



Publication number : **0 120 357 B2**

**NEW EUROPEAN PATENT SPECIFICATION**

Date of publication of the new patent  
specification : **24.02.93 Bulletin 93/08**

Int. Cl.<sup>5</sup> : **D03D 47/12**

Application number : **84102421.9**

Date of filing : **07.03.84**

**Actuator assembly for a picker head in a wire cloth making machine.**

Priority : **11.03.83 IT 2004983**

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Date of publication of application :  
**03.10.84 Bulletin 84/40**

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Publication of the grant of the patent :  
**04.05.88 Bulletin 88/18**

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Mention of the opposition decision :  
**24.02.93 Bulletin 93/08**

Designated Contracting States :  
**CH DE FR GB LI**

References cited :  
**DE-B- 844 275**  
**FR-A- 1 465 062**  
**GB-A- 1 407 632**  
**US-A- 1 563 305**

**EP 0 120 357 B2**

## Description

This invention relates to an actuator assembly for a picker head in shuttleless looms for making wire cloth, particularly wire cloth for use in the manufacture of strainers, window screens, etc.

As is known, in wire cloth looms, a picker head, provided with a wire engaging latch and being reciprocated in timed relationship with the loom sley, is arranged to pass the weft wire through the shed formed by warp wires laid on mutually parallel planes, thereby weaving the wire cloth.

To that end, the picker head is passed, over an initial portion of its stroke distance, through the shed up to one side thereof, whereat it will pick up the weft wire by means of its openable end bill; thereafter, the picker head is returned rapidly through the shed to take the weft wire in between the warp wires and thus weave, at each back and forth stroke, a portion of the cloth.

In such loom types, the picker head movement is implemented by means of complex camming mechanisms which receive their motion from the loom main drive via additional driving and timing members.

This contributes, of course, to the complexity of the loom as a whole. While with such prior looms, the wire insertion is not entirely satisfactory on account of frequent breakages caused in the wire by the vibration and irregular motion of the picker head. IT-A-1 126 425 discloses a picker element and related drive which have been effective to greatly reduce the occurrence of breakages in the weft wire, so as to result, with fairly high efficiency, in the production of a wire cloth having satisfactory characteristics.

However, actual tests conducted on production looms so constructed, and further extensive studies by the Applicant, have shown that the mechanism proposed in IT-A-1 126 425, while being generally satisfactory, was not entirely faultless, among its deficiencies being that it could not provide a very high rate of operation for the cited picker element.

A further disadvantage shown by said mechanism was that adjustment for operative transition from one cloth type to a different, especially heavier grade, one involved a significant degree of complexity.

DE-C-844275 dating back to the year 1952 discloses a mechanism for actuating a shuttle in a ribbon loom wherein the actuating mechanism comprises a cross the axis of rotation of which is arranged to run over a circular path and the cross is driven by a planetary gearing in which the shaft of the planet gear coincides with the crankshaft.

Apart from the fact that this prior disclosure is concerned exclusively with low speed shuttle looms, it does not provide a solution for the problem of a perfect timing of the actuating mechanism with the loom sley.

Thus the task of this invention is to provide an improved actuator assembly and/or mechanism for a picker head in shuttleless looms for making wire cloth, which can move the picker head at a very high speed and in perfectly timed relationship with the position of the loom sley at each operative phase of the picker head.

Within that task it is an object of the invention to provide an assembly as indicated, which can actuate the picker head during the return or weft wire drawing stroke thereof such that the weft wire is held under constantly applied tension, thus preventing it from becoming entangled and producing a cloth having optimum characteristics.

It is another object of this invention to provide an assembly as indicated, which can be readily adjusted for adaptation in an optimum fashion to the production of the various types of wire cloth presently on demand by the market.

Still another object of the invention is to provide an assembly as indicated, which is construction-wise simple and reliable, and in particular which may be easily fitted on existing looms without involving substantial alteration of the latter.

It is a further object of this invention to provide an actuator assembly as indicated, which is compatible, in particular, with currently available commercial picker actuating carriage assemblies.

Yet another object of the invention is to provide an actuator assembly as indicated, which can be easily manufactured from materials and on equipment commonly available on the market.

The above task and objects are achieved by an actuator assembly for a picker head in shuttleless looms as defined in claim 1.

Further features and advantages of the actuator assembly for a picker head in shuttleless looms for making wire cloth, according to this invention, will be more readily understood from the following detailed description of a preferred embodiment thereof, with reference to the accompanying illustrative drawings, where:

Figure 1 is a perspective view of the inventive actuator assembly, as associated with one abutment shoulder of a shuttleless loom for making wire cloth;

Figure 2 is an exploded view showing the main components of the actuator assembly of this invention;

Figures 3 to 5 are diagrams showing how the actuator assembly of this invention operates;

Figure 6 is an enlarged scale detail view showing the adjusting carriage element associated with the actuator assembly according to this invention; and

Figure 7 is a fragmentary perspective view showing the gear case in a closed condition and the main connecting rod element deriving motion

therefrom for the actuator assembly of this invention.

Making now specific reference to the drawing views, and in particular to Figures 1 and 2, the actuator assembly for a picker head according to this invention will be next described in detail, although a detailed discussion of the loom incorporating it is omitted herein inasmuch as reference can be had for its description to the aforementioned prior Italian patent application by this same Applicant.

More specifically, the actuator assembly for a picker head, according to the invention, is generally designated with the reference numeral 1.

Said assembly, as shown best in Figure 2, comprises a gear case SC affixed to an abutment shoulder SP (Figure 1) on the loom, which gear case has a substantially cylindrical shape and contains rigid therewith a first spur gear 2 (Figure 2) journaled to one end of the loom crankshaft (not shown) and made relatively rotatable therewith, and a second spur gear 3 arranged to mesh with the first spur gear 2. The first and second gears 2 and 3 are provided in a 1:1 drive ratio and are supported on a plate-like gear carrier or holder element 4 of substantially rectangular shape, which supports the gear 3 rotatably at its upper end, and the gear 2 is relatively rotatable with respect to its lower end. To that aim, formed in the plate-like carrier 4, respectively at the upper and lower ends thereof, are two throughgoing round holes, indicated at 5 and 6, respectively, which are arranged to accommodate conventional means of securing the carrier 4 onto the loom crankshaft and the spur gears 3 and 2, respectively. However, such conventional means will not be described in detail herein.

It may suffice to say that the crankshaft (not shown) and cited gears 2 and 3 are associated with the plate-like element 4, and the gear 3 is in mesh engagement with the gear 2, thereby, on rotating the loom crankshaft, the plate-like element 4 and gear 3 are rotated, the gear 3 describing an epicycloid around the gear 2 with which it meshes.

On the opposite side of the plate-like element 4 with respect to that side which carries the gear 3, a disk assembly, generally indicated at 7, is supported which, in one embodiment, may comprise an outer bearing race 8 and a center disk element 9, between the disk element 9 and bearing race 8 there being arranged, in a manner known per se, plural bearing balls 10. The center disk element 9 has a slot or throughgoing aperture 11 formed therein which is sized and configured to receive one end of a first connecting rod element 13, as explained more detailedly hereinafter.

It may be seen that between the disk assembly 7 and plate-like gear carrier element 4 there intervenes a cover C, provided to close the gear case as shown more clearly in Figure 7.

In particular, the cover C is made pivotally rigid with the disk assembly 7 and gear carrier plate 4, so

that in operation said cover C will also turn. Again with reference to Figure 2, the elongate slot 11, which may have an enlarged end to facilitate coupling to the connecting rod 13, is arranged to accommodate, fixedly but adjustably, one end of said first connecting rod element 13, the other end of which is engaged articulately with a set of rods, generally designated with the reference numeral 16, formed essentially by six rods which are interconnected to define a substantially triangular arrangement lying on an essentially vertical plane, with the actuator assembly in a fully assembled condition. More specifically, the rod set 16 comprise two rods 17 and 18 which have a substantially yoke-like configuration and define the base of said triangular configuration, two additional rods 20 and 21 defining one side of said triangular configuration, and two rods 22 and 23 defining the other side of the triangular configuration. The yoke-like shape of the rods 20 and 21 causes them to meet each other at a substantially common end, e.g. their welded end indicated at 19, having a through connection hole 19'. As may be seen, the common end 19 of the rod pair 20 and 21 projects farther than the two base rods 17 and 18, which have their common end located more to the rear than said end 19, the common end of the rods 17 and 18 being for example welded at said rearward location.

On the other hand, the rods 22 and 23 are substantially straight and parallel ones, and have coupling holes, not referenced herein, formed at each end, their respective lower ends also projecting from the aforementioned two base rods 17 and 18 defining the aforementioned triangular configuration.

In particular, the two base rods 17 and 18 in the triangular configuration set, or bow divider-like set, are formed at their diverging ends with two slots or elongate longitudinal apertures, indicated at 24 and 25, respectively, for engaging adjustably therewith the pair of substantially parallel rods 22 and 23.

For said adjustable coupling, there is provided a throughgoing peg element, or threaded bolt, 26 which couples the two rods 22 and 23 together at their lower end portions, said peg being passed, as may be seen, through the slots 24 and 25. The peg 26, which comprises as mentioned a releasable bolt, will enable, as is apparent, adjustment of the positions of the rods 23 and 24 in the slots 24 and 25, and such rods to be locked in the adjusted positions.

Thus, the actuator assembly of this invention provides at least two adjustment points already, namely the aforementioned coupling of the first connecting rod 13 within the slot 11 and the coupling just described of the two rods 22 and 23 within the slots 24 and 25 of the rods 17 and 18. Said dual adjustment affords the faculty of synchronizing in an optimum fashion the motion transmitted by the actuator assembly of this invention with the motion of the other main loom members, and in particular the sley.

The triangular rod arrangement described hereinabove is articulated at one side, respectively at the lower ends of the rods 22 and 23, to an adjustment carriage assembly, generally indicated at 30, shown more detailedly on an enlarged scale in Figure 6.

In particular, the lower ends of the rods 22 and 23 are made rigid, e.g. through a pin 32, with a pivot connection 33, which pivot connection 33 is made rigid with a plate-like element 34 of substantially C-like configuration, which plate-like element 34 is adapted for sliding movement in a longitudinal slot 35 formed in the lower body 36 of the carriage. For producing said sliding movement of the plate 34, and hence of the pivot connection 33 attached thereto, a hand-wheel element, indicated at 37, is provided, the hand-wheel 37 being coupled to the sliding plate 34 through any suitable means, such as a worm and gear means, not shown.

It may be appreciated that the adjusting carriage assembly 30 is substantially rigid with the abutment SP of the loom, a plate-like element 40 being also made rigid, via a support 41, with the abutment of the loom, the element 40 being provided to function as a stop for the sliding motion of the plate 34 associated with the adjusting carriage assembly 30.

Again in connection with the cited adjusting assembly 30, it should be noted that it is quite easy to adjust the positions of the two rods 22 and 23 in the cited triangular arrangement by simply threading out substantially no more than three bolts, namely the bolt or pin 26 joining the two rods 22 and 23, and the two bolts 41 and 42 which locate the sliding positions of the sliding plate 34 in the longitudinal slots 35 of the carriage body 36. This easily carried out adjustment, required to suit the motion supplied by the inventive assembly to the type of cloth being weaved, constitutes a peculiar aspect of the invention not to be found with the complex camming devices of the prior art, which were on the contrary quite difficult to adjust, the adjustment thus achieved being less fine than that to be obtained with the carriage assembly of the inventive actuator assembly.

At the end portion 19 of the two rods 20 and 21, and through the hole 19', the cited triangular rod arrangement, or bow divider-like arrangement, are articulated, by conventional means, such as a pin 50, to a twin connecting rod element 51 which has its opposite end connected, through an additional pin element 52, for example to a picker head actuating carriage 54. The carriage 54 is a part of an actuating assembly 55, which is available commercially and requires no further detailed discussion herein.

It is considered that the foregoing description is adequate for understanding the operation of the actuator assembly according to the invention.

Making reference to Figures 3 to 5, which illustrate different operative steps in the actuation of the picker head, the operation of the actuator assembly

according to the invention will be next described. The main motion is in particular derived from the loom main shaft as drive by the motor M (Figure 1), through a drive belt 56 and flywheel-pulley 57. Assuming that the flywheel-pulley 57 turns in a clockwise direction, as indicated by the arrow A in Figure 1, the rotary motion is transmitted from the main shaft to the crankshaft mentioned hereinabove, which in turn drives the gear system of the actuator mechanism according to the invention, thereby the rotation of the outward gear 3 and elements connected thereto, in particular to the plate 4, cover C, and disk assembly 7, will occur in a counterclockwise direction, as shown by the arrow B. Consequently to the rotation of the crankshaft, the gear 3 will describe an epicycloidal path around the gear 2, wherein the disk assembly 7 turns together with the cover C. The rotary motion imparted to the disk assembly 7 will cause the first connecting rod element 13 to drive in a push-pull mode the triangular rod arrangement which, being pivoted at 33, reciprocates the picker head actuating carriage. In particular, Figure 3 shows the main connecting rod 13 in the fully backward position, which in accordance with the invention is a picker rest position. Of course, the dimensions of the connecting rod 3 and rod mechanism as a whole should be selected to determine a desired rest interval for the picker head after drawing the weft wire through the shed. In Figure 4, the connecting rod 13, under the drive from the gears 2 and 3, plate 4, and disk assembly 7, begins its outward travel, which corresponds to a working stroke during which the picker head (not shown) starts through the shed in its movement across it for picking up the weft wire from the left-hand extremity of the shed.

In particular, the weft wire is engaged with the connecting rod in its fully extended position and the carriage 54 at the bottom travel limit of its back-and-forth stroke distance. Said fully extended position of the connecting rod 13 is shown schematically in Figure 5. Thus, in the condition corresponding substantially to that shown in Figure 5, the picker head is engaged with the weft wire. As the crankshaft is rotated further, the connecting rod element 3 starts its backward movement, thereby the picker head will be caused to move backward through the shed with the wire (not shown) engaged therewith, dimensions being selected such that the picker head is at a standstill over an angle of substantially 120-130°. This standstill phase of the picker head constitutes an advantageous aspect of the invention, because during that phase, the weft wire may be cut in ideal conditions to yield an optimum cloth in a nearly finished condition.

It should be noted in this respect that the cited standstill interval of the picker head does not jeopardize, as actual tests have shown, the cloth production rate, which is higher than the rates currently achieved with conventional looms of the same general type.

It should be further pointed out that the inventive actuator assembly enables, by virtue of its peculiar construction, the picker head to hold the weft wire at all times under tension, which is effective to prevent the wire from becoming entangled and further improve the quality of the resulting wire cloth.

Also to be enhanced is the cited dual adjustment ability of the inventive actuator assembly, which adjustment is easy to make as well as being extremely accurate. Thus, ease of adjustment brings about a corresponding ready adaptability of the whole machine to produce a desired cloth type, especially as regards the cloth grade.

It may be appreciated from the foregoing that the invention fully achieves its objects.

While but one, presently preferred embodiment of the invention has been described by way of example, the skilled one in the art will readily recognize that many modifications and variations may be introduced therein without departing from the true scope of the inventive idea. As an example, the specific dimensions of the main component parts of the actuator assembly according to the invention may be selected contingent on individual application requirements.

## Claims

1. An actuator assembly for a picker head in shuttleless looms for making wire cloth and the like, characterized in that it comprises a meshing gear pair (2, 3) having a 1:1 gear ratio, whereof one gear (2) is rigid with the frame of the loom and is journaled on to the loom crankshaft and the other (3) is caused to follow a substantially epicycloidal path around it, said other gear (3) being rigid with a disk assembly (7) with which a first connecting rod element (13) is articulately engaged, which connecting rod element is coupled to one end of a rod linkage (16) comprising three points of articulation (16, 33, 50) and having a second end articulated to the frame of the loom and a third end articulated to a second connecting rod element (51) for reciprocating the picker head actuating carriage (54), the position of at least one (33) of said points of articulation being adjustable.
2. An actuator assembly according to claim 1, characterized in that said second gear (3) is supported rotatably on a gear holder element of platelike, substantially rectangular configuration (4) and in mesh engagement with said first gear (2), said disk assembly (7) is carried on said gear holder element (4) at the opposite side thereof to the side carrying said second gear (3), said first connecting rod element (13) is engaged at one end

thereof with said disk assembly (7) and extending on a substantially vertical plane, said rod linkage comprises a set of rods interconnected to define a substantially triangular arrangement and lying on a substantially vertical plane with two sides projecting by preset distances beyond the base of said triangle, the upper vertex of said triangle being pivoted to the other end of said first connecting rod element (13), the lower end of one of said projecting sides from said triangle being pivoted to an adjustment carriage (30), and the lower end of the other of said projecting sides from said triangle being pivoted to one end of a second twin connecting rod element (51) having the other end connected to said actuator carriage element (54) for actuating said picker head, said preceding elements are interconnected and constructed such that, on rotating said crankshaft, said second gear (3) performs, along with said plate-like element (4), a substantially epicycloidal movement around said first gear (2), and said second twin connecting rod element (51) linearly reciprocates said actuator carriage (54) for said picker head, said reciprocating motion being timed to the sley motion in said loom and including a forward stroke of said picker head to pick up the weft wire and a return stroke of said picker head to release the weft wire, on completion of said return stroke and prior to the successive forward stroke a standstill phase being provided for said picker head for an adjustable preset time period.

3. An actuator assembly according to claim 2, characterized in that said plate-like gear holding element (4) of substantially rectangular configuration has two substantially round apertures (5, 6) formed near the ends thereof, one (6) of said apertures (5, 6) being engaged rotatably, on opposite sides of said gear holding element (4), by said first gear (2) whereas said supporting disk assembly (7), and the other of said apertures (5) are engaged rotatably with respect to each other and with respect to said second gear (3).
4. An actuator assembly according to Claim 1, characterized in that said supporting disk assembly (7) includes a bearing outer race (8) and center disk-like portion (9) provided with a substantially diametrically extending aperture (11) which widens at one end for adjustably securing said one end of said first connecting rod element (13) therein.
5. An actuator assembly according to Claim 1, characterized in that said first gear (2), said second gear (3), and said gear holding element (4) are accommodated within a bearing case (SC) of sub-

stantially cylindrical shape and attached, on a substantially vertical plane, to an abutment shoulder (SP) on said loom, said disk assembly (7) protruding from the cover (C) of said case (SC) and also extending on a substantially vertical plane, said case (SC) cover (C) being made pivotally rigid with said gear holding element (4).

6. An actuator assembly according to any of the preceding claims, characterized in that said adjustment carriage (30) having the projecting end of said one side of said substantially triangular arrangement pivoted thereto includes a substantially parallelepipedal carriage body (36) made rigid with the frame of said loom, said body having two longitudinal guide slots (35) formed through opposite sides thereof, a supporting plate (34) being slidably engaged in said guide slots (35), said supporting plate supporting rigidly therewith the articulation or pivot means (33) for said projecting end of said one side, and a handwheel control means (37) being operatively coupled to said plate (34) to translate said plate and time the motion of said assembly to the motion of said sley in accordance with the type of wire cloth to be made.

7. An actuator assembly according to any of the preceding claims, characterized in that said rod set (16) includes essentially six rods (17, 18, 20, 21, 22, 23) in juxtaposed pairs to define said substantially triangular arrangement, the two base rods (17, 18) in said triangular arrangement being bent yoke-like to provide respective end portions converging to a point located inwardly of the projecting end from said base of said triangular arrangement, to said same point there also converging the respective ends of two rods (20, 21) defining said side of said triangular arrangement, the remaining rod pair (22, 23) defining the other side of said triangular arrangement being juxtaposed in substantially mutually parallel relationship.

8. An actuator assembly according to Claim 7, characterized in that said two base rods (17, 18) are each provided, near the non-converging ends thereof, with a respective longitudinal slot (24, 25), said longitudinal slots (24, 25) extending in juxtaposed relationship and each said slot being engaged in an adjustable fashion by a respective end portion of said two substantially parallel rods (23, 22) of said other side of said substantially triangular arrangement.

9. An actuator assembly according to Claim 8, characterized in that said end portions of said two substantially parallel rods (22, 23) are engaged in an adjustable fashion within said longitudinal

slots (25, 24) of said two base rods (18, 17) by means of a cross bolt (26) passed through said two slots (25, 24) and coupling together said end portions of said two substantially parallel rods (22, 23), the coupling region being located more to the rear than said end portions of said projecting rods from said base side.

10. An actuator assembly according to any of the preceding claims, characterized in that said supporting plate (34) for said adjustment carriage (30) has a substantially U-like configuration and is slidably engaged on said carriage body (36), said plate (34) being lockable at each adjustment position thereof by means of two bolts passed through said two guide slots (35) in said carriage body (36) and coupling together the parallel wing portions of said plate and wherein said adjustable duration time preset for said standstill phase of said picker head corresponds substantially to a 120-130° rotation of said second gear (3), said gear holding element (4), said disk assembly (7), and said first connecting rod element (13) around said first gear (2) and wherein the drive ratio of said first gear (2) to said second gear (3) is substantially 1:1.

## Patentansprüche

1. Antriebsvorrichtung für einen Greiferkopf in schützenlosen Webstühlen zur Herstellung von Drahtgeweben und dergleichen, dadurch gekennzeichnet, daß sie ein kämmendes Zahnradpaar (2, 3) mit einem Zahnradübersetzungsverhältnis von 1 : 1 umfaßt, wovon ein Zahnrad (2) standfest bezüglich des Rahmens des Webstuhls ist und auf der Webstuhlkurbelwelle gelagert ist und das andere (3) veranlaßt wird, einer im wesentlichen epizykloidalen Bahn um es herum zu folgen, und das andere Zahnrad (3) starr mit einer Scheibenanordnung (7) verbunden ist, mit der ein erstes Verbindungsstangenelement (13) gelenkig in Eingriff kommt, wobei dieses Verbindungsstangenelement gegen ein Ende eines Lenkergestänges (16) gekuppelt ist, welches drei Gelenkpunkte (15,33,50) umfaßt und mit einem zweiten Ende gelenkig am Rahmen des Webstuhls ist und ein drittes Ende gelenkig bezüglich eines zweiten Verbindungsstangenelementes (51) ist, um den den Greiferkopf betätigenden Schlitten (54) hin- und herzubewegen, wobei die Position wenigstens eines (33) dieser Gelenkpunkte verstellbar ist.

2. Antriebsvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das zweite Zahnrad (3) drehbar auf einer plattenartigen, im wesentlichen

- rechteckigen Zahnradhalterung (4) gelagert ist und mit dem ersten Zahnrad (2) kämmt, die Scheibenanordnung (7) auf der Zahnradhalterung (4) an der Seite, die zu der das zweite Zahnrad (3) tragenden Seite entgegengesetzt liegt, gehalten ist, die erste Verbindungsstange (13) mit einem ihrer Enden mit der Scheibenanordnung (7) im Eingriff steht und sich auf einer im wesentlichen vertikalen Ebene erstreckt, das Gestänge aus einem Satz von Stangen besteht, die miteinander derart verbunden sind, daß sie eine im wesentlichen dreieckige Anordnung definieren und in einer im wesentlichen vertikalen Ebene liegen, wobei zwei deren Seiten um einen voreingestellten Abstand über die Basis des genannten Dreiecks vorstehen, der Scheitel des Dreiecks am anderen Ende der ersten Verbindungsstange (13) angelenkt ist, das untere Ende von einer der vom Dreieck vorstehenden Seiten an einen Regelschlitten (30) angelenkt ist, und das untere Ende der anderen vom Dreieck vorstehenden Seite an ein Ende einer zweiten doppelten Verbindungsstange (51) angelenkt ist, deren anderes Ende mit dem Betätigungsschlitten (54) für den Greiferkopf verbunden ist, die vorgenannten Elemente derart miteinander verbunden und derart konstruiert sind, daß bei Drehung der Kurbelwelle das zweite Zahnrad (3) zusammen mit dem Plattenteil (4) eine im wesentlichen epicycloidale Bewegung um das erste Zahnrad (2) durchführt und die zweite doppelte Verbindungsstange (51) den Betätigungsschlitten (54) für den Greiferkopf linear hin- und herbewegt, welche Hin- und Herbewegung zeitlich auf die Schlagbewegung in der Webmaschine abgestimmt ist und einen Vorwärtshub des Greiferkopfes, um den Schußdraht aufzunehmen, und einen Rückwärtshub, um den Schußdraht freizugeben, beinhaltet, wobei nach Beendigung des Rückwärtshubes und vor dem folgenden Vorwärtshub eine Stillstandsphase für den Greiferkopf während einer regelbar voreingestellten Zeitperiode vorgesehen ist.
3. Antriebsvorrichtung nach Anspruch 2, dadurch gekennzeichnet, daß die plattenartige Zahnradhalterung (4) von im wesentlichen rechteckiger Form zwei im wesentlichen runde, in der Nähe der Enden derselben ausgebildete Öffnungen (5,6) besitzt, wobei in eine (6) der Öffnungen (5,6) drehbar an entgegengesetzten Seiten der Zahnradhalterung (4) das erste Zahnrad (2) eingreift, wogegen die Haltescheibenanordnung (7) und die andere der Öffnungen (5) drehbar miteinander und mit dem zweiten Zahnrad (3) im Eingriff stehen.
4. Antriebsvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß die Haltescheibenanordnung (7) einen äußeren Laufkranz (8) und einen zentralen, scheibenartigen Teil (9) aufweist, der mit einer sich im wesentlichen diametral erstreckenden Öffnung (11) versehen ist, welche sich an einem Ende erweitert, um verstellbar das genannte eine Ende der ersten Verbindungsstange (13) darin zu sichern.
5. Antriebsvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das erste Zahnrad (2), das zweite Zahnrad (3) und die Zahnradhalterung (4) im Inneren eines Lagergehäuses (SC) von im wesentlichen zylindrischer Form untergebracht sind, das auf einer im wesentlichen vertikalen Ebene an einer Anschlagschulter (SP) der Webmaschine angebracht ist, wobei die Scheibenanordnung (7) vom Deckel (C) des Gehäuses (SC) wegsteht und sich ebenfalls in einer im wesentlichen vertikalen Ebene erstreckt und der Deckel (C) des Gehäuses (SC) schwenkfest mit der Zahnradhalterung (4) ausgebildet ist.
6. Antriebsvorrichtung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Regelschlitten (30), an den das vorstehende Ende der genannten einen Seite der im wesentlichen dreieckigen Anordnung angelenkt ist, einen im wesentlichen parallelepipedischen Schlittenkörper (36) aufweist, der starr mit dem Rahmen der Webmaschine verbunden ist und zwei an entgegengesetzten Seiten desselben in Längsrichtung verlaufende Führungsschlitze (35) besitzt, in welche eine Halteplatte (34) verschiebbar eingreift, die, starr mit ihr verbunden, die Anlenkeinrichtungen (33) für das genannte vorstehende Ende der einen Seite trägt, wobei eine Handradsteuerung (37) operativ mit der Platte (34) verbunden ist, um die Platte zu verschieben und die Bewegung der Anordnung zeitlich auf die Schlagbewegung in Übereinstimmung mit dem jeweils herzustellenden Drahtgewebe abzustimmen.
7. Antriebsvorrichtung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Stangensatz (16) aus im wesentlichen sechs paarweise nebeneinander angeordneten Stangen (17,18,20,21,22,23) besteht, um die im wesentlichen dreieckige Anordnung zu bilden, wobei die beiden Basisstangen (17,18) in der dreieckigen Anordnung jochförmig unter Bildung von Endteilen gebogen sind, die zu einer Stelle innerhalb des von der Basis der dreieckigen Anordnung vorstehenden Endes konvergieren, zu welcher Stelle hin auch die betreffenden Enden von zwei Stangen (20,21) konvergieren, welche die genannte Seite der dreieckigen Anordnung definieren, wobei das verbleibende, die andere

Seite der dreieckigen Anordnung bildende Stangenpaar (22,23) im wesentlichen parallel nebeneinanderliegend angeordnet ist.

8. Antriebsvorrichtung nach Anspruch 7, dadurch gekennzeichnet, daß die beiden Basisstangen (17,18) jeweils in der Nähe ihrer nicht konvergierenden Enden mit Längsschlitz (24,25) versehen sind, welche sich nebeneinanderliegend erstrecken und von denen jeder verstellbar mit dem Endteil der zwei im wesentlichen parallelen Stangen (23,22) der anderen Seite der im wesentlichen dreieckigen Anordnung im Eingriff steht. 5
9. Antriebsvorrichtung nach Anspruch 8, dadurch gekennzeichnet, daß die Endteile der zwei im wesentlichen parallelen Stangen (22,23) verstellbar mit den Längsschlitz (25,24) der beiden Basisstangen (18,17) über einen Querbolzen (26) im Eingriff stehen, der durch die beiden Schlitz (25,24) geführt ist und die beiden Endteile der beiden im wesentlichen parallelen Stangen (22,23) miteinander verbindet, wobei die Verbindungszone weiter hinten liegt als die Endteile der von der Basisseite vorstehenden Stangen. 10 15 20 25
10. Antriebsvorrichtung nach der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Halteplatte (34) für den Regelschlitten (30) eine im wesentlichen U-förmige Gestalt besitzt, verschiebbar am Schlittenkörper (36) angeordnet und in jeder seiner Einstellpositionen mittels zweier Bolzen blockierbar ist, die durch die beiden Führungsschlitz (35) im Schlittenkörper (36) gesteckt sind und die parallelen Flügelabschnitte der Platte miteinander verbinden, wobei die regelbare Zeitvoreinstellung für die Stillstandsphase des Greiferkopfes im wesentlichen einer Drehung um 120-130% des zweiten Zahnrades (3), der Zahnradhalterung (4), der Scheibenanordnung (7) und der ersten Verbindungsstange (13) um das erste Zahnrad (2) entspricht und das Antriebsverhältnis des ersten Zahnrades (2) zum zweiten Zahnrad (3) im wesentlichen 1:1 beträgt. 30 35 40 45

## Revendications

1. Dispositif d'entraînement d'une aiguille d'insertion dans des métiers à tisser sans navette pour réaliser des tissus métalliques et analogues, caractérisé en ce qu'il comprend une paire de roues dentées ongrénées (2,3) ayant un rapport d'engrenage de 1:1, dont une roue (2) est solidaire du bâti du métier à tisser et est tourillonnée sur le vilebrequin du métier à tisser, et l'autre (3) est entraînée à suivre une voie sensiblement épicycloïdale autour de celle-ci, ladite autre roue (3) étant solidaire d'un ensemble de disque (7) avec lequel est engagée, de façon articulée, une première bielle de liaison (13), laquelle bielle de liaison est couplée à une extrémité d'une tringle (16) comprenant trois points d'articulation (15, 33, 50) et ayant une deuxième extrémité articulée au bâti du métier à tisser, et une troisième extrémité articulée à une seconde bielle de liaison (51) pour entraîner selon un mouvement de va-et-vient le chariot d'entraînement (54) de l'aiguille d'insertion, la position d'au moins l'un (33) desdits points d'articulation étant réglable. 50 55

cloïdale autour de celle-ci, ladite autre roue (3) étant solidaire d'un ensemble de disque (7) avec lequel est engagée, de façon articulée, une première bielle de liaison (13), laquelle bielle de liaison est couplée à une extrémité d'une tringle (16) comprenant trois points d'articulation (15, 33, 50) et ayant une deuxième extrémité articulée au bâti du métier à tisser, et une troisième extrémité articulée à une seconde bielle de liaison (51) pour entraîner selon un mouvement de va-et-vient le chariot d'entraînement (54) de l'aiguille d'insertion, la position d'au moins l'un (33) desdits points d'articulation étant réglable.

2. Dispositif d'entraînement selon la revendication 1, caractérisé en ce que ladite seconde roue dentée (3) est supportée, de façon rotative, sur un support en forme de plaque, de configuration sensiblement rectangulaire (4) et est en engrenement avec ladite première roue dentée (2), ledit ensemble de disque (7) est porté sur ledit support (4) sur son côté opposé au côté portant ladite seconde roue dentée (3), ladite première bielle de liaison (13) est engagée à une extrémité de celle-ci avec ledit ensemble de disque (7) et s'étend dans un plan sensiblement vertical, ladite tringle comprend une série de bielles interconnectées pour définir un agencement sensiblement triangulaire et s'étendant dans un plan sensiblement vertical en ayant deux côtés faisant saillie de distances prédéterminées au-delà de la base dudit triangle, le sommet supérieur dudit triangle pouvant pivoter à l'autre extrémité de ladite première bielle de liaison (13), l'extrémité inférieure de l'un desdits côtés en saillie dudit triangle pouvant pivoter sur un chariot de réglage (30), et l'extrémité inférieure de l'autre desdits côtés en saillie dudit triangle pouvant pivoter sur une extrémité d'une seconde bielle de liaison double (51) dont l'autre extrémité est reliée audit chariot d'entraînement (54) de ladite aiguille d'insertion, ledits éléments précédents sont interconnectés et construits de sorte que, en faisant tourner ledit vilebrequin, ladite seconde roue dentée (3) réalise, en même temps que ledit élément en forme de plaque (4), un mouvement sensiblement épicycloïdal autour de ladite première roue dentée (2), et ladite seconde bielle de liaison double (51) entraîne ledit chariot (54) pour ladite aiguille d'insertion selon un mouvement de va-et-vient linéaire, ledit mouvement de va-et-vient étant synchronisé avec le déplacement du peigne dans ledit métier à tisser et comportant une course en avant de ladite aiguille d'insertion pour prendre le fil de trame et une course de retour de ladite aiguille d'insertion pour relâcher le fil se trame, un temps mort étant prévu pour ladite aiguille s'insérer pendant une période de temps prédéterminé ré-



glable, à la fin de ladite course se retour et avant la course en avant suivante.

3. Dispositif d'entraînement selon la revendication 2, caractérisé en ce que le support de roue dentée en forme de plaque (4) de configuration sensiblement rectangulaire présente deux ouvertures sensiblement circulaires (5,6) formées à proximité de ses extrémités, l'une (6) desdites ouvertures (5,6) étant engagée de façon rotative, sur des côtés opposés dudit support (4), par ladite première roue dentée (2), tandis que ledit ensemble de disque de support (7), et l'autre desdites ouvertures (5) sont engagés de façon rotative l'un par rapport à l'autre et par rapport à ladite seconde roue dentée (3).

4. Dispositif d'entraînement selon la revendication 1, caractérisé en ce que ledit ensemble de disque de support (7) comprend une bague externe de roulement (8) et une partie centrale en forme de disque (9) munie d'une ouverture s'étendant sensiblement sur un diamètre (11) qui s'élargit à une extrémité pour y fixer de façon réglable ladite première extrémité de ladite première bielle de liaison (13).

5. Dispositif d'entraînement selon la revendication 1, caractérisé en ce que ladite première roue dentée (2), ladite seconde roue dentée (3), et ledit support (4) sont logés à l'intérieur d'un carter (SC) de forme sensiblement cylindrique et fixé, dans un plan sensiblement vertical, à un épaulement d'aboutement (SP) dudit métier à tisser, ledit ensemble de disque (7) faisant saillie du couvercle (C) dudit carter (SC) et s'étendant également dans un plan sensiblement vertical, ledit couvercle (C) du carter (SC) étant solidaire en pivotement dudit support (4).

6. Dispositif d'entraînement selon une quelconque des revendications précédentes, caractérisé en ce que ledit chariot de réglage (30), par rapport auquel peut pivoter l'extrémité en saillie dudit côté dudit agencement sensiblement triangulaire, comporte un corps de chariot sensiblement parallélépipédique (36) solidaire du châssis du métier à tisser, ledit corps présentant deux fentes de guidage longitudinales (35) formées à travers des côtés opposés de celui-ci, une plaque de support (34) étant engagée de façon coulissante dans lesdites fentes de guidage (35), ladite plaque supportant de façon solidaire de celle-ci des moyens d'articulation ou de pivot (33) pour ladite extrémité en saillie dudit côté, et des moyens de commande d'une roue à main (37) étant couplés de façon active à ladite plaque (34) pour déplacer ladite plaque et synchroniser

le déplacement dudit dispositif avec le déplacement dudit peigne selon le type de tissu métallique à réaliser.

7. Dispositif d'entraînement selon une quelconque des revendications précédentes, caractérisé en ce que ladite tringlerie (16) comporte essentiellement six bielles (17,18,20,21,22,23) en paires juxtaposées pour définir ledit agencement sensiblement triangulaire, les deux bielles de base (17,18) dans ledit agencement triangulaire étant courbées en forme d'étrier pour fournir des parties d'extrémité respectives convergeant en un point situé à l'intérieur de l'extrémité en saillie de ladite base dudit agencement triangulaire, au même dit point convergeant également les extrémités respectives de deux bielles (20,21) définissant ledit côté dudit agencement triangulaire, la paire de bielles restante (22,23) définissant l'autre côté dudit agencement triangulaire en étant juxtaposées de façon sensiblement parallèle.

8. Dispositif d'entraînement selon la revendication 7, caractérisé en ce que lesdites deux bielles de base (17,18) sont chacune munies, à proximité de leurs extrémités non convergentes, d'une fente longitudinale respective (24,25), lesdites fentes longitudinales (24,25) s'étendant de façon juxtaposée et chacune desdites fentes étant engagée, de façon réglable, par une partie d'extrémité respective desdites deux bielles sensiblement parallèles (23,22) dudit autre côté dudit agencement sensiblement triangulaire.

9. Dispositif d'entraînement selon la revendication 8, caractérisé en ce que lesdites parties d'extrémité desdites deux bielles sensiblement parallèles (22,23) sont engagées, de façon réglable, dans lesdites fentes longitudinales (25,24) desdites deux bielles de base (18,17) au moyen d'un bouchon transversal (26) traversant lesdites deux fentes (25,24) et couplant ensemble lesdites parties d'extrémité desdites deux bielles sensiblement parallèles (22,23), la zone de couplage étant située plus en arrière que lesdites parties d'extrémité desdites bielles en saillie dudit côté de base.

10. Dispositif d'entraînement selon une quelconque des revendications précédentes, caractérisé en ce que ladite plaque de support (34) pour ledit chariot de réglage (30) présente une configuration sensiblement en U et est engagée de façon coulissante sur ledit corps de chariot (36), ladite plaque (34) pouvant être verrouillée en chaque position de réglage de celle-ci au moyen de deux boulons traversant lesdites deux

fentes de guidage (35) dans ledit corps de chariot (36) et couplant ensemble les parties d'aile parallèles de ladite plaque, et en ce que ladite période de temps réglage prédéterminée pour ledit temps mort de l'aiguille d'insertion correspond sensiblement à une rotation de 120-130° de ladite seconde roue dentée (3), dudit support (4), dudit ensemble de disque (7), et de ladite première bielle de liaison (13) autour de ladite première roue dentée (2), et en ce que le rapport d'entraînement de ladite première roue (2) à ladite seconde roue (3) est sensiblement 1:1.

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