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**(54) DEVICE FOR WEAVING THE TRIMMINGS OF A FABRIC PRODUCED BY MEANS OF  
SHUTTLELESS WEAVING MACHINES**

Vorrichtung zur Webkantenerzeugung eines Gewebes, das auf einer schützenfreien Webmaschine  
gewebt wird

Dispositif de formation de lisière d'un tissu produit par un métier à tisser sans navette

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**FR-A- 2 095 367** **JP-A- 2000 170 052**  
**US-A- 5 392 819** **US-A1- 2002 148 524**

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## Description

**[0001]** The present invention relates to a device for weaving the trimmings of a fabric produced by means of shuttleless weaving machines.

**[0002]** As is known, the weaving of the side trimmings of a fabric must be effected by interlacing the warp and weft threads so as to prevent the side warp threads from becoming unthreaded from the weft threads.

**[0003]** The most widely used weaving method, called slotted leno heald, consists in controlling the position of a pair of threads to form a so-called "warp mouth", similar to that of the other warp threads, by inverting the reciprocal position for each, or more, weft insertion(s).

**[0004]** Various devices are known which can effect this interlacing.

**[0005]** A first type of traditional device uses, in particular, a disk with two holes through which the weaving threads pass, wherein the disk is placed parallel to the threads in order to effect the weaving.

**[0006]** This device, however, has the drawback of vertical encumbrance, which prevents the device itself from being housed inside the doup-heald frame, thus limiting the maximum number of installable frames.

**[0007]** A further disadvantage lies in the fact that as the disk holes run in a circular path, they scrape the weaving threads with the consequent risk of damage due to wear.

**[0008]** Other types of devices are proposed for solving the problem of vertical encumbrance and can be positioned inside the doup-heald frames, but still have drawbacks, among which the possibility of causing excessive sliding between the guiding eyelets and the threads and/or excessive transversal encumbrance, which limits the maximum weaving height of the machine.

**[0009]** The most commonly used devices for weaving the trimmings of a fabric are called "rotating splitz" and are based on an epicycloid gearing having the reserves of the two weaving threads installed on board.

**[0010]** These devices represent a good compromise from the point of view of controlling the opening angle of the weaving threads (which, in practice, follows a sinusoidal law, if a constant rotation rate of the gearing is imposed) and of the path (of the elliptical type) of the guiding eyelets of the threads.

**[0011]** This type of device, however, has the problem of encumbrance, due to the fact that the thread feeding spools are assembled on the satellites of the epicycloid gearing of the device itself.

**[0012]** This means that it is practically impossible to position the device inside the doup-heald frame, due to the encumbrance and this fact also limits the dimensions of the packs of yarn which feed the weaving threads.

**[0013]** US-A-5 392 819 discloses a device for weaving the trimmings of a fabric produced by weaving machines according to the preamble of claim 1.

**[0014]** An objective of the present invention is to overcome the above drawbacks and, in particular, to provide

a device for weaving the trimmings of a fabric produced by weaving machines, which reduces the overall encumbrance of the system, regardless of the dimensions of the yarn packs used, which are situated outside the device itself.

**[0015]** Another objective of the invention is to provide a device for weaving the trimmings of a fabric produced by weaving machines, which allows the efficient control of the thread opening, so as to obtain the same opening angle of the upper and lower thread, thus nullifying/minimizing the sliding between the threads in the feeding tract between the yarn packs and the device itself.

**[0016]** A further objective of the invention is to provide a device for weaving the trimmings of a fabric produced by weaving machines, which allows the percentage elongation of the threads in the shed opening to be reduced.

**[0017]** An additional objective of the invention is to provide a device for weaving the trimmings of a fabric in a simple, fast, precise, economical and reliable way.

**[0018]** These objectives are achieved by producing a device for weaving the trimmings of a fabric produced by means of weaving machines according to claim 1.

**[0019]** Other technical characteristics are indicated in the following claims.

**[0020]** Advantageously, the present invention retains the technical properties of the epicycloid gearings ("rotating splitz") of the known type, it overcomes encumbrance problems and, with respect to all the traditional systems, reduces the percentage elongation of the threads, in the shed opening.

**[0021]** Further characteristics and advantages of a device for weaving the trimmings of a fabric produced by means of weaving machines will appear more evident from the following description and enclosed figures, which are provided for illustrative and non-limiting purposes, in which:

- figure 1 shows a complete perspective view of the device for weaving the trimmings, object of the present invention;
- figure 2 is a perspective view illustrating the thread feeding side of the device shown in figure 1;
- figure 3 is a sectional view of the device of figure 1, taken along the line III-III of figure 1;
- figure 4 shows a Cartesian diagram of the trend of the opening angle of the thread near the selvedge weaving in relation to the rotation angle of the gearing of figure 1.

**[0022]** With particular reference to figures 1-3, 1 generically indicates a device with an epicycloid gearing of the known type, comprising, inside a shaped support 10, a circular plate 11, made to rotate by known means, along the direction of the arrow F in figure 1, so as to distribute the rotatory movement to two satellites 13, each of which is connected to the relative weaving thread 4, 4A.

**[0023]** In particular (fig. 2), the yarns 4, 4A, arranged in pairs, are guided into the device 1 through the duct 14

of the supporting element 15 and from there to the centre of the plate 11, inside the shaped hole 16.

**[0024]** The weaving threads 4, 4A are then split and passed through the central openings 17, 18 (fig. 1) of the satellites 13 and subsequently deviated inside the eyelets 8, in turn assembled on suitable brackets 19, 20, until they converge in correspondence with the path 21, which represents the weaving points 22 of the selvedge 23 of the fabric produced, the latter generically marked with 24.

**[0025]** Both the eyelets 8 are positioned eccentrically with respect to the relevant axis 6 (fig. 3) of each satellite 13, so that the above eyelets 8 follow elliptical paths.

**[0026]** In any case, the passage through the eyelets 8, positioned eccentrically on the satellites 13, is known art, as is also the weaving procedure.

**[0027]** According to the present invention, the spools, marked with 2 in figure 1, of the weaving threads 4 and 4A, are positioned on an external support 9, rotating along the direction of the arrow G of figure 1, and the threads 4 and 4A enter the epicycloid device 1, first at the center of the plate 11, near the revolution axis 5 of the satellites 13, and then to the centre of the respective satellites 13, close to the relative rotation axes 6.

**[0028]** The device can operate according to two different modes, with the support 9 in synchronous rotation with the rotating plate 11, when the latter rotates in a single direction, in order to avoid an accumulation of the intertwining of the threads 4, 4A with each other, in the tract between the interception 3 and the device 1, or with the support 9 fixed, when the rotating plate 11 is rotated alternately for a certain number of rounds in the two opposite directions, maintaining the intertwining of the weaving threads 4, 4A in the tract existing between the interception 3 and the device 1, on an average null.

**[0029]** The reduction in the elongation of the threads 4, 4A is due to the fact that the "splitz" with epicycloid gearings, such as that used in the present invention, does not also form a shed at the thread feeding side and distributes the elongation caused by the anterior warp shed (in correspondence with the formation side of the fabric 24) on a thread length extended to the packs 2 of yarn.

**[0030]** Finally, the device described is capable of maintaining the opening angles of the yarn, marked by  $\alpha$  and  $\beta$  in figure 1, almost equal in all phases, by optimising the opening of the weaving threads 4, 4A and minimizing the respective sliding of the threads 4, 4A in the feeding zone, particularly in the operating mode with a fixed support 9 of the yarn packs 2.

**[0031]** In this case, unlike the known devices which have a delayed or anticipated opening angle of the thread with respect to a comparative sinusoidal law, depending on whether the thread is opened in the upper or lower part, (i.e. the angle  $\alpha$  is different from the angle  $\beta$  in many of the operating phases of the device), as shown in the diagram of figure 4, the use of the device according to the invention causes a trend of the thread opening angle in the upper part (angle  $\alpha$ ) and in the lower part (angle  $\beta$ ) which practically follows a sinusoidal law, if a constant

rotation rate of the rotating plate 11 is established.

**[0032]** From the above description the characteristics of the device for weaving the trimmings of a fabric produced by weaving machines, which is the objective of the present invention, as defined by the claims, are evident, as are also the relevant advantages.

**[0033]** In particular they refer to the following aspects:

- reduction in the vertical and transversal encumbrance, also maintaining a sufficient opening angle of the weaving threads;
- minimum phenomena of sliding and of general damage to the weaving threads;
- efficient control of the opening angle of the weaving threads and of the path (of the elliptical type) of the guiding eyelets of the threads themselves.

**[0034]** Finally, numerous other variations can obviously be applied to the device in question, all included in the invention, as defined by the claims. It is also evident that in the practical embodiment of the invention, as defined by the claims the materials, forms and dimensions of the details illustrated can vary according to the demands and can be substituted by other technically equivalent alternatives.

## Claims

- 1.** A device for weaving the trimmings (23) of a fabric (24) produced by weaving machines, comprising a device (1) with at least one satellite (13) epicycloid gearing, suitable for distributing two weaving threads (4, 4A) in correspondence with the points (22) of the fabric (24) where the weaving of the trimmings (23) is to be effected, wherein said weaving threads (4, 4A), connected to respective satellites (13), come from packs of yarn (2) arranged on at least one support (9) outside the device (1), **characterised in that** said support (9) of the yarn packs (2) rotates (G) in synchrony with said epicycloid gearing or, alternatively, said support (9) of the yarn packs (2) is stationary and said epicycloid gearing rotates alternately in one and in the opposite direction with programmable sequences.
- 2.** The device according to claim 1, **characterised in that** said epicycloid gearing comprises, inside a shaped support (10), a rotating (F) circular plate or disk (11), suitable for distributing the rotational movement to two satellites (13), said weaving threads (4, 4A) being arranged in pairs in the feeding tract and being guided into the device (1) in correspondence with said plate or disk (11).
- 3.** The device according to claim 2, **characterised in that** said weaving threads (4, 4A) are decoupled downstream of said plate or disk (11) and are devi-

ated inside respective eyelets (8) present on each satellite (13), until they converge in correspondence with a path (21), which represents all the weaving points (22) of the selvedge (23) of the fabric (24).

4. The device according to claim 3, **characterised in that** said eyelets (8) are positioned eccentrically with respect to the relative axis (6) of each satellite (13), so that said eyelets (8) follow an elliptic path.
5. The device according to claim 2, **characterised in that** said weaving threads (4, 4A) are guided into the device (1), close to the revolution axis (5) of said satellites (13), and are then guided centrally, near the rotation axis (6) of said satellites (13).
6. The device according to claim 1, **characterised in that** said device (1) maintains the opening angles ( $\alpha, \beta$ ) of the yarn, substantially equal in all phases, optimizing the opening of the weaving threads (4, 4A) and nullifying the relative sliding between the threads (4, 4A) in the areas where they can be intertwined.

#### Patentansprüche

1. Vorrichtung zum Weben der Einfassungen (23) eines Gewebes (24), das durch Webmaschinen hergestellt wird, umfassend eine Vorrichtung (1) mit zu mindest einem Satelliten (13) umfassenden Planetengetriebe, das zum Verteilen von zwei Webfäden (4, 4A) entsprechend den Punkten (22) des Gewebes (24), an denen das Weben der Einfassungen (23) bewirkt werden soll, geeignet ist, wobei die Webfäden (4, 4A), die mit jeweiligen Satelliten (13) verbunden sind, von Pakkungen aus Garn (2) stammen, die an zumindest einem Träger (9) außerhalb der Vorrichtung (1) angeordnet sind, **dadurch gekennzeichnet, dass** der Träger (9) der Garnpak kungen (2) synchron mit dem Planetengetriebe rotiert (G) oder alternativ dazu der Träger (9) der Garnpackungen (2) stationär ist und das Planetengetriebe abwechselnd in einer und in der entgegengesetzten Richtung mit programmierbaren Abfolgen rotiert.
2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das Planetengetriebe innerhalb eines geformten Trägers (10) eine rotierende (F) kreisförmige Platte oder Scheibe (11) umfasst, die zum Verteilen der Rotationsbewegung an zwei Satelliten (13) geeignet ist, wobei die Webfäden (4, 4A) in Paaren in dem Zuführteil angeordnet und in die Vorrichtung (1) entsprechend der Platte oder Scheibe (11) geführt sind.
3. Vorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** die Webfäden (4, 4A) unterstromig

der Platte oder Scheibe (11) entkoppelt sind und innerhalb jeweiliger Ösen (8), die an jedem Satelliten (13) vorhanden sind, abgelenkt werden, bis sie entsprechend einem Pfad (21) zusammenlaufen, der alle Webpunkte (22) der Webkante (23) des Gewebes (24) repräsentiert.

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4. Vorrichtung nach Anspruch 3, **dadurch gekennzeichnet, dass** die Ösen (8) exzentrisch in Bezug auf die relative Achse (6) jedes Satelliten (13) positioniert sind, so dass die Ösen (8) einem elliptischen Pfad folgen.
5. Vorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** die Webfäden (4, 4A) in die Vorrichtung (1) nahe der Umdrehungssachse (5) der Satelliten (13) geführt sind und dann zentral nahe der Rotationsachse (6) der Satelliten (13) geführt sind.
6. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Vorrichtung (1) die Öffnungswinkel ( $\alpha, \beta$ ) des Garnes in allen Phasen im Wesentlichen gleich beibehält, wobei die Öffnung der Webfäden (4, 4A) optimiert wird und das relative Verschieben zwischen den Fäden (4, 4A) in den Bereichen, in denen sie sich verflechten können, aufgehoben ist.

#### Revendications

1. Dispositif pour tisser les lisières (23) d'un tissu (24) fabriqué par des machines à tisser, comprenant un dispositif (1) avec au moins un engrenage épicycloïdal satellite (13), approprié pour distribuer deux fils à tisser (4, 4A) en correspondance avec les points (22) du tissu (24) où le tissage des lisières (23) doit être effectué, dans lequel lesdits fils à tisser (4, 4A), reliés à des satellites respectifs (13), proviennent de blocs de fil (2) agencés sur au moins un support (9) à l'extérieur du dispositif (1), **caractérisé en ce que** ledit support (9) des blocs de fil (2) tourne (G) de façon synchrone avec ledit engrenage épicycloïdal ou, en variante, ledit support (9) des blocs de fil (2) est stationnaire et ledit engrenage épicycloïdal tourne en alternance dans une direction et dans la direction opposée avec des séquences programmables.
2. Dispositif selon la revendication 1, **caractérisé en ce que** ledit engrenage épicycloïdal comprend, à l'intérieur d'un support de forme particulière (10), une plaque circulaire ou un disque (11) rotative ou rotatif (F), approprié(e) pour distribuer le mouvement de rotation à deux satellites (13), lesdits fils à tisser (4, 4A) étant agencés par paires dans le passage d'alimentation et étant guidés dans le dispositif (1) en correspondance avec ladite plaque ou ledit disque

(11).

3. Dispositif selon la revendication 2, **caractérisé en ce que** lesdits fils à tisser (4, 4A) sont découplés en aval de ladite plaque ou dudit disque (11) et sont déviés à l'intérieur d'oeillets respectifs (8) présents sur chaque satellite (13), jusqu'à ce qu'ils convergent en correspondance avec un passage (21), qui représente tous les points de tissage (22) de la lisière (23) du tissu (24). 5

4. Dispositif selon la revendication 3, **caractérisé en ce que** lesdits oeillets (8) sont positionnés de façon excentrique par rapport à l'axe relatif (6) de chaque satellite (13), de sorte que lesdits oeillets (8) suivent 15 un trajet elliptique.

5. Dispositif selon la revendication 2, **caractérisé en ce que** lesdits fils à tisser (4, 4A) sont guidés dans le dispositif (1), près de l'axe de révolution (5) desdits satellites (13), et sont alors guidés de façon centrale, près de l'axe de rotation (6) desdits satellites (13). 20

6. Dispositif selon la revendication 1, **caractérisé en ce que** ledit dispositif (1) maintient les angles d'ouverture ( $\alpha$ ,  $\beta$ ) du fil, sensiblement égaux dans toutes les phases, optimisant l'ouverture des fils à tisser (4, 4A) et annulant le glissement relatif entre les fils (4, 4A) dans les zones où ils peuvent être entrelacés. 25 30

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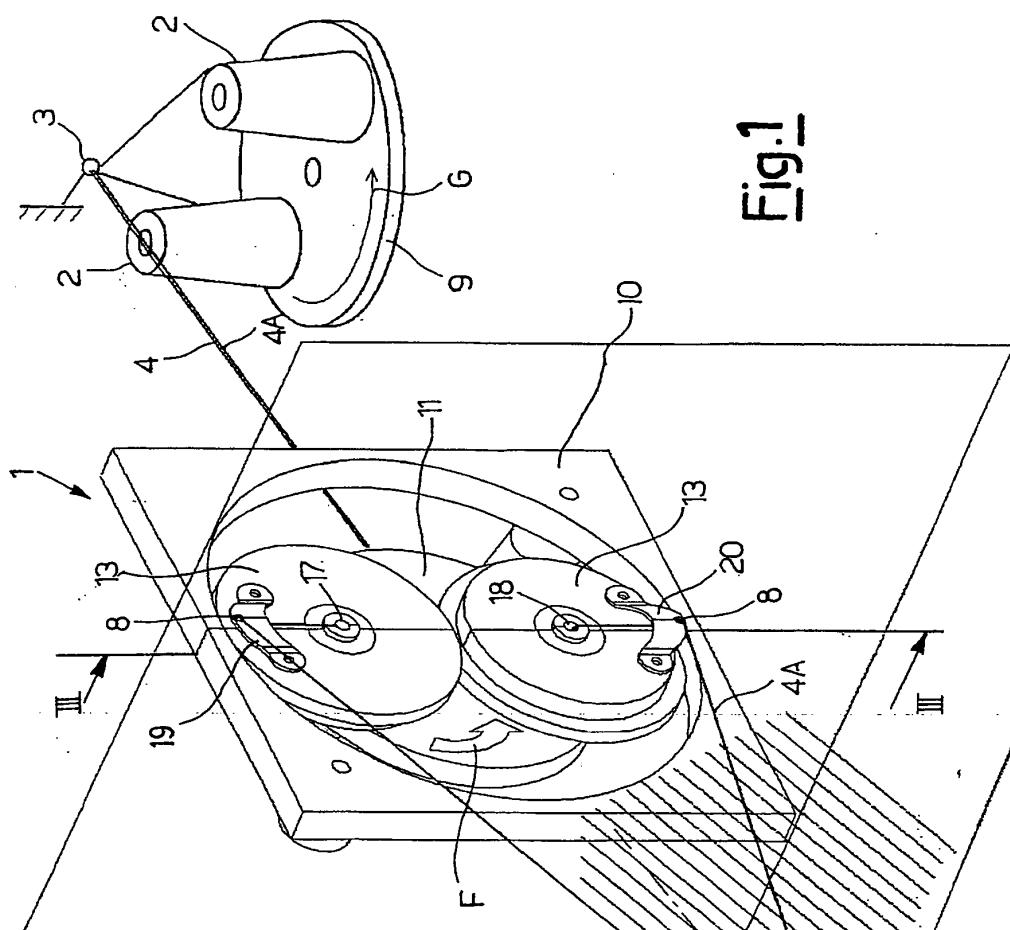


Fig. 1

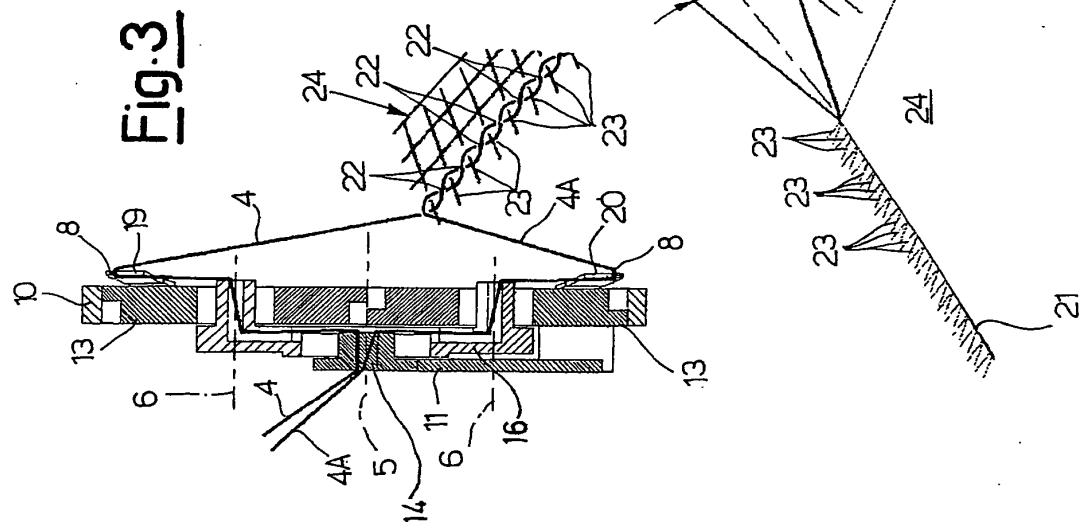


Fig. 3

Fig.2

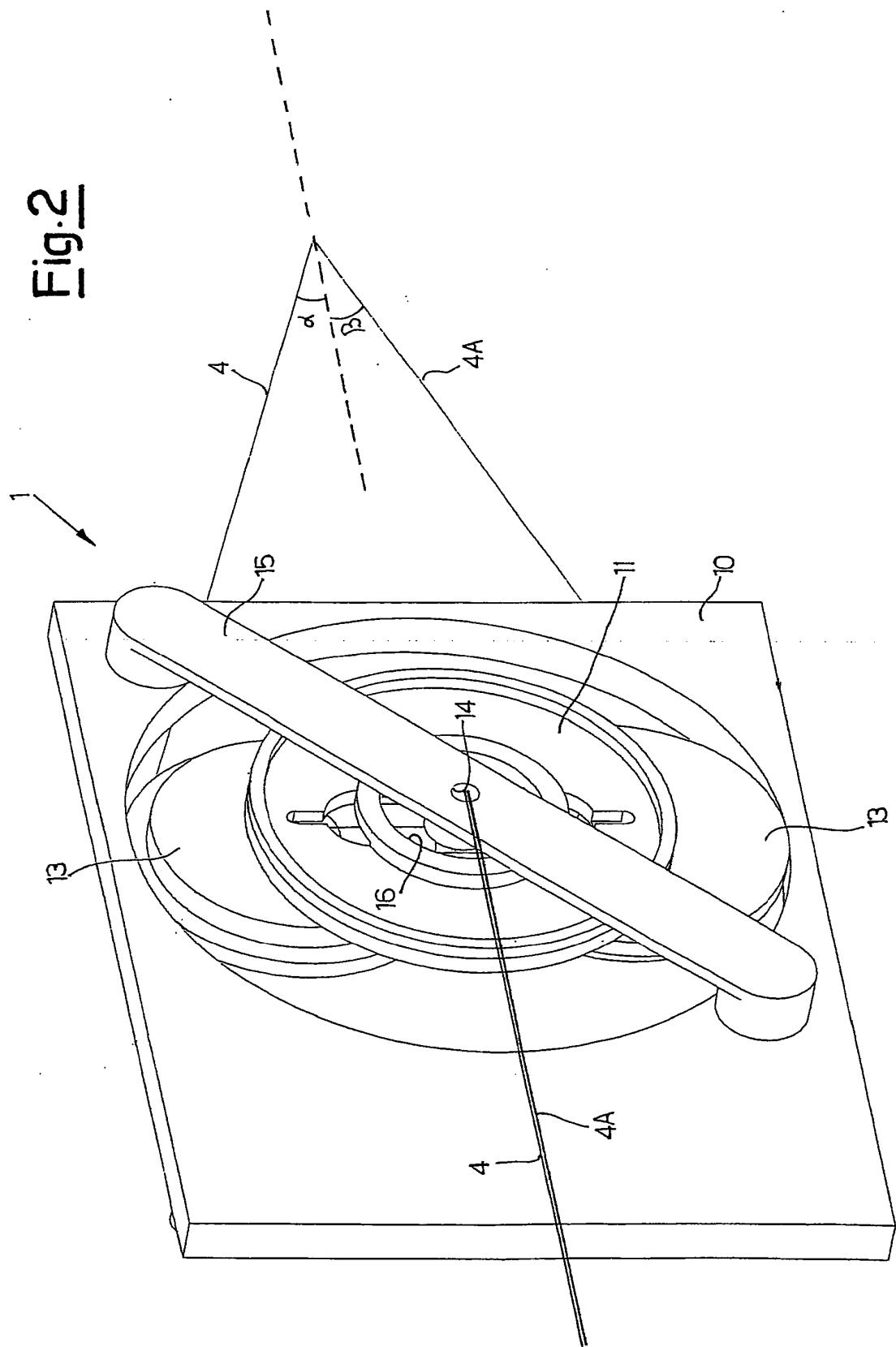
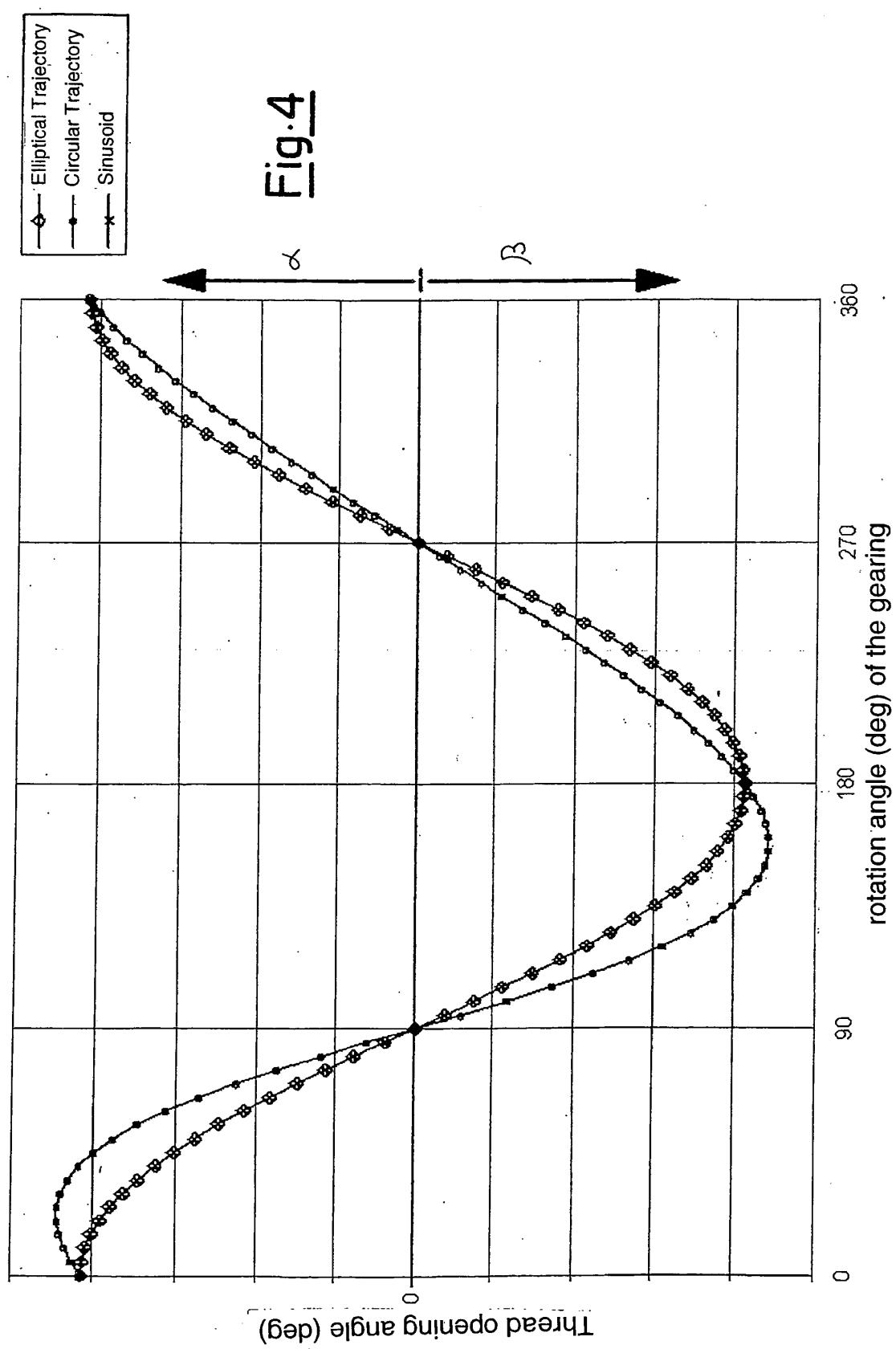


Fig.4



**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- US 5392819 A [0013]