferential surface (the protruding part **22**) of the air turn bar **20** and the inner circumferential surface **31** of the hood **30**. The plurality of guide rollers **60** are arranged along the outer circumferential surface (the protruding part **22**) of the air turn bar **20** and the inner circumferential surface **31** of the hood **30**. The plurality of guide rollers **60** are arrayed spaced from each other in a circular arc shape. In this embodiment, the plurality of guide rollers **60** are supported by side walls **33** provided so as to cover both ends of the sheet A along the width direction in the conveyance passage of the sheet A. The side walls **33** oppose each other in a left-right direction across the conveyance passage of the sheet A. The form of supporting the plurality of guide rollers **60** is not limited to any particular manner.

[0042] The sheet A is allowed to pass between the air turn bar **20** and the plurality of guide rollers **60**. The guide rollers **60** are what are called free rollers, which may rotate by being driven by the sheet A conveyed along the outer circumferential surfaces of the guide rollers **60**.

[0043] The sheet A is pushed in a direction extending from the outer circumferential surface of the air turn bar **20** toward the inner circumferential surface **31** of the hood **30** due to the air ejected through the ejection holes **25** of the air turn bar **20** and the suction through the suction holes **35** of the hood **30**. In this embodiment, the plurality of guide rollers **60** are provided on the outside (the non-coated surface A**1** side) of the sheet A. This allows the sheet A to be conveyed in a state such as to be in contact with the plurality of guide rollers **60**. As a result, it is possible to reduce fluttering of the sheet A in conveying. Moreover, the gap between the coated surface A**2** and the air turn bar **20** is maintained easily, and therefore, the risk of contacting the sheet A and the air turn bar **20** with each other may be reduced.

[0044] As described previously, negative pressure is likely to produce in the upstream of the air turn bar **20** at which the sheet A starts to be turned back. Provision of the upstream ejection hole **26** in the upstream portion **22***b* of the air turn bar **20** causes the buoyant force to be greater at the position at which the sheet A starts to be turned back. In this embodiment, the plurality of guide rollers **60** are also provided between the opposing portion **31***b* of the inner circumferential surface **31** of the hood **30** and the upstream portion **22***b* of the outer circumferential surface (the protruding part **22**) of the air turn bar **20**. This allows the sheet A to be pressed against the guide rollers **60** to follow the guide rollers **60** easily even when the buoyant force is made greater at the position at which the sheet A starts to be turned back. As a result, fluttering of the sheet A is reduced, and the

conveying of the sheet A is made more stable.
[0045] The above-described embodiment has described an embodiment of the sheet conveyor apparatus **10** in which the sheet A including the non-coated surface A**1** and the coated surface A**2** is turned back. However, the sheet A to be turned back is not limited to such an embodiment. The sheet conveyor apparatus **10** may also be used when turning back a sheet in which coated surfaces are formed on both surfaces and when turning back a sheet in which no coated surface is formed. The sheet is less likely to come into contact with the air turn bar and is accordingly less likely to be damaged when the sheet is turned back. This may improve the quality of the products that are manufactured using the sheet. In addition, the conveyance passage of the sheet is not limited to the above-described passage including the first conveying section **11**, the first turn-back section **12**, the second conveying section **13**, the second turn-back section **14**, and the third conveying section **15**. The technology disclosed herein may be used when a conveyance passage is set such that a sheet is turned back by an air turn bar. The angle at which the sheet is to be turned back is not limited to any particular angle.
[0046] Various embodiments of the technology according to the present disclosure have been described hereinabove. Unless specifically stated otherwise, the embodiments described herein do not limit the scope of the present disclosure. It should be noted that various other modifications and alterations may be possible in the embodiments of the technology disclosed herein. In addition, the features, structures, or steps described herein may be omitted as appropriate, or may be combined in any suitable combinations, unless specifically stated otherwise. In addition, the present description includes the disclosure as set forth in the following items.
Item 1:
[0047] A sheet conveyor apparatus including: [0048] an air turn bar turning back a strip-shaped sheet conveyed along a predetermined conveyance passage; and [0049] a hood including an inner circumferential surface opposing an outer circumferential surface of the air turn bar, wherein: [0050] the outer circumferential surface of the air turn bar includes an ejection hole ejecting air toward one surface of the sheet; and [0051] the inner circumferential surface of the hood includes a suction hole sucking air from another surface of the sheet.
Item 2:
[0052] The sheet conveyor apparatus according to item 1, further including a plurality of guide rollers arranged along the outer circumferential surface of the air turn bar and the inner circumferential surface of the hood.
Item 3:
[0053] The sheet conveyor apparatus according to item 1 or 2, wherein: [0054] the outer circumferential surface of the air turn bar includes a semi-circular cross-sectional shaped portion; and [0055] the air turn bar turns back the conveyed sheet in an opposite direction.
Item 4:
[0056] The sheet conveyor apparatus according to item 3, wherein: [0057] the outer circumferential surface of the air turn bar includes an upstream portion extending from the semi-circular cross-sectional shaped portion toward an upstream of a conveying direction of the sheet; and [0058] the upstream portion includes an upstream ejection hole ejecting air toward the one surface of the sheet.
Item 5:
[0059] The sheet conveyor apparatus according to item 4, wherein: [0060] the inner circumferential surface of the hood includes an opposing portion opposing the upstream portion; and [0061] further including a guide roller disposed between the opposing portion of the inner circumferential surface of the hood and the upstream portion of the outer circumferential surface of the air turn bar.
Item 6:
[0062] The sheet conveyor apparatus according to any one of items 1 through 4, wherein the

suction hole is formed in at least a region of the inner circumferential surface of the hood that opposes a turn end portion of the outer circumferential surface of the air turn bar.

Claims

1. A sheet conveyor apparatus comprising: an air turn bar turning back a strip-shaped sheet conveyed along a predetermined conveyance passage; and a hood including an inner circumferential surface opposing an outer circumferential surface of the air turn bar, wherein: the outer circumferential surface of the air turn bar includes an ejection hole ejecting air toward one surface of the sheet; and the inner circumferential surface of the hood includes a suction hole sucking air from another surface of the sheet.
2. The sheet conveyor apparatus according to claim 1, further comprising a plurality of guide rollers arranged along the outer circumferential surface of the air turn bar and the inner circumferential surface of the hood.
3. The sheet conveyor apparatus according to claim 1, wherein: the outer circumferential surface of the air turn bar includes a semi-circular cross-sectional shaped portion; and the air turn bar turns back the conveyed sheet in an opposite direction.
4. The sheet conveyor apparatus according to claim 3, wherein: the outer circumferential surface of the air turn bar includes an upstream portion extending from the semi-circular cross-sectional shaped portion toward an upstream of a conveying direction of the sheet; and the upstream portion includes an upstream ejection hole ejecting air toward the one surface of the sheet.
5. The sheet conveyor apparatus according to claim 4, wherein: the inner circumferential surface of the hood includes an opposing portion opposing the upstream portion; and further comprising a guide roller disposed between the opposing portion of the inner circumferential surface of the hood and the upstream portion of the outer circumferential surface of the air turn bar.
6. The sheet conveyor apparatus according to claim 1, wherein the suction hole is formed in at least a region of the inner circumferential surface of the hood that opposes a turn end portion of the outer circumferential surface of the air turn bar.