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(54) **Traverse device**

Changiervorrichtung

Dispositif de va-et-vient

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Description

Field of the Invention

[0001] The present invention relates to a traverse device unit according to the preamble of claim 1 for traversing a yarn that is wound into a package.

Background of the Invention

[0002] A known traverse device unit of this kind traverses a yarn while transferring it between an upper and lower set of wings that rotate in opposite directions.

[0003] This wing traverse device unit does not easily accommodate a mechanism for changing a position where traversing is turned, that is, a position where a yarn is transferred between the sets of wings, so that it is difficult to arbitrarily change a right and left traverse turn position, that is, a traverse range in order to form packages in an arbitrary form.

[0004] It is contemplated that a yarn guide for threading a yarn may be connected to a linear motor so as to be reciprocated to arbitrarily change the right and left traverse turn positions. In this case, however, the linear motor requires a motor stroke corresponding to the traverse range, resulting in an increase in the size of the entire device including the linear motor.

[0005] Document WO 00/37346 (Prior art under Article 54(3) EPC) discloses a yarn traverse device unit having an arm member pivotably supported by a shaft. The arm member is driven by an electrical coil motor which is formed by two stationary magnets defining an air gap therebetween and an electric coil extending through the air gap. In particular, each of the two magnets has N and S poles on a surface thereof.

[0006] Document WO 00/24663 (Prior art under Article 54(3) EPC) describes a traverse device unit having an oscillating arm member which is pivotably supported by a shaft. The arm member is driven by an electrical coil motor. The coil motor is formed by an electrical coil mounted on a top surface of the arm member and two fixed permanent magnets. The permanent magnets are arranged at positions defining the oscillating range end positions. In operation, the electrical coil together with the arm member is oscillated between the fixed permanent magnets due to electromagnetic forces.

[0007] Document US-A-5 523 911 discloses a traverse device unit for a magnetic disk drive including an oscillating arm member pivotably supported by a shaft. The arm member is driven by an electrical coil motor comprising a moveable member and a stator. The stator is formed by one or more stationary permanent magnets while the oscillating arm member is formed by a coil mounted on one end of the oscillating arm member and surrounding the permanent magnet. The permanent magnets each have N and S poles arranged on a surface thereof.

[0008] It is an object of the present invention to provide

a traverse device unit of the above mentioned kind which is less complicated in structure, however, which has an improved efficiency and is capable for high speed reverse movement of a traversing arm member.

Summary of the Invention

[0009] In accordance with the present invention there is provided a yarn traverse device comprising the features of claim 1 wherein the features set forth in the preamble are known from US-A-5 523 911.

[0010] The traverse device unit comprises an oscillating arm member having a yarn guide, a voice coil motor connected to the oscillating arm member and driven normally and reversely within a predetermined range, and control means for controlling the normal and reverse driving of the voice coil motor, the control means determining a range within which the oscillating arm member is oscillated.

[0011] With this configuration, a yarn traverse range is determined by the oscillating range of the oscillating arm member, which is in turn determined by the control means for controlling the motor. Thus, by changing the oscillating range of the oscillating arm member, a traverse width can be gradually narrowed, that is, a position where traversing is turned can be gradually moved inward to easily wind a yarn into a tapered-end package or the traverse width can be periodically or non-periodically narrowed, that is, the traverse turn position can be periodically or non-periodically moved inward to carry out creeping to prevent saddle bag shapes.

[0012] Normal and reverse driving of the voice coil motor within a predetermined range is controlled by a command value such as a triangular wave in such a manner that the normal and reverse driving operations are switched at peaks or bottoms of the command value, thereby enabling high-speed braking and acceleration before and after the oscillating arm member is turned. In addition, high-speed turns are achieved by directly attaching an elongated light oscillating arm member to a shaft of the voice coil motor while attaching a small light yarn guide to a tip of the oscillating arm member.

[0013] Alternatively, the present invention is a traverse device unit comprising an oscillating arm member having a yarn guide, a motor connected to the oscillating arm member and driven normally and reversely within a predetermined range, and control means for controlling the normal and reverse driving of the motor, a plurality of the oscillating arm members being arranged in a traverse direction so as to transfer a yarn between the adjacent oscillating arm members.

[0014] With this configuration, the traverse range is divided into two or more so that oscillating ranges of the two or more short oscillating arm members can be combined together to obtain a wide traverse range. The short oscillating arm members serve to reduce the inertia while increasing the turn speed.

[0015] Alternatively, the present invention is a traverse

device unit that individually controls oscillation of the plurality of oscillating arm members.

[0016] With this configuration, by changing driving timings and/or driving ranges for the plurality of oscillating arm members, positions where the yarn is transferred between the oscillating arm members can be shifted to suppress straight winding at these transfer positions.

[0017] Alternatively, the present invention is a traverse device unit comprising detection means for detecting a normal and reverse driving range of the motor over the entire range.

[0018] With this configuration, the detection means can be used for feedback control to accurately control the traverse turn positions. Additionally, if the yarn is transferred between the plurality of oscillating arm members, yarn transfer positions can be accurately controlled by, for example, controlling oscillation of a receiving-side oscillating arm member depending on the position of a delivering-side oscillating position.

Brief Description of the Drawings

[0019]

Figure 1 is a schematic structural drawing of a traverse device unit according to the present invention.

Figure 2 is a block diagram of a control section.

Figure 3 is graph showing how a command voltage is output from the control section.

Figure 4 is a schematic structural drawing of a traverse device showing another example of the present invention.

Figure 5 is a graph showing how a command voltage is output from a control section for each arm.

Figure 6 is a partial structural drawing of a traverse device unit showing yet another example of the present invention.

Detailed Description of the Preferred Embodiments

[0020] Embodiments of the present invention will be described with reference to the drawings.

[0021] In Figure 1, a traverse device unit 1 comprises an oscillating arm member 11, a voice coil motor 12, a control section 13, and a detection section 14. The traverse device unit 1 has no mechanical part such as a damper which determines a position where oscillation of the arm member 11 is inverted, and a traverse range L is determined by oscillation of the arm member 11 connected to the voice coil motor 12. A yarn Y traversed by the traverse device unit 1 is wound into a package 3 that is in contact with a rotatively driven friction drum 2.

[0022] A yarn guide 21 for guiding the yarn Y is attached to a tip of the oscillating arm member 11. The oscillating arm member 11 has the other side or its intermediate portion connected to a shaft 22 so as to oscillate around the shaft 22. The oscillating arm member 11 has the voice coil motor 12 connected to the other end thereof. The oscillating arm member 11 constitutes an oscillating member having the yarn guide and connected to the voice coil motor 12 so as to be normally and reversely driven within a predetermined range.

[0023] The voice coil motor (oscillating motor) 12 provided at the other end of the oscillating arm member 11 and driven normally and reversely within a predetermined range comprises a stator 23 comprising a permanent magnet shaped like a fan extended around the shaft 22 and a movable member 24 provided to surround the stator 23 and comprising a fan-shaped air-core coil. The relationship between the stator 23 and the movable member 24 is similar to that between a magnet and a coil, and the movable member 24 is oscillated around the shaft 22 by means of a driving force exerted based on interactions between a current flowing through the coil and magnetic fields crossing the current. In this voice coil motor 12, a permanent magnet surface of the stator 23 which is opposed to the movable member 24 has N or S poles contiguously disposed in a driving direction, compared to the other linear motors having N and S poles alternately disposed in the driving direction. Accordingly, when the movable member 24 is driven in one direction, the direction of a current flowing through a coil in the movable member 24 need not be switched. The movable member 24, which is driven normally and reversely within a range within which the stator 23 is present, is supplied with power via flexible power-supplying line. The stator 23 may be a coil, while the movable member 24 may be a permanent magnet.

[0024] The normal and reverse driving range of the movable member 24 is determined by a voltage supplied to the coil. Consequently, to change turn positions at traverse ends, a peak height (amplitude) of a triangular wave voltage supplied to the coil can be changed. The power supplied to the coil is not limited to the triangular wave voltage.

[0025] When the movable member 24 is constructed using the air core coil, its weight can be reduced to allow the oscillating arm member 11 to be inverted at a high speed. In addition, since the stator 23 is shaped like a fan covering the normal and reverse driving range of the movable member 24 and the movable member 24 may be sized to move along the stator 23, the weight of the movable member 24 and thus its inertia can be reduced, compared to motors that rotate through 360 degrees. As a result, the oscillating arm member 11 can be inverted at a high speed when its direction is changed.

[0026] The control section 13 (control means) has a servo function and outputs a command signal to the voice coil motor 12 to control oscillations effected by the voice coil motor 12. The control section 13 is provided for each

voice coil motor 12. Preferably, the detection section 14 (detection means) is, for example, a rotary encoder that can detect the oscillation of the shaft 22 over the entire range. The control section 13 uses feedback control based on an output from the detection section 14 to arbitrarily control a position where and a time when an oscillation is effected by the voice coil motor 12.

[0027] Figure 2 shows a specific example of the control section 13 including an analogical servo function. In this example, the detection section 14 comprises a magneto-resistance element that varies a resistance value depending on the position of the movable member 24. In the feedback circuit shown in Figure 2, a voltage corresponding to a difference between an output voltage value from the magneto-resistance element (detection section 14) and a command voltage value is output to the voice coil motor 12 through a comparator 26 and supplied to the coil (movable member 24) of the voice coil motor 12, which effects predetermined normal and reverse driving in a manner following the command value. That is, a current corresponding to the difference between the output voltage value from the detection section 14 and the command voltage value flows through the coil of the voice coil motor 12. When the output voltage value from the detection section 14 equals the command voltage value, an output from the comparator 26 becomes zero to cause no current to flow through the voice coil motor 12. Another example of the control section 13 may include a digital servo function. In addition, the present invention is not limited to the feedback control, but open control can be employed where a spring is provided for the oscillating shaft so that its position is controlled while maintaining the balance with an urging force of the spring.

[0028] Figure 3 is a graph showing an example of a command value output from the control section 13 in Figure 2. The command value is output as a triangular wave voltage. The height of the triangular wave determines the normal and reverse driving range of the voice coil motor 12, and the period of the triangular wave determines a speed at which the voice coil motor 12 is driven normally and reversely. This enables controlling of oscillating motions of the arm 11 connected to the voice coil motor 12. A current value is particularly high near a peak of the command value (near a position where the oscillating arm member 11 is turned). This large variation in current induces braking before a turn as well as acceleration after a turn to enable the oscillating arm member 11 to be inverted at a high speed without using an energy accumulating device against which the arm oscillating arm member 11 collides.

[0029] Next, the operation of the traverse device unit configured as described above will be explained with reference to Figure 1. In the illustrated example, a tapered-end package is formed.

[0030] The control section 13 outputs a triangular wave of a predetermined height and a predetermined period to normally and reversely drive the voice coil motor 12 to traverse the yarn Y within the predetermined traverse

range L, the yarn Y being guided by the yarn guide 21 disposed at the tip of the oscillating arm member 11. The control section 13 provides such control that the triangular wave in Figure 3 has its height gradually reduced depending on the elapsed time or a measured yarn length. Accordingly, the traverse range L narrows gradually to allow a tapered-end package as shown in Figure 1 to be formed easily. In addition, a creeping operation of periodically or non-periodically mixing a lower triangular wave as shown by the alternate long and two short dashes line in Figure 3 can be performed to prevent saddle bag shapes from being formed at turn sections corresponding to opposite ends of the traverse range, thereby obtaining a package having a yarn layer with a straight surface.

[0031] Since the voice coil motor 12 is structured to normally and reversely drive the oscillating arm member 11 in a fashion tracing a fan around the shaft 22, the normal and reverse driving range is limited to enable the size and inertia of the motor to be reduced.

[0032] In addition, no mechanical part such as a damper is provided at the turn portions of the oscillating range, so that the oscillating range, that is, traverse range of the oscillating arm member 11 can be arbitrarily set to easily form tapered-end packages while performing a creeping operation to prevent formation of saddle bag shapes.

[0033] In addition, the weights of the oscillating arm member 11 and the yarn guide 21 disposed at the tip thereof are minimized to enable the oscillating arm member 11 to be turned at a high speed.

[0034] Since, however, a longer oscillating arm member 11 limits high-speed turns, the above described traverse device unit with the single oscillating arm member 11 is preferably applicable to a double twister or the like. The single oscillating arm member type is also applicable to a spun yarn winder with a narrow traverse range.

[0035] Figure 4 is a schematic structural drawing of another traverse device according to the present invention. For example, four oscillating arm members are arranged in juxtaposition in a traverse direction (an axial direction of a winding package) to accommodate high-speed traversing. Description of that part of the configuration of this traverse device which is common to the traverse device unit (single arm type) is omitted as appropriate.

[0036] The traverse device 30 comprises traverse device units 31 and 32 for turning the yarn rightward or leftward traverse device and central traverse device units 33 and 34 for transferring the yarn. Each of the traverse device units 31 to 34 has an oscillating arm member 35, a voice coil motor (an oscillating motor) 36, a control section 37, and a detection section 38. In addition, a main control section 39 controls the control sections 37, and each control section 37 controls a position where the oscillating arm member 35 is oscillated, based on a command from the main control section 39. The control sections 37 and the main control section 39 constitute control

means. The traverse device may comprise two or more traverse device units, for example, only the right and left traverse device units and one central traverse device unit.

[0037] Since there are four traverse device units in Figure 4, the yarn is transferred from the right to left traverse device units or from the left to right traverse device units at a point P1 between the traverse device units 31 and 33, a point P2 between the traverse device units 33 and 34, and a point P3 between the traverse device units 34 and 32. The oscillating arm member 35 transfers the yarn during oscillation at the yarn transfer points P1, P2, and P3. That is, the delivering-side arm 35 stops the oscillation after transferring the yarn, and the receiving-side arm receives the yarn after starting oscillation. As a result, the yarn is transferred from the oscillating arm member 35 to the subsequent oscillating arm member 35, thereby allowing the yarn to be transferred at the points P1, P2, and P3 at a high speed. Appropriate guide plates are provided at the yarn transfer points P1, P2, and P3 to transfer the yarn from one yarn guide to another, but illustration thereof is omitted. For example, the guide plates are each shaped to instantly receive the yarn from the delivering-side yarn guide and to transfer it to the receiving-side yarn guide.

[0038] The present invention is not limited to the oscillating arm member 35 that transfers the yarn during oscillation, but the delivering side arm may stop at the transfer position, while the receiving-side arm may start oscillation at this transfer position, so that the yarn is transported over the total oscillating range of the plurality of arms.

[0039] Figure 5 is a graph showing timings in a command voltage generated by each control section 37 due to a command from the main control section 39 in Figure 4.

[0040] In the illustrated example, at a reference voltage (zero voltage), each oscillating arm member 35 lies leftward. In response to an increase in voltage, the oscillating arm member 35 of the left traverse device unit 31 oscillates rightward from a turn position T1 and transfers, at the point P2, the yarn to the oscillating arm member 35 of the central traverse device unit 34. The oscillating arm member 35 of the central traverse device unit 34 oscillates rightward and transfers, at the point P3, the yarn to the oscillating arm member 35 of the right traverse device unit 32. Likewise, in response to an increase in voltage, the oscillating arm member 35 of the right traverse device unit 32 moves to a turn position T2. Subsequently, in response to a voltage drop in each traverse device unit, the yarn is transferred from the turn position T2 to the turn position T1. Repeating the above operation allows the yarn Y to be traversed within the traverse range.

[0041] Thus, since the traverse range L in Figure 1 is divided, for example, into four, the oscillation range of the oscillating arm member 35 of each of the traverse device units 31 to 34 is narrowed to correspondingly enable the oscillating arm member 35 to be shortened.

When the oscillating arm member 35 is shortened, inertia exerted during oscillation is diminished to enable the size of the entire traverse device to be reduced to accommodate high-speed turns. The length of the oscillating arm member 35 of each of the right and left traverse device units 31 and 32 (this length equals the distance from the oscillating shaft to the yarn guide) can also be reduced below that of each of the central traverse device units 33 and 34 to accommodate high-speed turns. This reliably prevents saddle bag shapes from being formed at the right and left ends. Further, a pattern of an increase or decrease in voltage at each of the traverse device units 31 to 34 can be individually varied to shift the yarn transfer points P1, P2, and P3 in the traverse direction (the axial direction of the package) to hinder straight winding at these points P1, P2, and P3.

[0042] Figure 6 is a partial structural drawing of yet another traverse device. Two traverse device units 40 and 41 are stacked on each other (in the direction of the oscillating shaft) in a right and left portions where traversing is turned, so that the yarn is transferred between an upper oscillating arm member 42 and a lower oscillating arm member 43, which are overlapping each other. In this case, a guide plate (not shown in the drawing) can be provided as appropriate to reliably transfer the yarn from the upper oscillating arm member 42 to the lower oscillating arm member 43.

[0043] In Figure 6, the upper oscillating arm member 42, which is moving leftward to traverse the yarn Y, and the lower oscillating arm member 43, which is empty and is moving rightward to also traverse the yarn Y, transfer the yarn there between at the turn point T1 where they overlap each other. Since the lower oscillating arm member 43 reaches the turn point T1 while being accelerated, high-speed turns are achieved to more reliably prevent saddle bag shapes from being formed at the right and left ends.

[0044] As described above, according to the present invention, the yarn traverse range is determined by the oscillating range of the oscillating member, which is in turn determined by the control means for controlling the voice coil motor. Thus, by changing the oscillating range of the oscillating arm member, the traverse range can be gradually narrowed to easily wind the yarn into a tapered-end package or the traverse range can be periodically or non-periodically varied to carry out creeping to prevent saddle bag shapes.

[0045] In addition, due to its simple mechanical configuration including the oscillating arm member and the voice coil motor that is driven normally and reversely, the present invention eliminates the needs for drive transmission means such as an endless belt to thereby improve durability while enabling the size of the entire traverse device to be reduced.

[0046] Further, the voice coil motor that is subjected to a small inertia and that can be switched between normal and reverse driving at a high speed serves to achieve high-speed turns to enable accurate formation of pack-

ages in a predetermined form such as a tapered end while preventing saddle bag shapes.

[0047] Alternatively, according to the present invention, the traverse range is divided into two or more so that the oscillating ranges of the two or more short oscillating arm members can be combined together to obtain a wide traverse range. The short oscillating arm members serve to reduce the inertia while increasing the turn speed, thereby enabling packages in an accurate form to be obtained while preventing saddle bag shapes. In addition, the number of oscillating arm members can be augmented to accommodate a wide traverse range.

[0048] Alternatively, according to the present invention, by changing driving timings and/or driving ranges for the plurality of oscillating arm members, positions where the yarn is transferred between the oscillating arm members can be shifted to suppress straight winding at these transfer positions. As a result, despite the plurality of oscillating arm members, packages obtained each have an appropriate winding form.

[0049] Alternatively, according to the present invention, the detection means can be used for feedback control to accurately control the traverse turn positions. Additionally, if the yarn is transferred between the plurality of oscillating arm members, the yarn transfer positions can be accurately controlled. As a result, packages obtained have an appropriate winding form, and the yarn can be reliably transferred to prevent winding errors.

Claims

1. A traverse device unit (1) comprising

- an arm member (11),
- a voice coil motor (12) comprising a stator (23) and a moveable member (24) surrounding the stator (23), and
- a control means for controlling the voice coil motor (12),

in which

- said arm member (11) oscillating in a predetermined yarn traverse range (L), having a yarn guide (21) attached to one end, having its intermediate portion connected to a shaft (22) to oscillate around it and having the movable member (24) of the voice coil motor (12) connected to the other end,
- said moveable member (24) being driven normally and reversely within a predetermined range, and
- said stator (23) comprising a permanent magnet,

characterized in that

a permanent magnet surface of said stator (23)

which is opposed to said movable member (24) has N or S poles contiguously disposed in a driving direction of said movable member (24).

2. A traverse device unit (1) according to claim 1, **characterized in that** said permanent magnet is shaped like a fan extended around the shaft (22).
3. A traverse device unit (1) according to claim 1 or 2, **characterized in that** the stator (23) covers the normal and reverse driving range of the moveable member (24).
4. A traverse device unit (1) according to any one of preceding claims, **characterized in that** the moveable member (24) is sized to move along the stator (23).
5. A traverse device (30) comprising a plurality of traverse device units (31, 32, 33, 34) according to one of the claims 1 to 4, each of said traverse device units (31, 32, 33, 34) having an oscillating arm member (35), **characterized in that** said oscillating arm members (35) being arranged in a traverse direction so as to transfer a yarn between the adjacent oscillating arm members (35).
6. A traverse device according to claim 5, **characterized in that** two oscillating arm members (42, 43) are stacked at each traverse end in a direction of an oscillating shaft.
7. A traverse device according to any one of claims 5 or 6, **characterized in that** said control means (37, 39) individually controls oscillation of said plurality of oscillating arm members (35; 42, 43).
8. A traverse device according to claim 7, **characterized by** comprising detection means (38) for detecting positions at which said plurality of oscillating arm members are oscillated, said control means (37, 39) controlling oscillation of a receiving-side oscillating arm member depending on a detected oscillating position of a delivering-side oscillating arm member.
9. A traverse device according to any one of claims 5 to 8, **characterized in that** the oscillating arm members (35) arranged at the traverse ends are shorter than oscillating arm members arranged in a central portion of a traverse range.

10. A traverse device unit (1) according to one of the claims 1 to 4,
characterized in that
 a command value to the voice coil motor (12) is changed to vary a position at which traversing is turned as winding progresses.

11. A traverse device unit (1) according to claim 10,
characterized in that
 an amplitude of the command value to the voice coil motor (12) is periodically or non-periodically changed to vary the traverse turn position.

12. A traverse device (30) according to one of the claims 5 to 9,
characterized in that
 the driving timings and/or driving ranges for the plurality of oscillating arm members (35; 42, 43) are changed to vary positions where the yarn is transferred between the oscillating members (35; 42, 43).

Patentansprüche

1. Traversiervorrichtungseinheit (1) mit

- einem Armteil (11),
- einem Schwingspulenmotor (12) mit einem Stator (23) und einem beweglichen Teil (24), das den Stator (23) umgibt, und
- einer Steuereinrichtung zum Steuern des Schwingspulenmotors (12),

wobei 1

- das Armteil (11) in einem vorbestimmten Fadentraversierbereich (L) schwenkbar ist, eine Fadenführung (21) hat, die an einem Ende angebracht ist, mit seinem mittleren Abschnitt mit einer Welle (22) so verbunden ist, dass es um diese schwenkbar ist, und mit dem anderen Ende mit dem beweglichen Teil (24) des Schwingspulenmotors (12) verbunden ist,
- das bewegliche Teil (24) in einem vorbestimmten Bereich in Normalrichtung und in Rückwärtsrichtung bewegbar ist, und
- der Stator (23) einen Permanentmagneten aufweist,

dadurch gekennzeichnet, dass

eine Permanentmagnetoberfläche des Stators (23), die dem beweglichen Teil (24) gegenüberliegt, N- oder S-Pole aufweist, die in einer Bewegungsrichtung des beweglichen Teils (24) angeordnet sind.

2. Traversiervorrichtungseinheit (1) nach Anspruch 1,
dadurch gekennzeichnet, dass
 der Permanentmagnet in Form eines Fächers gebil-

det ist, der sich um die Welle (22) erstreckt.

3. Traversiervorrichtungseinheit (1) nach Anspruch 1 oder 2,
dadurch gekennzeichnet, dass
 der Stator (23) den Bewegungsbereich in Normal- und Rückwärtsrichtung des beweglichen Teils (24) umfasst.

4. Traversiervorrichtungseinheit (1) nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet, dass
 das bewegliche Teil (24) so ausgelegt ist, um sich längs des Stators (23) zu bewegen.

5. Traversiervorrichtung (30) mit mehreren Traversiervorrichtungseinheiten (31, 32, 33, 34) nach einem der Ansprüche 1 bis 4, wobei jede der Traversiervorrichtungseinheiten (31, 32, 33, 34) ein Schwenkarmteil (35) aufweist,
dadurch gekennzeichnet, dass
 die Schwenkarmteile (35) in Traversierrichtung so angeordnet sind, um einen Faden zwischen zwei benachbarten Schwenkarmteilen (35) zu übertragen.

6. Traversiervorrichtung nach Anspruch 5,
dadurch gekennzeichnet, dass
 zwei Schwenkarmteile (35) an jedem Traversierenden in einer Richtung einer Schwenkwelle übereinander angeordnet sind.

7. Traversiervorrichtung nach einem der Ansprüche 5 oder 6,
dadurch gekennzeichnet, dass
 die Steuereinrichtungen (37, 39) die Schwenkbewegungen der mehreren Schwenkarmteile (35; 42, 43) einzeln steuern.

8. Traversiervorrichtung nach Anspruch 7,
dadurch gekennzeichnet, dass
 eine Erfassungseinrichtung (38) vorgesehen ist, um die Positionen zu erfassen, an denen die mehreren Schwenkarmteile geschwenkt werden, und die Steuereinrichtungen (37, 39) die Schwenkbewegung eines empfangsseitigen Schwenkarmteils abhängig von einer erfassten Schwenkposition eines zuführseitigen Schwenkarmteils steuern.

9. Traversiervorrichtung nach einem der Ansprüche 5 bis 8,
dadurch gekennzeichnet, dass
 die Schwenkarmteile (35), die an den Traversierenden vorgesehen sind, kürzer sind als die Schwenkarmteile, die in einem mittleren Abschnitt eines Traversierbereichs vorgesehen sind.

10. Traversiervorrichtungseinheit (1) nach einem der Ansprüche 1 bis 4,

dadurch gekennzeichnet, dass

eine Steuergröße an den Schwingspulenmotor (12) geändert wird, um eine Position zu verändern, an der das Traversieren bei fortschreitendem Aufwickeln umgekehrt wird.

11. Traversiervorrichtungseinheit (1) nach Anspruch 10, dadurch gekennzeichnet, dass

eine Amplitude der Steuergröße an den Schwingspulenmotor (12) periodisch oder nicht-periodisch geändert wird, um die Traversier-Wendeposition zu verändern.

12. Traversiervorrichtung (30) nach einem der Ansprüche 5 bis 9, dadurch gekennzeichnet, dass

die Bewegungszeitsteuerungen und/oder Bewegungsbereiche für die mehreren Schwenkarmteile (35; 42, 43) geändert werden, um die Positionen zu verändern, an denen der Faden zwischen den Schwenkarmteilen (35; 42, 43) übertragen wird.

Revendications**1. Unité de dispositif de va-et-vient (1) comprenant**

- un organe formant bras (11),
- un moteur de bobine acoustique (12) comprenant un stator (23) et un organe mobile (24) entourant le stator (23) et
- un moyen de commande pour commander le moteur de bobine acoustique (12),
- le dit organe formant bras (11) oscillant dans une plage de va-et-vient de fil prédéterminée (L) ayant un guide-fil (21) attaché à une extrémité, ayant sa portion intermédiaire connectée à un arbre (22) pour osciller autour de cette dernière et ayant l'organe mobile (24) du moteur de bobine acoustique (12) connecté à l'autre extrémité,
- ledit organe mobile (24) étant entraîné normalement et inversement dans une plage prédéterminée, et
- ledit stator (23) comprenant un aimant permanent,

caractérisée en ce qu'

une surface d'aimant permanent dudit stator (23) qui est opposée audit organe mobile (24) présente des pôles N ou S disposés en contiguë dans une direction d'entraînement dudit organe mobile (24).

2. Unité de dispositif de va-et-vient (1) selon la revendication 1, caractérisée en ce que

ledit aimant permanent a la forme d'un éventail étendu autour de l'arbre (22).

3. Unité de dispositif de va-et-vient (1) selon la revendication 1 ou 2, caractérisée en ce que le stator (23) couvre la plage d'entraînement normale et inversée de l'organe mobile (24).

4. Unité de dispositif de va-et-vient (1) selon l'une des revendications précédentes, caractérisée en ce que l'organe mobile (24) est dimensionné pour se déplacer le long du stator (23).

5. Dispositif de va-et-vient (30) comprenant une pluralité d'unités de dispositif de va-et-vient (31, 32, 33, 34) selon l'une des revendications 1 à 4, chacune desdites unités de dispositif de va-et-vient (31, 32, 33, 34) ayant un organe formant bras oscillant (35), caractérisé en ce que ledit organe formant bras oscillant (35) est disposé dans une direction transversale de manière à transférer un fil entre les organes oscillants formant bras adjacent (35).

6. Dispositif de va-et-vient selon la revendication 5, caractérisé en ce que deux organes oscillants formant arbre (42, 43) sont superposés à chaque extrémité transversale dans une direction d'un arbre oscillant.

7. Dispositif de va-et-vient selon l'une des revendications 5 ou 6, caractérisé en ce que lesdits moyens de commande (37, 38) commandent individuellement l'oscillation de ladite pluralité d'organes oscillants formant bras (35; 42, 43).

8. Dispositif de va-et-vient selon la revendication 7, caractérisé par le fait de comprendre des moyens de détection (38) pour la détection de positions auxquelles ladite pluralité des organes oscillants formant bras sont oscillés, lesdits moyens de commande (37, 39) commandant l'oscillation d'un organe de bras oscillant côté réception dépendant d'une position d'oscillation détectée d'un organe oscillant formant bras côté approvisionnement.

9. Dispositif de va-et-vient selon l'une des revendications 5 à 8, caractérisé en ce que les organes oscillants formant bras (35) disposés sur les extrémités transversales sont plus courts que les organes oscillants de bras disposés dans une portion centrale d'une plage de va-et-vient.

10. Unité de dispositif de va-et-vient (1) selon l'une des revendications 1 à 4, caractérisée en ce qu'une valeur de commande au moteur de bobine acoustique (12) est modifiée pour varier une position à laquelle le va-et-vient est inversé au moment où l'enroulement progresse.

11. Unité de dispositif de va-et-vient (1) selon la reven-

dication 10, **caractérisée en ce qu'**une amplitude de la valeur de commande au moteur de bobine acoustique (12) est modifiée périodiquement ou non périodiquement pour modifier la position d'inversion de va-et-vient.

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- 12.** Dispositif de va-et-vient (30) selon l'une des revendications 5 à 9, **caractérisé en ce que** les intervalles d'entraînement et/ou les plages d'entraînement pour la pluralité des organes oscillants formant bras (35; 42, 43) sont modifiés pour varier les positions où le fil est transféré entre les organes oscillants (35; 42, 43).

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FIG. 1

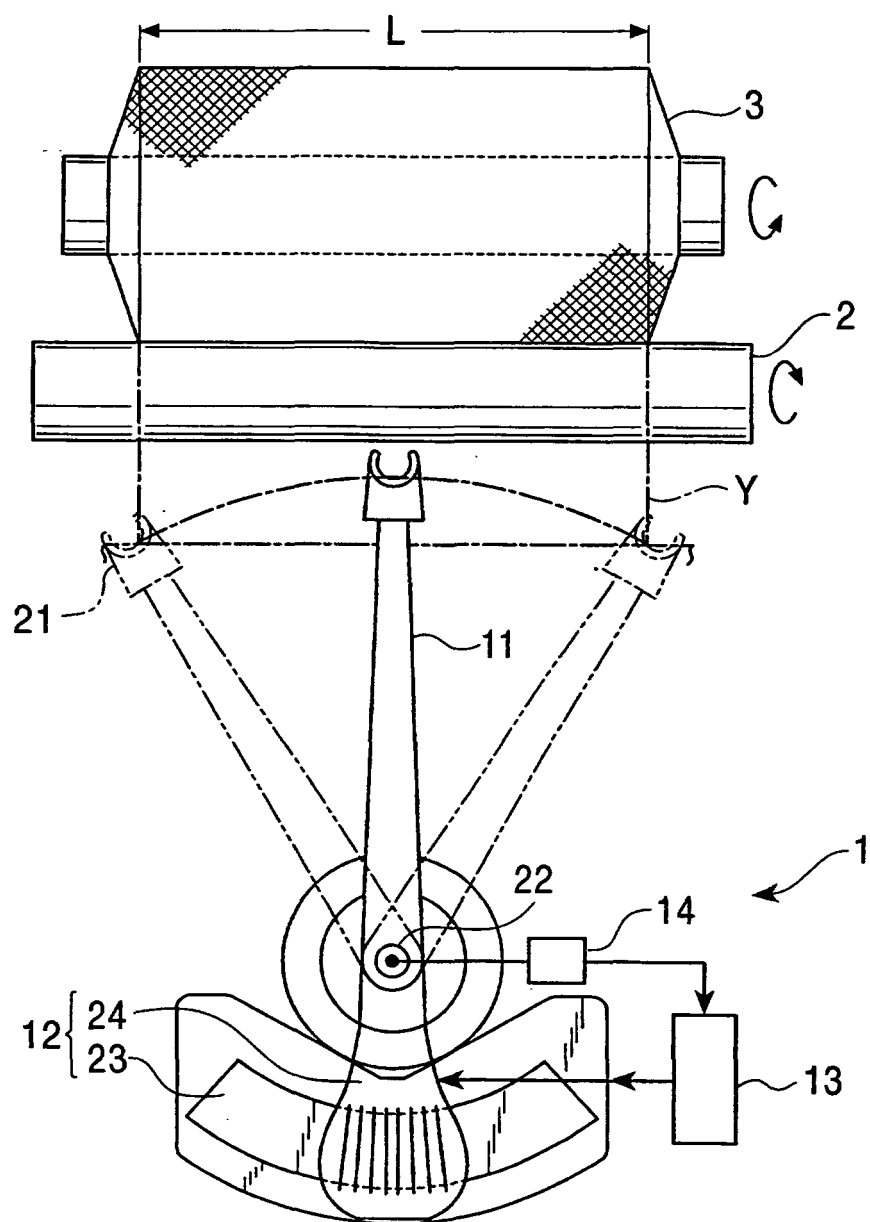


FIG. 2

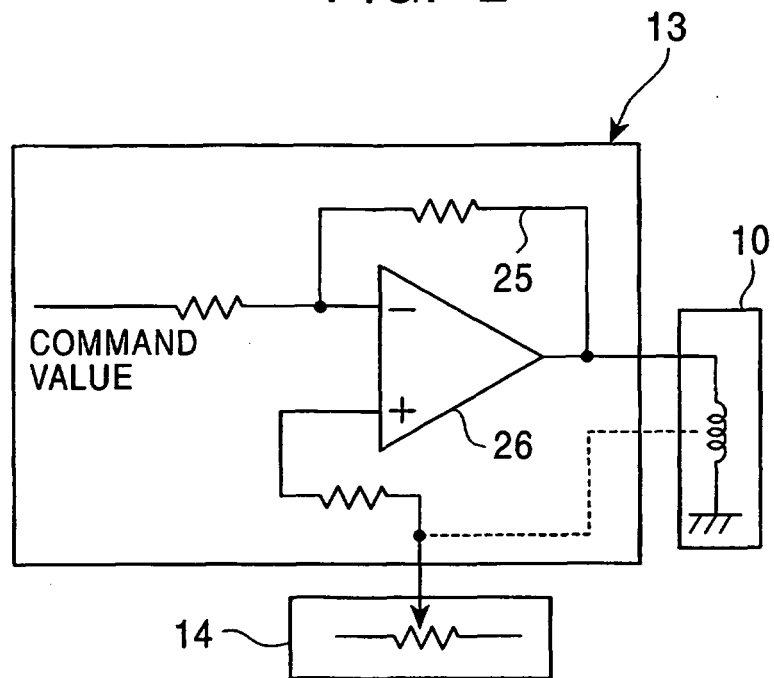


FIG. 3

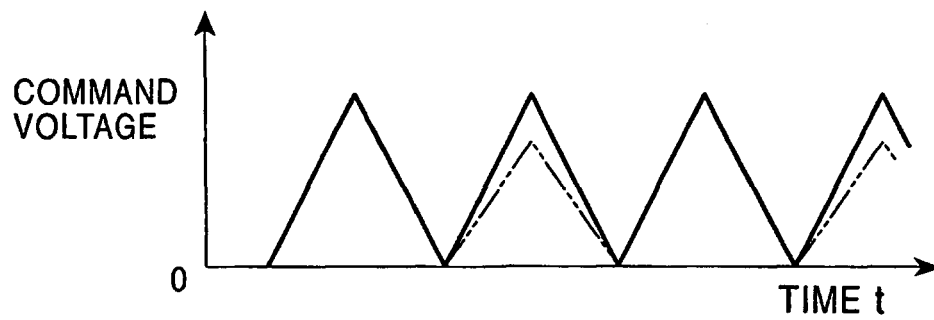


FIG. 4

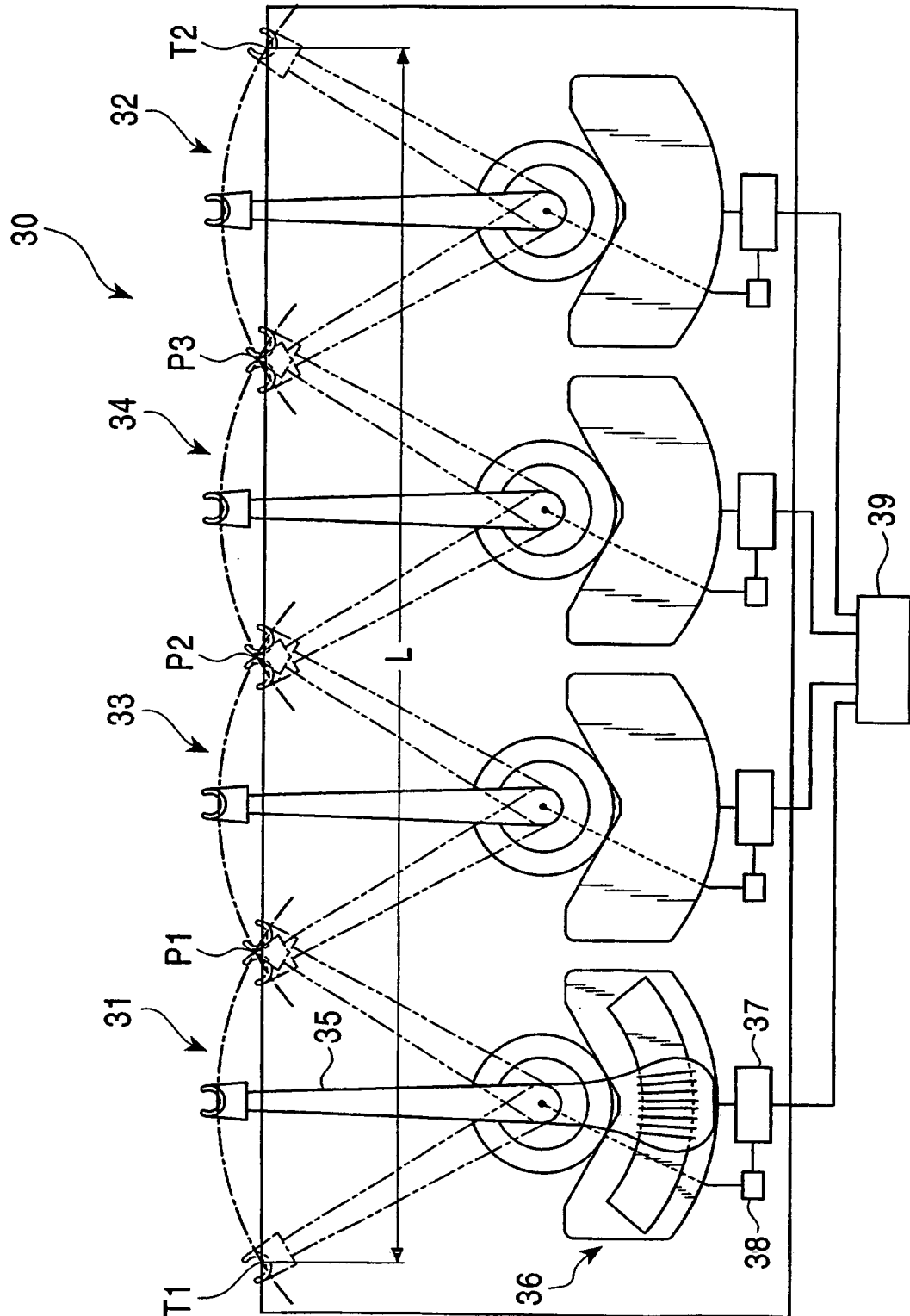


FIG. 5

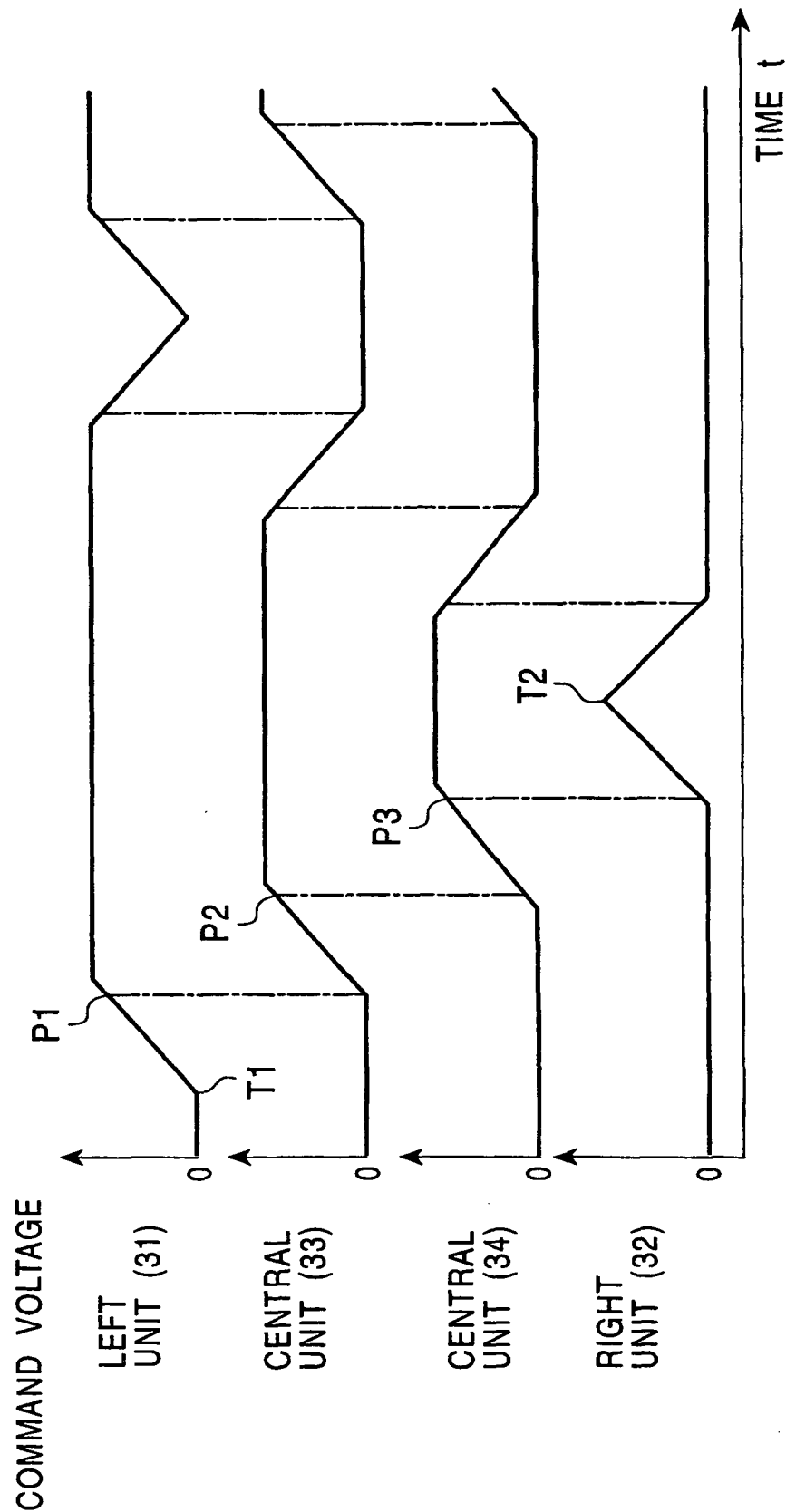


FIG. 6

