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(54) **CIRCULAR LOOM FOR PRODUCING DOUBLE BAG.**

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Description

This invention relates to a circular loom for continuously producing a double tubular material for double-layered bags by continuously weaving a tubular and simultaneously inserting a separately fabric prepared tubular film into the tubular fabric.

Bags formed from woven fabrics of a plain weave structure utilizing tapes of synthetic resins, such as polypropylene and polyethylene resins, or synthetic fiber strands, such as multifilament yarns or cords, as warps and wefts have been widely utilized for transportation and storage of bulk items such as grain, sugar, fertilizer, and synthetic resin pellets. This is because these bags are strong and light in weight. These bags can be made from a tubular fabric produced by using an ordinary power loom. There has been an increasing tendency, however, to use circular looms having a high weaving efficiency. Therefore, various developments for the use of circular looms have been made in Japan and other industrially advanced countries. Representative examples of such developments are the circular loom disclosed in U.S. Patent No. 3,871,413 and the circular loom manufactured and sold by the British Company, Fairbairn Lawson Machinery, Ltd.

Improved bags with inner bags of non-porous materials such as plastic film inserted inside to form double-layered bags are suitable for accommodating hygroscopic fertilizers, volatile chemicals, or small size granules. In a conventional process for making such double-layered bags, a tubular fabric woven by circular loom is cut into individual pieces having a predetermined length. Each individual piece is sewn or bonded at one end thereof to form a first bag. A separate tubular film prepared by blown film extrusion is cut into individual pieces having the same predetermined length. Each individual piece is sealed at one end to form a second bag. Next, the second bag is manually inserted inside the first bag.

In a conventional circular loom, for example, as disclosed in Figure 3 of the U.S. Patent No. 3,871,413, the central portion of the loom in which an open end of the tubular fabric on loom resides is substantially blocked off from access due to the installation of a mounting means for a cam drum and a driving means. Therefore, there is no space for inserting another material into the tubular fabric. Accordingly, the conventional process for making double layered bags is a very inefficient one which needs much labor and time.

Circular looms are known, however, which can continuously provide a double tubular material by continuously weaving a tubular fabric and simultaneously inserting a separately prepared tubular film into the tubular fabric. For example, reference should be made to West German Patent No. 29 25 553 and Belgian Patent No. 503 229. However, it is important when inserting the film into the tubular fabric to ensure that the film is inserted at the same rate as the production of the

material without twists and that the double thickness issuing from the loom is drawn off flat without creasing or wrinkling of the interior film.

To this end, it is an object of the present invention to provide a circular loom which can continuously produce a double tubular material by continuously weaving a tubular fabric and simultaneously inserting a separately prepared tubular film, characterised in that guiding means are provided for the tubular film as it is inserted into the tubular material to ensure that the film is inserted without wrinkles and to constrain the cross-sectional shape of the film to change from circular to flat as the double material is drawn off from the loom.

According to the present invention there is provided a circular loom for producing double tubular material, in which a plurality of warps are inwardly introduced into the gap between a pair of outer and inner gauge rings through a plurality of healds circularly arranged along a periphery of the gauge rings and alternately raised and lowered to form at least a shed around the gauge rings by shedding motions of the healds, the shedding motions being derived from rotation of a cam drum supported coaxially relative to the healds and the gauge rings by means of a supporting mechanism, and in which a shuttle loaded with a weft runs through the shed, whereby a tubular fabric is woven from the warps and the weft is drawn out through the gap by means of a drawing-off mechanism the gauge rings, cam drum and supporting mechanism being of annular shape whereby a space is formed through the central portion of the circular loom, and an inner bag material feeding mechanism being provided for continuously inserting a tubular material utilized as an inner bag into the tubular fabric through the central space, the circular loom being characterised in that the inner bag feeding mechanism comprises a guiding means for inner bag material including a circular shaped guiding disc supported by a plurality of rollers arranged in a circle in such a manner that the supporting rollers are engageable with a circumference of the guiding disc, and a pair of guide wheels spaced from the guide disc in the feeding direction of the tubular material, and both the guiding disc and the guide wheels being connected to a supporting rod which is provided with a pair of swing arms symmetrically pivoted adjacent the bottom thereof, the swing arms being connected to each other by a length-adjustable stay and each carrying one of the guide wheels, the swing arms, the length-adjustable stay and the guide wheels serving to constrain the cross-sectional shape of the tubular material from circular at the guiding disc to flat at the drawing-off mechanism.

The present invention will now be described by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a sectional side view illustrating the major parts of a circular loom according to the present invention; and

Figure 2 is a front view illustrating a part of a guiding means for an inner bag material.

In Figure 1, a circular loom is depicted comprising a loom body A, for weaving a tubular fabric utilized for an outer bag material and an inner bag feeding mechanism B, for supplying a tubular film utilized for an inner bag material. The loom further comprises creels (not shown), for supplying a plurality of warps to the loom body A, and a taking-up mechanism for winding up a resultant double tubular material (not shown).

The loom body A is provided with a pair of inner and outer gauge rings (1), (2) and a cam drum (4) with a cam rail (3) on the circumference thereof. Warps (5) are introduced to the gauge rings (1), (2) from the outer side.

The cam drum (4) is rotatably supported around an axis (7) of the gauge rings (1), (2) by means of a supporting mechanism (6). The gauge rings (1), (2), the cam drum (4), and the supporting mechanism (6) all comprise an annular shape. The supporting mechanism (6) is provided with a sleeve (8) arranged coaxially to the axis (7) and a thrust bearing (9) rotatably fitted in an annular groove on the upper surface of the sleeve (8). An inwardly projected flange (10) provided on the cam drum (4) is engaged with the aforesaid bearing (9), thereby the cam drum (4) is supported with the bearing (9) and the flange (10). Further, a plurality of holding rollers (12), each of which is rotatably mounted at an upper end of supporting rods (11), are engaged with the flange (10). The bottom ends of the sleeve (8) and of the supporting rods (11) are fixed on an annular base (14) secured to a table (13).

The outer gauge ring (2) is supported by connection to uppermost ends of a plurality of supporting posts (15). The bottom end of supporting posts (15) is secured to the base (14). The inner gauge ring (1) is also stationarily supported on the base (14) by connection to a plurality of brackets (16).

The warps are drawn into a plurality of healds (17), (18) and shed by up-and-down motion thereof. Each of the healds (17) and (18) is coaxially arranged on a circle having a predetermined radius around the axis (7). A plurality of cam followers (19) are engaged to the cam rail (3) of the cam drum (4), and the healds (17) which face and mate with the corresponding healds (18) are connected to the corresponding cam followers (19). The cam follower (19) is guided to be displaceable along the up-down direction by means of a corresponding guide rod (20). The one heald (18) is connected to the other heald (17) and the cam follower (19) through a belt (22) engaged to a pulley (21). Accordingly, the healds (17) and (18) are reversely displaceable from one another in the up-down direction.

Such healds and the up-and-down mechanism thereof are described in detail in the aforementioned U.S. Patent No. 3,871,413 and in the International Patent Application PCT/JP 79/00138 (WO 80/01173).

Warps are unwound from a plurality of shuttles

(23). The shuttles (23) are held between the shedding warps (5) in a runnable conditions along the outer circumference of the gauge rings (1) and (2). The shuttles (23) run by thrust of pushing rollers (24) as hereinafter described. The pushing rollers (24) are rotatably pivoted on brackets (25) which are equidistantly secured on the upper surface of the cam drum (4).

Such a shuttle and driving mechanism thereof are described in detail in the afore-mentioned International Patent Application PCT/JP 79/00138 (WO 80/01173).

The cam drum (4) is driven by a motor (26). A driving shaft of the motor (26) is connected to a rotational shaft (29) by means of a pulley (27) and a belt (28). The rotational shaft (29) is installed parallel to the axis (7) of the gauge rings (1), (2), and a pinion (30) secured on an upper end of the rotational shaft (29) is intermeshed with an external ring gear (31) provided on the circumference of the cam drum (4).

It is a feature of the present invention, as described hereinbefore, that the motor, shafts and gears are all arranged in a region remote from the axis of the cam drum and, thereby, a space is provided through the central portion of the loom body A.

In the present embodiment, the inner bag feeding mechanism B is installed above the loom body A, in which a roll (32) of a tubular plastic film (34) prepared by a blown film extrusion system is supported by brackets (33) and in which the film (34) unwound from the roll (32) is guided by a guide roller (35) onto the gauge rings (1) and (2).

Thereafter, a resultant double tubular material (100) is downwardly dragged by a delivery roller (37) disposed under the loom body A through a gap between the gauge rings (1) and (2) to a take-up mechanism (not shown).

Next, the operation of the above-mentioned apparatus according to the present invention will be explained.

The rotation of the driving shaft of the motor (26) is transmitted to the cam drum (4) through the belt (28), the pinion (30), and the ring gear (31).

The cam drum (4) thereby rotates around the axis (7) of the gauge rings (1) and (2). The thrust bearing (9) also rotates along the annular groove on the sleeve (8) together with the rotation of the cam drum (4). The holding roller (12) rotates according to the rotation of the cam drum (4), thereby the flange (10) is pressed onto the bearing (9) and is held stably.

The cam drum (4) causes the cam followers (19) to be alternately displaced in the up-and-down direction due to the rotation thereof and results in the shedding motion of the warps (5).

The pushing rollers (24) rotate together with the cam drum (4) and the brackets (25). The shuttles (23) thereby run through the shedding warps (5) along the circumference of the gauge rings (1) and (2) to feed the wefts.

As a result, a tubular fabric (36) for the outer bag is woven from the warps (5) and the wefts

and is continuously taken out through the gap between the gauge rings (1) and (2) in the downward direction.

During the taking-out operation, the tubular film (34) from the guide roller (35) is inserted into the tubular fabric (36) passing through the interior of the gauge rings (1), (2) the cam drum (4), and the supporting mechanism (6). The tubular film (34) thus inserted is drawn out together with the tubular fabric (36) by the delivery roller (37).

A point which must be watched during the insertion of the tubular film (34) into the tubular fabric (36) is that the two tubular material must be advanced at an equal rate without slippage therebetween and neither of the materials must be wrinkled. Clearly, the tubular fabric (36) is of a cylindrical shape immediately after being drawn out from the gap between the gauge rings due to the shape of the gap, but is gradually flattened in the passage to the delivery roller (37) and increases in width thereof. Because of this fact, the tubular film (34) to be inserted into the tubular fabric (36) preferably should undergo a corresponding transformation. According to the embodiment shown in Figure 1, the above-mentioned transformation is carried out by means of a guiding means C for the inner bag material provided in the mid-portion of the feeding passage of the tubular film (34). The guiding means C comprises a guiding disc (38), which is to be positioned inside of the tubular film (34) above the gauge rings (1) and (2), and two guide wheels (39) symmetrically arranged at a predetermined distance at an outer end of a supporting rod (41) extending downwardly from a center of the disc (38). The disc (38) is formed with the same diameter as that of the tubular film (34) when stretched out in a tubular form. The two guide wheels (39) are adjusted to have a maximum distance therebetween corresponding to the width of the tubular film (34) when lapped flatly. The tubular film (34) unwound from the roll (32) is advanced downwardly from the guide roller (35) in a flat condition. It is then opened up into a cylindrical form by means of the guiding disc (38). As it proceeds lower, it is then gradually widened by the guide wheels (39), and, in the widened condition, is inserted into the tubular fabric (36), transformed in the same manner. Due to this process, a double tubular material can be produced having less slippage as well as less wrinkles in both of the tubular materials.

In order to maintain the guiding disc (38) stably at a predetermined position, a plurality of supporting rollers (40) are arranged around the predetermined position in the mid-portion of the passage of the tubular film. The supporting rollers (40) contact a periphery of the guiding disc (38) and are supported by stands (46) secured on the stationary part of the loom.

Figure 2 illustrates the detailed construction of the mounting of the guide wheels (39). The supporting rod (41) is a hollow tube.

A shaft (42) is slidably inserted into the interior of the rod (41). At a bottom portion of the

supporting rod (41) are symmetrically pivoted two swing arms (43), each of which is rotatably provided with the aforesaid respective guide wheel (39) at one end thereof. Further, perpendicular to the bottom end of the shaft (42) is fixed a midportion of a stay (44). The ends of the stay (44) are threaded in opposite directions to each other. From the midportion of the swing arms (43) are projected bolts (45) with threads of reverse direction to that of the corresponding threads on the stay (44). The swing arm (43) and the stay (44) are connected together by means of two known turn-buckles (46), each of which is engaged to the corresponding threads on the swing arms (43) and the stay (44). Due to such a construction, the two guide wheels (39) are held at a constant distance therebetween. When changing the distance between the guide wheels (39) corresponding to a new size of the utilized tubular film (34), the turn-buckles (46) should be rotated manually in the suitable direction.

In addition to the above-mentioned construction, the loom according to the present invention may comprise other mechanisms already adopted in a known circular loom, such as a dancing lever (47) for adjusting warp tension.

As described above, according to the present invention, since the gauge rings, the cam drum, and the supporting mechanism thereof are formed in an annular shape, the tubular film for the inner bag can be inserted into the tubular fabric for the outer bag through the space formed in the central portion of the loom body, and thus the double tubular material can be obtained continuously in one process.

Further, due to the guiding means, the tubular film for the inner bag can be layered to the tubular fabric while being changed in shape in a similar manner, thereby allowing a high quality resultant product to be obtained.

In the above-mentioned embodiment, the tubular film for the inner bag is supplied from the top and the product is taken out from the bottom of the loom. However, it is possible without exceeding the scope of the present invention that the tubular film is supplied from the bottom and the product is taken out from the top of the loom. Further, the material for inner bag may be a tubular fabric prepared by another circular loom or a knitted fabric prepared by a circular knitting machine.

Claim

A circular loom for producing double tubular material, in which a plurality of warps (5) are inwardly introduced into a gap between a pair of outer and inner gauge rings (1, 2) through a plurality of healds (17, 18) circularly arranged along a periphery of the gauge rings (1, 2) and alternately raised and lowered to form at least a shed around the gauge rings (1, 2) by shedding motions of the healds (17, 18) the shedding motions being derived from rotation of a cam drum (4) supported coaxially relative to the

healds (17, 18) and the gauge rings (1, 2) by means of a supporting mechanism (6), and in which a shuttle (23) loaded with a weft runs through the shed, whereby a tubular fabric is woven from the warps (5) and the weft and is drawn out through the gap by means of a drawing-off mechanism (37) the gauge rings (1, 2), cam drum (4) and supporting mechanism (6) being of annular shape whereby a space is formed through the central portion of the circular loom, and an inner bag material feeding mechanism (35) being provided for continuously inserting a tubular material (34) utilized as an inner bag into the tubular fabric through the central space, the circular loom being characterised in that the inner bag feeding mechanism comprises a guiding means for inner bag material (34) including a circular shaped guiding disc (38) supported by a plurality of rollers (40) arranged in a circle in such a manner that the supporting rollers (40) are engageable with a circumference of the guiding disc (38), and a pair of guide wheels (39) spaced from the guide disc (38) in the feeding direction of the tubular material (34), and both the guiding disc (38) and the guide wheels (39) being connected to a supporting rod (41) which is provided with a pair of swing arms (43) symmetrically pivoted adjacent the bottom thereof, the swing arms (43) being connected to each other by a length-adjustable stay (44) and each carrying one of the guide wheels (39), the swing arms (43), the length-adjustable stay (44) and the guide wheels (39) serving to constrain the cross-sectional shape of the tubular material from circular at the guiding disc (38) to flat at the drawing-off mechanism (37).

Patentanspruch

Rundwebstuhl zur Herstellung von Doppelschlauchmaterial, bei dem eine Vielzahl von Kettfäden (5) nach innen in einen Spalt zwischen einem Paar von äußeren und inneren Paßringen (1, 2) durch eine Vielzahl von Schäften (17, 18) eingeführt werden, die kreisförmig entlang eines Randes der Paßringe (1, 2) angeordnet sind und abwechselnd angehoben und abgesenkt werden, um wenigstens ein Fach um die Paßringe (1, 2) durch Fachbildungsbewegungen der Schäfte (17, 18) zu bilden, wobei die Fachbildungsbewegungen von der Rotation einer Steuertrommel (4) erzeugt werden, die koaxial bezüglich der Schäfte (17, 18) und der Paßringe (1, 2) mittels einer Lagerungsanordnung (6) gelagert ist, und bei dem ein Schützen (23), der mit einem Schußfaden versehen ist, durch das Fach läuft, wobei ein Schlauchgewebe aus Kettfäden (5) und Schußfäden gewebt wird und durch einen Spalt mittels einer Abzugsvorrichtung (37) ausgeführt wird, bei dem die Paßringe (1, 2), Steuertrommel (4) und die Lagerungsanordnung (6) ringförmig ausgebildet sind, wobei ein Raum durch den Mittelbereich des Rundwebstuhls gebildet wird, und bei dem eine Vorrichtung (35) zur Zuführung des Innensackmaterials vorgesehen ist, die für das kontinuierliche Einsetzen durch den Mittelraum eines

Schlauchmaterials (34), das als Innensack verwendet wird, in das Schlauchgewebe ausgebildet ist, dadurch gekennzeichnet, daß die Vorrichtung zur Zuführung des Innensackmaterials Führungsmittel für das Innensackmaterial (34) besitzt, die mit einer kreisförmigen Führungsscheibe (38), die auf einer Vielzahl von Rollen (40) gelagert ist, die auf einem Kreis derart angeordnet sind, daß die abstützenden Rollen (40) am Umfang der Führungsscheibe (38) anliegen, wobei ein Paar Führungsräder (39) in Zuführrichtung des Schlauchmaterials (34) mit Abstand von der Führungsscheibe (38) angeordnet sind und die Führungsscheibe (38) und die Führungsräder (39) mit einer Haltestange (41) verbunden sind, die mit einem Paar von Schwenkarmen (43) ausgebildet ist, die symmetrisch dem Boden gegenüberliegend drehbar hieran gelagert sind, wobei die Schwenkarme (43) miteinander durch eine längenverstellbare Stütze (44) verbunden sind und jeder eines der Führungsräder (39) trägt und wobei die Schwenkarme (43), die längsverstellbare Stütze (44) und die Führungsräder (39) dazu dienen, eine Änderung der Querschnittsform des Schlauchmaterials von einer kreisrunden Form an der Führungsscheibe (38) zu einer ebenen Form an der Abzugsvorrichtung (37) zu erzeugen.

Revendication

Métier circulaire destiné à la fabrication d'une matière tubulaire double, dans lequel plusieurs chaînes (5) sont introduites vers l'intérieure dans un espace délimité entre deux anneaux (1, 2) externe et interne d'écartement par l'intermédiaire de plusieurs lisses (17, 18) disposées circulairement à la périphérie des anneaux d'écartement (1, 2) et levées et baissées en alternance afin qu'elles forment au moins une foule autour des anneaux d'écartement (1, 2) lors des mouvements de formation de foule des lisses (17, 18), les mouvements de formation de foule étant obtenus par rotation d'un tambour (4) de came supporté coaxialement aux lisses (17, 18) et aux anneaux d'écartement (1, 2) par un mécanisme de support (6) et dans lequel une navette (23) chargée d'un trame se déplace dans la foule, si bien qu'un étoffe tubulaire est déplace dans la foule, si bien qu'une étoffe tubulaire est tissée à l'aide des chaînes (5) et de la trame et est retirée par l'intermédiaire dudit espace à l'aide d'un mécanisme d'extraction (37), es anneaux d'écartement (1, 2), le tambour de came (4) et le mécanisme de support (6) ayant une forme annulaire si bien qu'un espace est formé dans la partie centrale du métier circulaire, et un mécanisme d'avance d'une matière se sac interne (35) est disposé afin qu'il introduise constamment une matière tubulaire (34) utilisée comme sac interne dans l'étoffe tubulaire (34) utilisée comme sac interne dans l'étoffe tubulaire par l'intermédiaire de l'espace central, le métier circulaire étant caractérisé en ce que le mécanisme d'avance de sac interne comporte un dispositif de guidage de la matière (34) de sac interne, comprenant un disque (38) de

guidage de forme circulaire supporté par plusieurs galets (40) disposés en cercle de manière que les galets de support (40) puissent coopérer avec la circonférence du disque de guidage (38) et deux roues de guidage (39) placées à distance du disque de guidage (38) dans la direction d'avance de la matière tubulaire (34), le disque de guidage (38) et les roues de guidage (39) étant raccordées à une tige de support (41) qui porte deux bras pivotants (43) articulés symétriquement à proximité de son extrémité inférieure, les bras pivo-

tants (43) étant raccordés l'un à l'autre par une entretoise (44) de longueur réglable et portant chacun l'une des roues de guidage (39), les bras pivotants (43), l'entretoise (44) de longueur réglable et les roues de guidage (39) ayant pour rôle d'obliger le passage de la configuration de la section de la matière tubulaire d'une forme circulaire au niveau du disque de guidage (38) à une forme aplatie au niveau du mécanisme d'extraction (37).

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Fig. 1

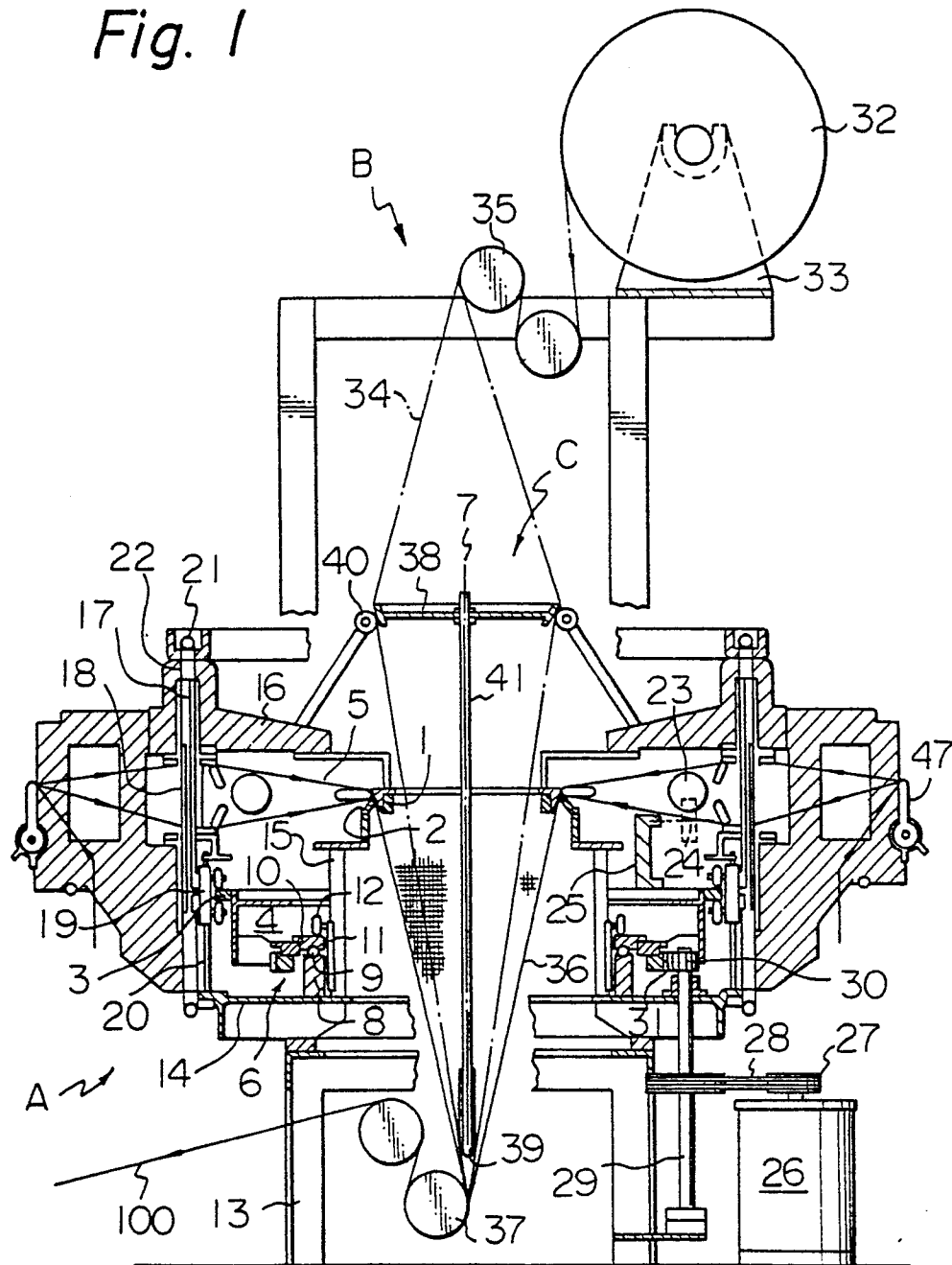


Fig. 2

