



AU9184110

(12) PATENT ABRIDGMENT (11) Document No. AU-B-84110/91
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 646496

(54) Title
DEVICE FOR HANDLING HEALDS OR DROP WIRES IN A WARP THREAD INSERTION MACHINE

International Patent Classification(s)
(51)⁵ **D03J 001/14**

(21) Application No. : **84110/91**

(22) Application Date : **03.09.91**

(87) PCT Publication Number : **WO92/05303**

(30) Priority Data

(31) Number	(32) Date	(33) Country
3000/90	17.09.90	CH SWITZERLAND

(43) Publication Date : **15.04.92**

(44) Publication Date of Accepted Application : **24.02.94**

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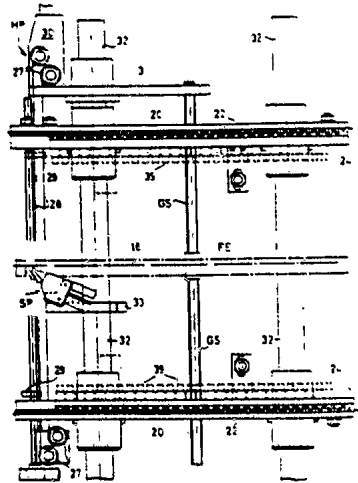
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(56) Prior Art Documents
EP 328680
EP 298616
EP 421943

(57) Claim

1. Device for manipulating healds or drop wires (designated below as harness member) in a warp-thread drawing-in machine from their separation from a stack via the drawing-in of the warp threads up to the transfer to supporting members provided for arranging in a weaving machine, characterised by holding means (22, 24; 44, 45) for accepting the separated harness members (LI, LA) and for positively transporting them to a drawing-in station and a transfer station, by positioning means (HP, SP; 47) arranged in the area of the drawing-in station, and by transfer means (39; 56, 57), arranged in the area of the transfer station, for transferring the harness members having a drawn-in warp thread to the supporting members (12).

(51) Internationale Patentklassifikation ⁵ : D03J 1/14	A1	(11) Internationale Veröffentlichungsnummer: WO 92/05303 (43) Internationales Veröffentlichungsdatum: 2. April 1992 (02.04.92)
(21) Internationales Aktenzeichen: PCT/CH91/00190 (22) Internationales Anmeldedatum: 3. September 1991 (03.09.91) (30) Prioritätsdaten: 3000/90-0 17. September 1990 (17.09.90) CH (71) Anmelder (für alle Bestimmungsstaaten ausser US): ZELL-WEGER USTER AG [CH/CH]; Wilstrasse 11, CH-8610 Uster (CH). (72) Erfinder; und (75) Erfinder/Anmelder (nur für US): BADERTSCHER, Markus [CH/CH]; Städtli 111, CH-7304 Maienfeld (CH). EGLSEER, Hermann [CH/CH]; Pfannenstielstrasse 1, CH-8610 Uster (CH).	(81) Bestimmungsstaaten: AT (europäisches Patent), AU, BE (europäisches Patent), CA, CH (europäisches Patent), DE (europäisches Patent), DK (europäisches Patent), ES (europäisches Patent), FR (europäisches Patent), GB (europäisches Patent), GR (europäisches Patent), IT (europäisches Patent), JP, KR, LU (europäisches Patent), NL (europäisches Patent), SE (europäisches Patent), SU*, US. Veröffentlicht <i>Mit internationalem Recherchenbericht.</i> 646496	
(54) Title: DEVICE FOR HANDLING HEALDS OR DROP WIRES IN A WARP THREAD INSERTION MACHINE (54) Bezeichnung: VORRICHTUNG ZUR HANDHABUNG VON LITZEN ODER LAMELLEN IN EINER KETTFADEN-EINZIEHMASCHINE (57) Abstract The device is for handling the healds or drop wires from their separation from a stack followed by the insertion of the warp threads to the transfer to carriers designed for setting in a weaving machine and comprises holding means (22, 24) to take the separated healds or drop wires and transport them by positive engagement to an insertion and a transfer station, positioning means (HP, SP) arranged in the region of the insertion station and transfer means (39) arranged in the region of the transfer station to transfer the healds or drop wires having an inserted warp thread to the holding component. Thus only one kind of handling device is needed for handling the healds or drop wires from their separation from a stack to their transfer to carriers. This in turn means a substantial reduction in potential sources of error and thus the time between breakdowns. In addition, only two interfaces, one to the separation station and one to the transfer station for the holders, are needed. (57) Zusammenfassung Die Vorrichtung dient zur Handhabung der Litzen oder Lamellen von deren Separierung von einem Stapel über den Einzug der Kettfäden bis zur Übergabe an zur Anordnung in einer Webmaschine vorgesehene Tragorgane und sie enthält Haltemittel (22, 24) zur Aufnahme der separierten Litzen oder Lamellen und zu deren formschlüssigem Transport an eine Einzugs- und an eine Übergabestation, im Bereich der Einzugsstation angeordnete Positionierungsmittel (HP, SP), und im Bereich der Übergabestation angeordnete Übergabemittel (39) zur Übergabe der einen eingezogenen Kettfaden aufweisenden Litzen oder Lamellen an die Tragorgane. Dadurch wird für die Handhabung der Litzen und Lamellen von deren Separierung bis zur Übergabe an die Tragorgane nur eine einzige Art von Handhabungsmitteln benötigt. Und das bedeutet eine wesentliche Reduktion von potentiellen Fehlerquellen und damit der Störungsanfälligkeit. Ausserdem sind nur zwei Schnittstellen, eine zur Separierstation und eine an der Übergabestation zu den Tragorganen, erforderlich. 		

Device for manipulating healds or drop wires in a warp-thread drawing-in machine

5 The present invention relates to a device for manipulating healds or drop wires (designated below as harness member) in a warp-thread drawing-in machine from their separation from a stack via the drawing-in of the warp threads up to the transfer to supporting members provided for arranging in a weaving machine.

10 Devices of this type known hitherto, as are used, for example, in the warp-thread drawing-in machine USTER DELTA (USTER - registered trademark of Zellweger Uster AG), comprise a multiplicity of various elements which in each case always perform only a limited partial function
15 within the said sequence. With regard to the manipulation of the drop wires, this means, for example, that these drop wires after their separation, are transported by first members to the drawing-in position, are gripped there by second members and turned for the orientation
20 for the drawing-in of the warp threads and are then transported further by third members, the various members only being partly connected frictionally to the drop wires.

25 Apart from the fact that the plurality of various members makes the device more expensive, the interfaces in particular between the various members inside the device represent potential sources of error. This especially applies when there is a frictional connection between the members and the drop wires.

30 The invention, then, is intended to specify a device of the type mentioned at the beginning in which the potential sources of error are minimised and the costs are kept as low as possible.

35 This object is achieved according to the invention by holding means for accepting the separated harness members and for positively transporting them to a drawing-in station and a transfer station, by positioning



means arranged in the area of the drawing-in station, and by transfer means, arranged in the area of the transfer station, for transferring the harness members having a drawn-in warp thread to the supporting members.

5 The device according to the invention therefore requires only a single type of manipulating means for manipulating the healds or drop wires from their separation up to the transfer to their supporting members. And that means that, through the elimination of a multiplicity of potential sources of error and causes of
10 trouble, the device is substantially less susceptible to trouble in operation. For integrating into the drawing-in process, the device requires merely two interfaces: one leading to the separating station and one at the
15 transfer station leading to the supporting members. The susceptibility to trouble is also substantially reduced and in addition the possibility of a modular construction of the drawing-in machine presents itself.

20 The invention is described in greater detail below with reference to an exemplary embodiment and the drawings, in which:

Fig. 1 shows a perspective overall representation of a drawing-in machine according to the invention,

25 Fig. 2 shows a perspective representation of the drawing-in module of the drawing-in machine in Fig. 1,

Fig. 3 shows a plan view of a device according to the invention for manipulating healds in the direction of arrow III in Fig. 2,

30 Fig. 4 shows a view in the direction of arrow IV in Fig. 3,

Fig. 5 shows a detail of Fig. 4 to an enlarged scale,

Fig. 6 shows a view in the direction of arrow VI in Fig. 5,

35 Fig. 7 shows a plan view of a device according to the invention for manipulating drop wires; and

Fig. 8 shows a view in the direction of arrow VIII in Fig. 7.

According to Fig. 1, the drawing-in machine consists of a mounting stand 1 and various subassemblies arranged in this mounting stand 1, each of which subassemblies represents a functional module. A warp-beam truck 2 with a warp beam 3 arranged thereon can be recognized in front of the mounting stand 1. In addition, the warp-beam truck 3 contains a so-called lifting device 4 for holding a frame 5, on which the warp threads KF are clamped. This clamping is effected before the actual drawing-in and at a location separate from the drawing-in machine, the frame 5 being positioned at the bottom end of the lifting device 4 directly next to the warp beam 3. For the drawing-in, the warp-beam truck 2 together with warp beam 3 and lifting device 4 is moved to the so-called setting-up side of the drawing-in machine and the frame 5 is lifted upwards by the lifting device 4 and it then assumes the position shown.

The frame 5 and the warp beam 3 are displaced in the longitudinal direction of the mounting stand 1. During this displacement, the warp threads KF are directed past a thread-separating group 6 and as a result are separated and selected. After the selection, the warp threads KF are cut off and presented to a drawing-in needle 7, which forms a component of the so-called drawing-in module. The selecting device used in the warp tying machine USTER TOPMATIC (USTER - registered trademark of Zellweger Uster AG) can be used, for example, for the selection of the warp threads.

Next to the drawing-in needle 7 can be recognized a video display unit 8, which belongs to an operating station and serves to display machine functions and machine malfunctions and to input data. The operating station, which forms part of a so-called programming module, also contains an input stage for the manual input of certain functions, such as, for example, creep motion, start-stop, repetition of operations, and the like. The drawing-in machine is controlled by a control module which contains a control computer and is arranged in a control box 9. Apart from the control computer, this



control box contains a module computer for every so-called main module, the individual module computers being controlled and monitored by the control computer. The main modules of the drawing-in machine, apart from the modules already mentioned - drawing-in module, yarn module, control module and programming module, are the heald, drop-wire, and reed modules.

The thread-separating group 6, which presents the warp threads KF to be drawn in to the drawing-in needle 7, and the path of movement of the drawing-in needle 7, which runs vertically to the plane of the clamped warp threads KF, define a plane in the area of a support 10 forming part of the mounting stand 1, which plane separates the setting-up side already mentioned from the so-called taking-down side of the drawing-in machine. The warp threads and the individual elements into which the warp threads are to be drawn in are fed at the setting-up side, and the so-called harness (healds, drop wires and reed) together with the drawn-in warp threads can be removed at the taking-down side. During the drawing-in, the frame 5 having the warp threads KF and the warp-beam truck 2 having the warp beam 3 are moved to the right past the thread-separating group 6, in the course of which the drawing-in needle 7 successively removes from the frame 5 the warp threads KF clamped on the latter.

When all warp threads KF are drawn in and the frame 5 is empty, the latter, together with the warp-beam truck 2, the warp beam 3 and the lifting device 4, is located on the taking-down side.

Arranged directly behind the plane of the warp threads KF are the warp-stop-motion drop wires LA, behind the latter the healds LI and further to the rear the reed. The drop wires LA are stacked in hand magazines and the full hand magazines are hung in sloping feed rails 11, on which they are transported to the right towards the drawing-in needle 7. At this location they are separated and moved into the drawing-in position. Once drawing-in is complete, the drop wires LA pass on drop-wire supporting rails 12 to the taking-down side.



The healds LI are lined up on rails 13 and shifted automatically on the latter to a separating stage. The healds LI are then moved individually into their drawing-in position and, once drawing-in is complete, are distributed over the corresponding heald shafts 14 on the taking-down side. The reed is likewise moved step-by-step past the drawing-in needle 7, the corresponding reed gap being opened for the drawing-in. After the drawing-in, the reed is likewise located on the taking-down side. A part of the reed WB can be recognized to the right next to the heald shafts 14. This representation is to be understood purely as an illustration, since the reed, at the position shown of the frame 5, is of course located on the setting-up side.

As further apparent from the figure, a so-called harness truck 15 is provided on the taking-down side. This harness truck 15, together with the drop-wire supporting rails 12, fixed thereon, heald shafts 14 and holder for the reed, is pushed into the mounting stand 1 into the position shown and, after the drawing-in, carries the harness having the drawn-in warp threads KF. At this moment, the warp-beam truck 2 together with the warp beam 3 is located directly in front of the harness truck 15. By means of the lifting device 4, the harness is now reloaded from the harness truck 15 onto the warp-beam truck 2, which then carries the warp beam 3 and the drawn-in harness and can be moved to the relevant weaving machine or into an intermediate store.

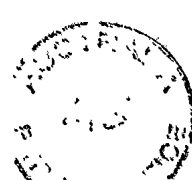
The functions described are distributed over a plurality of modules which represent virtually autonomous machines which are controlled by a common control computer. The cross connections between the individual modules run via this higher-level control computer and there are no direct cross connections between the individual modules. The main modules (already mentioned) of the drawing-in machine are themselves also of modular construction and as a rule consist of submodules. This modular construction is described in Swiss Patent Application No. 679871, to the disclosure of which

reference is herewith expressly made.

As apparent from Fig. 2, the drawing-in needle 7, which forms the main component of the drawing-in module, is formed by a gripper band 16 and a clamping gripper 17 carried by the same. The drawing-in needle 7 is guided in the lifting direction (arrow P) in a channel-like guide 18 which extends from the frame 5 in a rectilinear direction up to a curved end part 19. The guide 18 passes through the drawing-in machine and is in each case interrupted in the area of the harness members (drop wires LA, healds LI) and the reed WB in order to permit the feed of the harness members to the drawing-in position and their further transport after drawing-in is complete up to the transfer (arrow S) to drop-wire supporting rails 12 and to the heald shafts 14 (Fig. 1) or the drawing-in of the warp threads into the reed WB, the so-called reeding. The gripper band 16 is provided with feed holes at a uniform distance apart and is driven by a band wheel BR which can be motor-driven and which has on its periphery lobe-shaped or stud-shaped projections engaging into the feed holes.

The feed of the drop wires LA and the healds LI to the drawing-in position and their further transport up to the transfer to the drop-wire supporting rails or to the heald shafts is effected by a submodule drop-wire distribution LD and by a submodule heald distribution HD. In the transport direction of the healds LI, the heald distribution module HD follows the submodule heald separation, which is described in Swiss Patent Application No. 706/90. In the transport direction of the drop wires LA, the drop-wire distribution module LD follows the submodule drop-wire separation, which is described in Swiss Patent Application 2699/90.

Both submodules HD and LD perform the same functions in principle by accepting healds or drop wires presented to them sequentially, by transporting them to their drawing-in position and by transporting them further after drawing-in of the warp threads is complete to a transfer station, where transfer to the heald shafts



or drop-wire supporting rails is effected.

As can be gathered from the abovementioned Swiss Patent, ^{No. 680933} ~~Application No. 706/90~~, the frontmost heald LI, lying directly in front of the submodule HD, of a heald stack is in each case moved by a piston-like selecting member out of the heald stack into an intermediate position and is pushed from this intermediate position by a plunger onto needle-like holding means. The latter form a component of the heald distribution module HD.

According to Swiss Patent, ^{No. 682576} ~~Application 2699/90~~, the drop wires LA are pushed up slightly from their stack by a friction roller so that their head end projects freely upwards. In this position, a hook mounted on a conveyor belt grips the drop wires and pulls them completely out of the stack into a transfer station. In the latter, the suspended drop wire is blown by compressed air onto corresponding holding means which form a component of the drop-wire distribution module LD.

The heald distribution module HD is shown in Figs. 3 to 6. Fig. 3 shows a plan view to a scale of about 1:2.5, Fig. 4 shows a side view in the direction of arrow IV in Fig. 3 to a slightly smaller scale, and Figs. 5 and 6 show a detail to an enlarged scale.

According to the representation, the heald distribution module HD essentially comprises two components: transport planes formed by appropriate plates 20, in each of which planes an endless transport means provided with heald holders is guided. This transport means is designed like a band, belt or chain. A chain is preferably used as transport means, which chain consists of individual links 22 carried by a toothed belt 21. The toothed belt 21 is provided with a tooth system on either side; the tooth system on the inside meshes with corresponding guide rollers 23, of which at least one is motor-driven. The tooth system on the outside of the toothed belt 21 centres the chain links.

On its side remote from the toothed belt 21, each of the chain links 22 has a projecting V-shaped rib, to whose apex a pin 24 designed as heald holder is anchored.

The healds are slipped with their end hooks onto the pins 24; the mutual vertical distance apart of the pins 24 and thus of the plates 20 can be adjusted for adaptation to the length of the healds to be processed. Used for this purpose is a threaded spindle GS which meshes with thread locks mounted on the plates 20 of the transport planes.

The healds are transferred to the heald distribution module HD at the locations designated by arrows A, the two arrows symbolising the fact that the separation of the healds and their transfer takes place in two channels, although this is not absolutely necessary. Sensors 25 for monitoring the heald acceptance are present at the acceptance locations. After acceptance, the healds are transported to the thread drawing-in position by the chain 21, 22 rotating anti-clockwise and driven intermittently by a stepping motor.

Provided between the acceptance point A and the thread drawing-in position is a guide rail 26 which prevents the healds from falling off the pins 24. In Figs. 3 to 6, the thread drawing-in path is designated by a chain-dotted straight line FE; the thread drawing-in position of the healds is the point at which their path intersects the straight line FE.

In this area, the channel-like guide 18 (Fig. 2) has an interruption through which the healds cross the guide 18. Since the thread eyelet of the healds is relatively small, the healds must be positioned very accurately for the drawing-in of the thread. This precise positioning is effected vertically on the one hand, that is, in the longitudinal direction of the healds, and laterally on the other hand, that is, transversely to the longitudinal direction and transversely to the thread drawing-in path FE by corresponding positioning means HP and SP respectively. The vertical-positioning means HP apparent from Fig. 4 comprise an endless cable 28 which is guided via drive rollers 27 and to whose two sides one positioning pin 29 each is fastened. Upon actuation of the vertical-positioning means HP, these positioning pins shift up and down and press against the V-shaped ribs of



the two chain links 22 carrying the heald to be positioned. The drive for the cable 28, which drive is formed by a pneumatic cylinder 30, and the top drive rollers 27 are mounted on a supporting arm 31, which in turn is carried by a support shaft 32 passing through the heald distribution module HD. A total of two support shafts 32 of this type are provided.

The lateral-positioning means SP apparent in particular from Figs. 5 and 6 are mounted in the area of the channel-like guide 18 on a supporting means 33 likewise fastened to the support shaft 32 carrying the supporting arm 31 and comprise a cross guide 34 for the healds, a positioning lever 35 and a control stirrup 36. The cross guide 34, which is arranged just below the channel-like guide 18, has a funnel-like entry part and, following the entry part, a relatively narrow guide part in which the healds are guided fairly accurately with regard to their lateral displacement. The exact lateral positioning is effected by the positioning lever 35. This positioning lever 35 is designed as a two-piece gripper. It is driven by a pneumatic cylinder 37 and is moved at an angle from below towards the heald to be positioned. In its end position drawn in broken lines in Fig. 5, the positioning lever 35 is closed by the control stirrup 36 driven by a pneumatic cylinder 38, as a result of which the heald is firmly clamped and positioned for the drawing-in of the thread.

Following the drawing-in of the thread, the heald is released again from the positioning lever 35 so that it can leave the cross guide 34 and finally also the guide rail 26 and can be transferred to its heald supporting rail. This transfer is effected by pneumatically driven ejector cylinders 39 which are arranged in the area of the two plates 21 and can be selectively activated as a function of the distribution, predetermined by the pattern to be produced on the weaving machine, of the healds over the individual heald shafts, and in fact in each case the top and bottom ejector cylinder 39 of each heald can be activated in pairs. According to the

representation, 28 top and bottom ejector cylinders 39 each are provided, so that the healds can be distributed over a maximum of 28 shafts.

5 The drop-wire distribution module LD is shown in Figs. 7 and 8, and in fact in Fig. 7 in a plan view in the direction of arrow III in Fig. 2 to a scale of about 1:1.5 and in Fig. 8 in a side view in the direction of arrow VIII in Fig. 7. The function of the drop-wire distribution module LD is very similar to that of the
10 heald distribution module HD. The main differences between the two lie in the fact that the drop wires are shorter than the healds, that their thread eyelet is substantially larger than that of the healds so that the demands made on the positioning accuracy for the drawing-
15 in are not so great, and that the number of drop-wire supporting rails is substantially smaller than that of the heald supporting rails.

Just like the heald distribution module HD, the drop-wire distribution module LD contains as a basis two
20 plates 40 and 41 which are at an adjustable mutual distance apart and serve as supporting means for the various transport and positioning means for the drop wires LA. Stretched on the top plate 40 via corresponding gearwheels 42 is an endless toothed belt 43, to the
25 outside of which holding means for the drop wires LA are fastened. These holding means consist of a small plate 45 having two supporting pins 44 arranged vertically one below the other. The drop wires LA are suspended with their supporting slit on the supporting pins 44.

30 The drop wires are transferred to the holding means 44, 45 at locations designated by arrows B, the two arrows symbolising two processing channels of the drop-wire separation stage. The acceptance of the drop wires by the drop-wire distribution module LD is monitored by
35 sensors (not shown). After acceptance, the drop wires LA are transported by the toothed belt 43, moving anti-clockwise and driven intermittently by a stepping motor 46, to the thread drawing-in position, which lies in the area of a star-shaped positioning wheel 47 carried by the



bottom plate 41. Between the acceptance location B up to directly after the thread drawing-in position, one guide rail 48 each for preventing the drop wires from falling off the supporting pins 44 is provided in the area of the two plates 40, 41.

The channel-like guide 18 (Fig. 2) passes through the drop-wire distribution module LD along the chain-dotted straight line FE (Fig. 7), marking the thread drawing-in path, at the level between the two plates 40 and 41; the thread drawing-in position is located at the point at which this straight line passes through the toothed belt 43 at the positioning wheel 47, which point is designated by an x in Fig. 8. The thread eyelet FA of the drop wire LA positioned by the supporting pins 44 and between the projections of the positioning wheel 47 is then in alignment with the straight line FE. In this area, the channel-like guide 18 (Fig. 2) has an interruption in which the drop wires LA cross the guide 18.

The positioning wheel 47 is likewise driven intermittently, and in fact via a toothed belt 49 and a gearwheel 50 which is fastened to the drive spindle 52 of the toothed belt 43 carrying the holding means 44, 45 for the drop wires LA, which drive spindle 52 is driven by the stepping motor 46 via a toothed-belt drive 51.

After the drawing-in of the thread in the area of the positioning wheel 47, the drop wires LA, now carrying one drawn-in warp thread each, pass into the area of a bank-like row 53 of transfer stations, of which, according to Fig. 7, a total of 8 are provided in accordance with the number of 8 possible drop-wire supporting rails 12 (Fig. 1) In the transfer stations, the drop wires LA are pushed according to program onto the corresponding drop-wire supporting rails 12.

According to the representation, the transfer stations consist of a top and a bottom substation 54 and 55, of which each is fastened to the corresponding plate 40 or 41. Both substations 54 and 55 each have a pneumatically driven ejector 56 and 57 respectively, upon actuation of which the relevant drop wire LA is pushed



onto its supporting rail 12. The top substation 54 is designed in such a way that the drop wires, when being pushed down from the supporting pins 44, run with their topmost edge against a guide plane 58 sloping downwards and are thereby directed downwards so that they are positively guided onto an entry flank 59 (of corresponding sloping design) of the drop-wire supporting rails 12 and slide along from this entry flank 59 onto the horizontal part of the drop-wire supporting rail 12.

The bottom substation 55 contains a shaft-like chamber 60 which is open to the front, rear and top and is separated from the chamber of the adjacent stations by cross walls 61. Each chamber 60 is closed off from the toothed belt 43 and the ejector 57 by a flap 62 like a double swing door. This flap 62 serves as a safety device to prevent the drop wires LA from falling off the supporting pins 44 unintentionally as a result of the tension force of the drawn-in warp threads. When activated, the ejector 57 pushes open the flap 62 and as a result pushes the drop wire LA at its bottom part into the chamber 60; at the same time, the top ejector 56 pushes the drop wire from its supporting pins 44 towards the guide plane 58 and onto the entry flank 59 of the drop-wire supporting rails 12. The latter are held in the transfer position by distance plates displaceable in the longitudinal direction of the rails; when they are displaced along the drop-wire supporting rails 12, the distance plates transport the drop wires further. The drop-wire supporting rails 12 are held in the horizontal by retractable and extendable holding bolts fastened to a transport system. In their retracted position, these holding bolts position the drop-wire supporting rails 12; they are extended for passing the drop wires at the relevant location.

At their top plate 21 or 40, both the head and the drop-wire distribution module HD and LD respectively are provided with corresponding covering hoods which on the one hand cover the entire mechanism and protect the same from being covered in dust and on the other hand



have connections for the requisite pneumatic and electronic lines.



Abstract

The device serves to manipulate the healds or drop wires from their separation from a stack via the drawing-in of the warp threads up to the transfer to supporting members provided for arranging in a weaving machine and it contains holding means (22, 24) for accepting the separated healds or drop wires and for positively transporting them to a drawing-in station and a transfer station, positioning means (HP, SP) arranged in the area of the drawing-in station, and transfer means (39), arranged in the area of the transfer station, for transferring the healds or drop wires having a drawn-in warp thread to the supporting members.

Consequently, only a single type of manipulating means is required for manipulating the healds and drop wires from their separation up to the transfer to the supporting members. And that means a substantial reduction in potential sources of error and thus in the susceptibility to trouble. In addition, only two interfaces are necessary: one leading to the separating station and one at the transfer station leading to the supporting members.

(Fig. 4)



Patent Claims

1. Device for manipulating healds or drop wires (designated below as harness member) in a warp-thread drawing-in machine from their separation from a stack via the drawing-in of the warp threads up to the transfer to supporting members provided for arranging in a weaving machine, characterised by holding means (22, 24; 44, 45) for accepting the separated harness members (LI, LA) and for positively transporting them to a drawing-in station and a transfer station, by positioning means (HP, SP; 47) arranged in the area of the drawing-in station, and by transfer means (39; 56, 57), arranged in the area of the transfer station, for transferring the harness members having a drawn-in warp thread to the supporting members (12).

2. Device according to Claim 1, characterised in that the holding means (22, 24; 44, 45) are mounted at regular mutual distances apart on a supporting means (21, 43) which can be driven intermittently.

3. Device according to Claim 2, characterised in that the supporting means (21, 43) is designed like a belt and is guided via drive and guide rollers (23, 42).

4. Device according to Claim 3, characterised in that the holding means are formed by elements (22, 45) arranged on the belt-like supporting means (21, 43) and provided with a pin-like holding member (24, 44).

5. Device according to Claim 4, characterised in that rail-like guide means (26, 48) for preventing the harness members from falling off the pin-like holding members (24, 44) are provided in the area of the supporting means (21, 43) between the location (A, B) for accepting the harness members (LI, LA) from the separating station directly up to the means (39; 56, 57) for the transfer to the supporting members (12).

6. Device according to Claim 5, characterised in that, for the manipulation of healds (LI), two belt-like supporting means (21) are provided with holding members (24) for engaging in the end lugs of the healds, and in



that the mutual distance apart of the supporting means can be adjusted for adaptation to various heald lengths.

7. Device according to Claim 6, characterised in that the guide means arranged in the area of the drawing-in station are formed by a guide (34) for the healds (LI) at their centre part having a thread eyelet and by means (HP, SP) for vertically and laterally positioning the healds.

8. Device according to Claim 7, characterised in that the means (HP) for vertically positioning the healds (LI) are formed by vertically adjustable positioning pins (29) provided for fixing the elements (22) carrying the pin-like holding members (24).

9. Device according to Claim 8, characterised in that the positioning pins (29) can be adjusted by a cable drive (27, 28), and in that the elements (22) carrying the pin-like holding members (24) have a rib-like projection for engaging the positioning pins.

10. Device according to Claim 7, characterised in that the holding means (SP) for laterally positioning the healds (LI) are formed by a positioning lever (35) essentially displaceable transversely to the heald axis and by a control stirrup (36) actuating this positioning lever (35).

11. Device according to Claim 10, characterised in that the positioning lever (35) is formed by a tong-like gripper and is actuated by the control stirrup (36) in such a way that the heald (LI) to be positioned in each case is held in its drawing-in position by the positioning lever.

12. Device according to Claim 5, characterised in that holding means (44, 45) are provided for the manipulation of drop wires (LA), which holding means (44, 45) have two pin-like holding members (44) which are at a vertical distance apart and are provided for engaging in the supporting slit of the respective drop wire.

13. Device according to Claim 12, characterised in that the two pin-like holding members (44) are mounted on a small support plate (45) which in turn is fastened to



the belt-like supporting means (43).

14. Device according to Claim 13, characterised in that each drop wire (LA) is held at its head part on a small support plate (45) and hangs down freely.

5 15. Device according to Claim 14, characterised in that the positioning means arranged in the area of the drawing-in station are formed by means acting on the part of the drop wires (LA) which hangs down freely, which means are intended for laterally fixing the drop wires.

10 16. Device according to Claim 15, characterised in that the said means are formed by a star-shaped positioning wheel (47) provided with lobe-shaped projections, and in that the drop wires (LA) are fixed between the rail-like guide means (48) and the projections of the positioning wheel.

15 17. Device according to Claim 16, characterised in that the positioning wheel (47) is in drive connection with the drive of the belt-like supporting means (43).

20 18. Device according to Claim 17, characterised in that the transfer means are formed by two preferably pneumatically driven slides (56, 57) acting at a vertical distance apart on the drop wires (LA).

25 19. Device according to Claim 18, characterised in that the transfer station for each drop wire (LA) is of two-piece design and has a top and bottom substation (54 and 55 resp.), and in that a slide (56 or 57) is allocated to each substation.

30 20. Device according to Claim 19, characterised in that the top substation (54) has a sloping guide edge (58) which guides the drop wire (LA) at its front edge towards the allocated supporting member (12) when the drop wire (LA) is pushed down from the holding members (44) by the slides (56, 57).

35 21. Device according to Claim 20, characterised in that the guide edge (58) slopes down away from the holding members (44), and in that each supporting member (12) has an entry part (59) correspondingly sloping upwards.

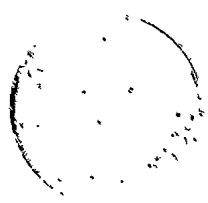


22. Device according to Claim 19, characterised in that the bottom substation (55) is designed as a chamber-like passage (60) and is closed off by a flap-like closure (62) from the drop wires (LA) held on the belt-like supporting means (43).

5

23. Device according to Claim 22, characterised in that the flap-like closure (62) is arranged at the level of the bottom slide (57) and is opened during the working stroke of the latter when the drop wire (LA) is pushed into the chamber-like passage (60).

10



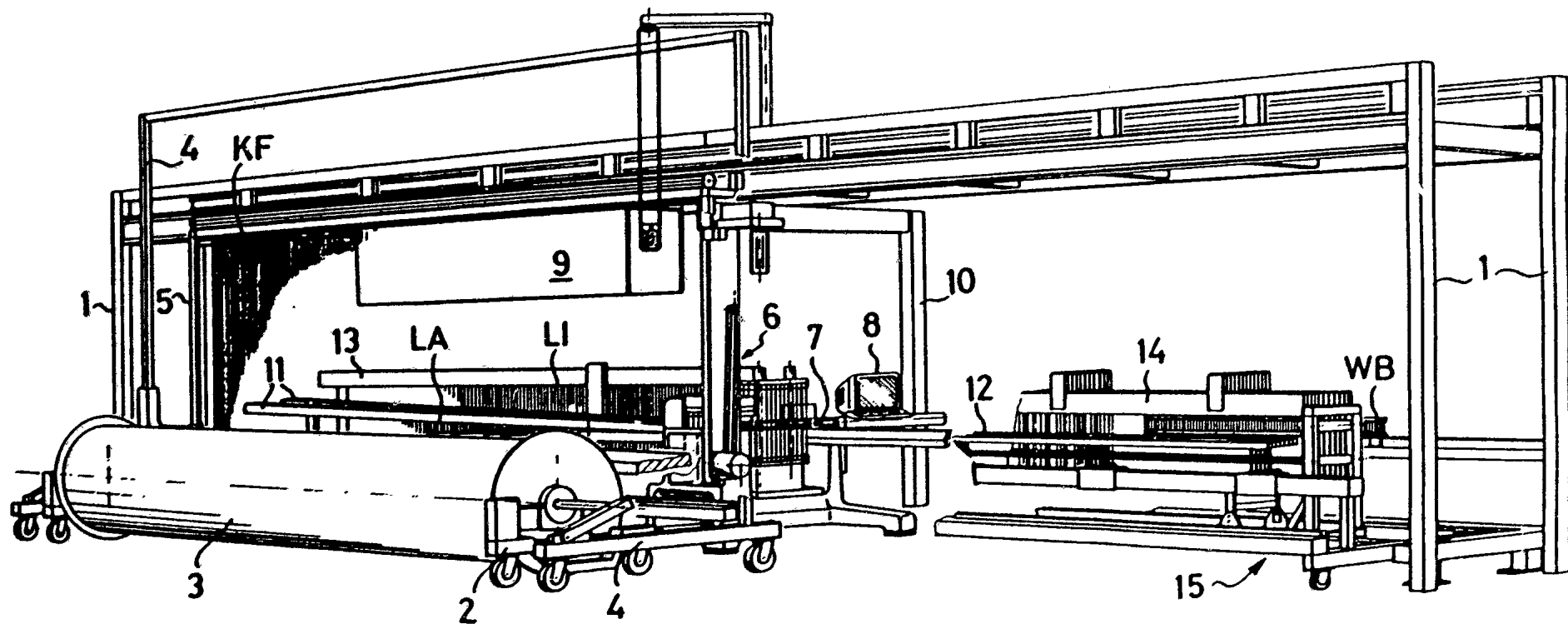


FIG. 1

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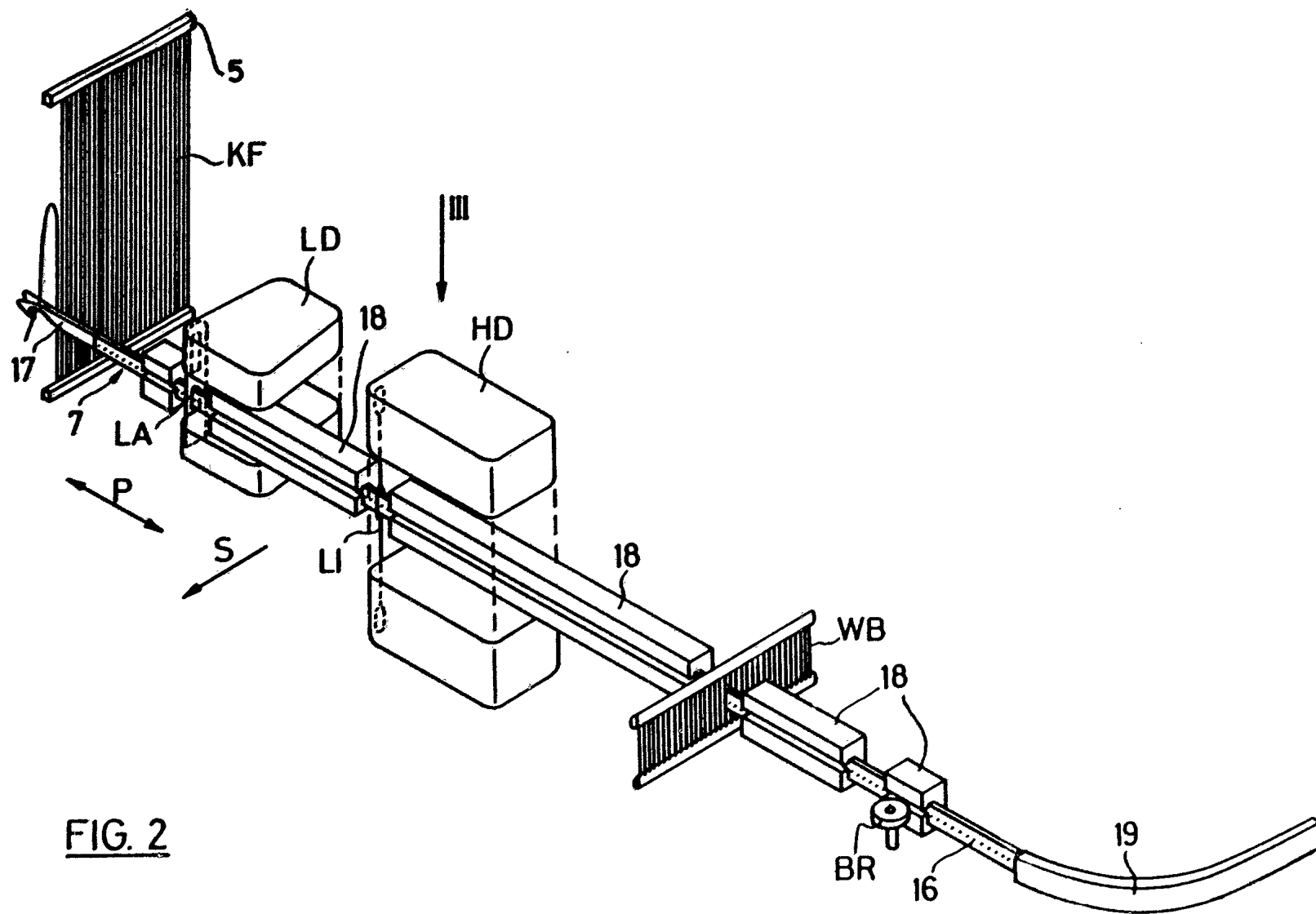


FIG. 2

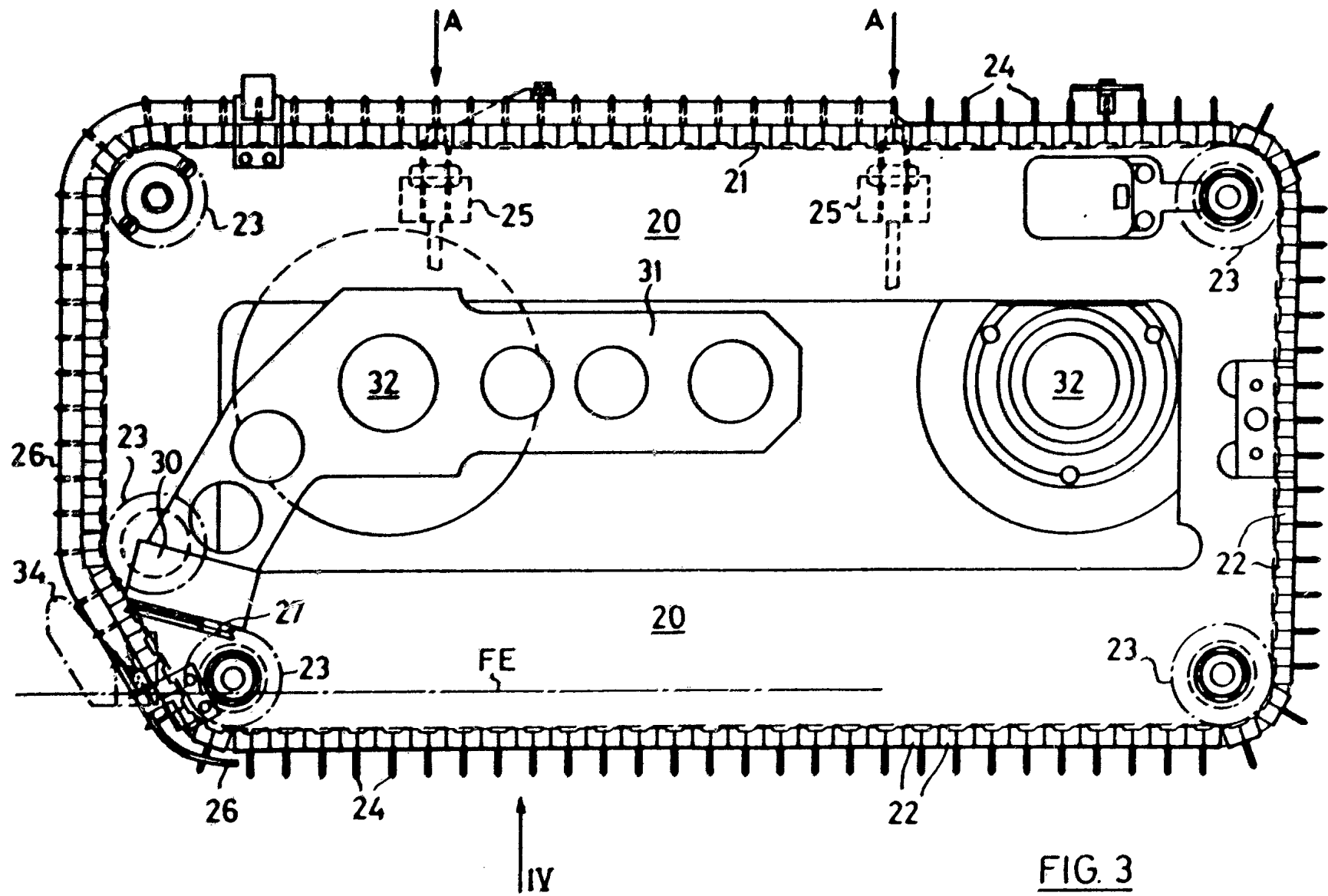
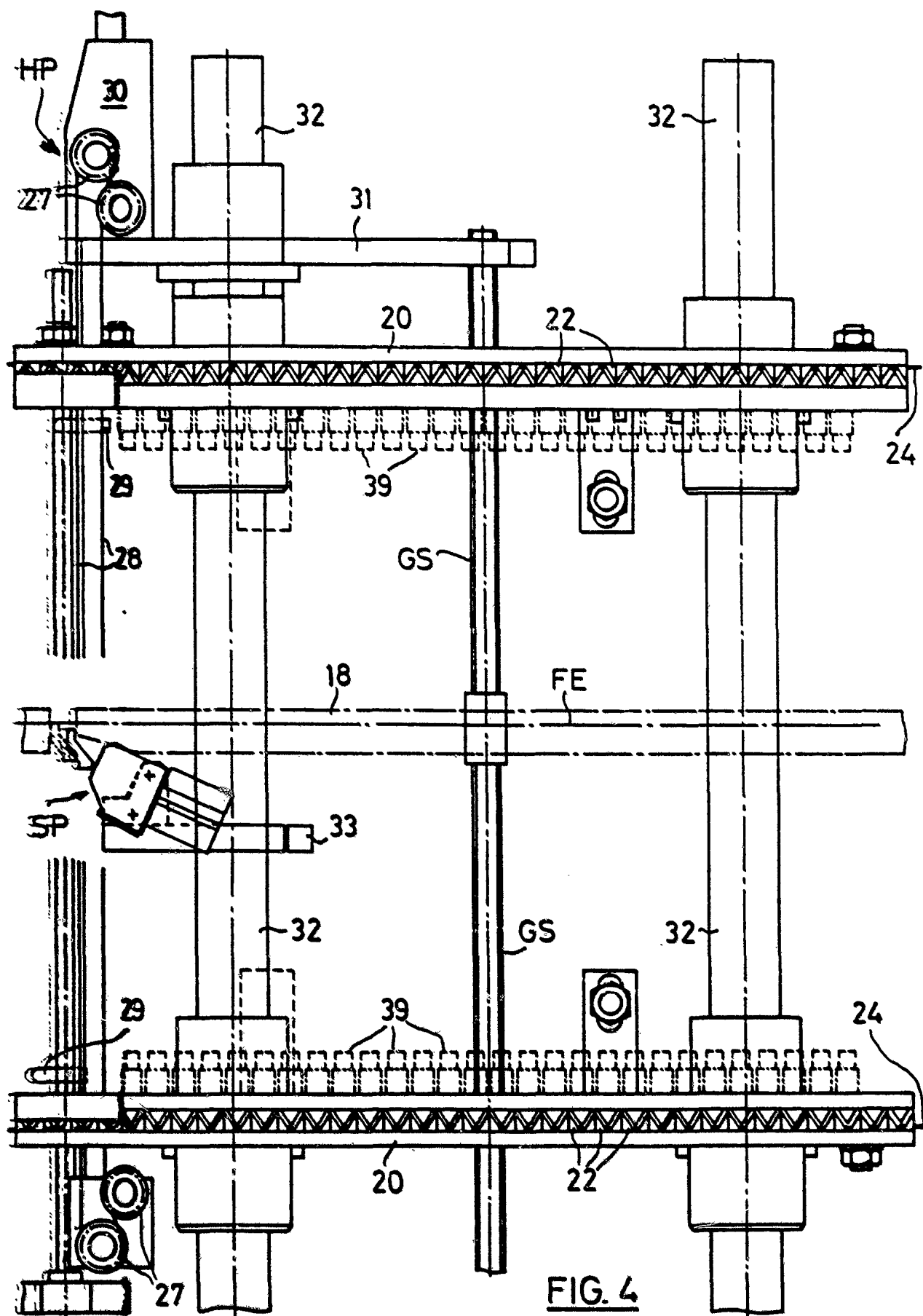


FIG. 3



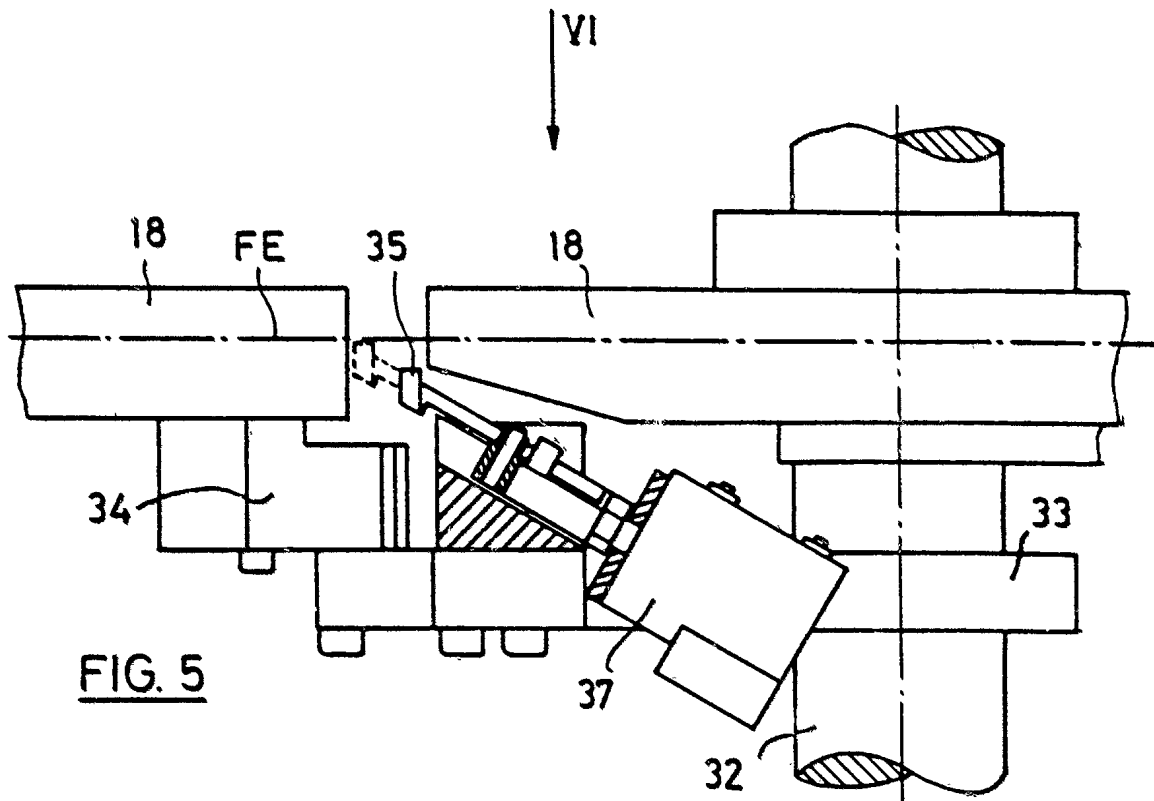


FIG. 5

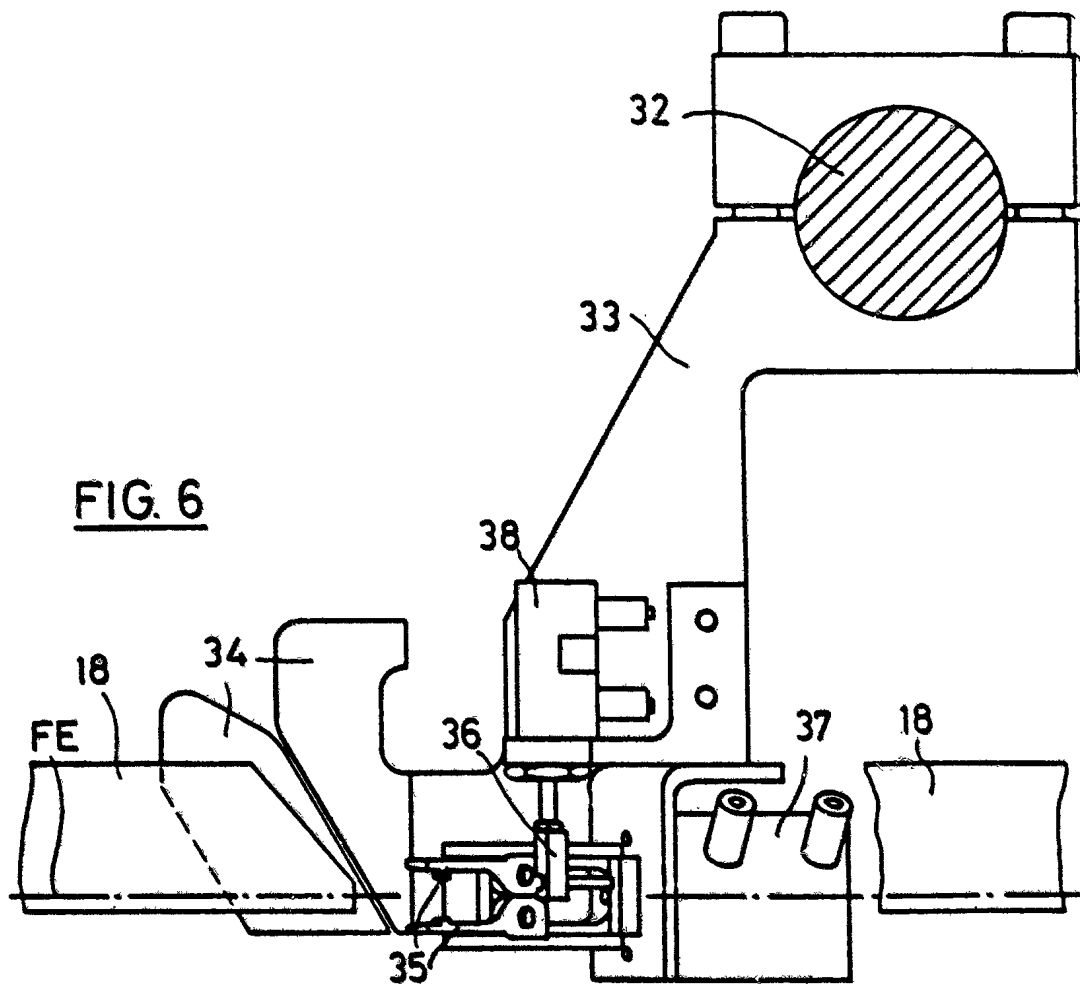
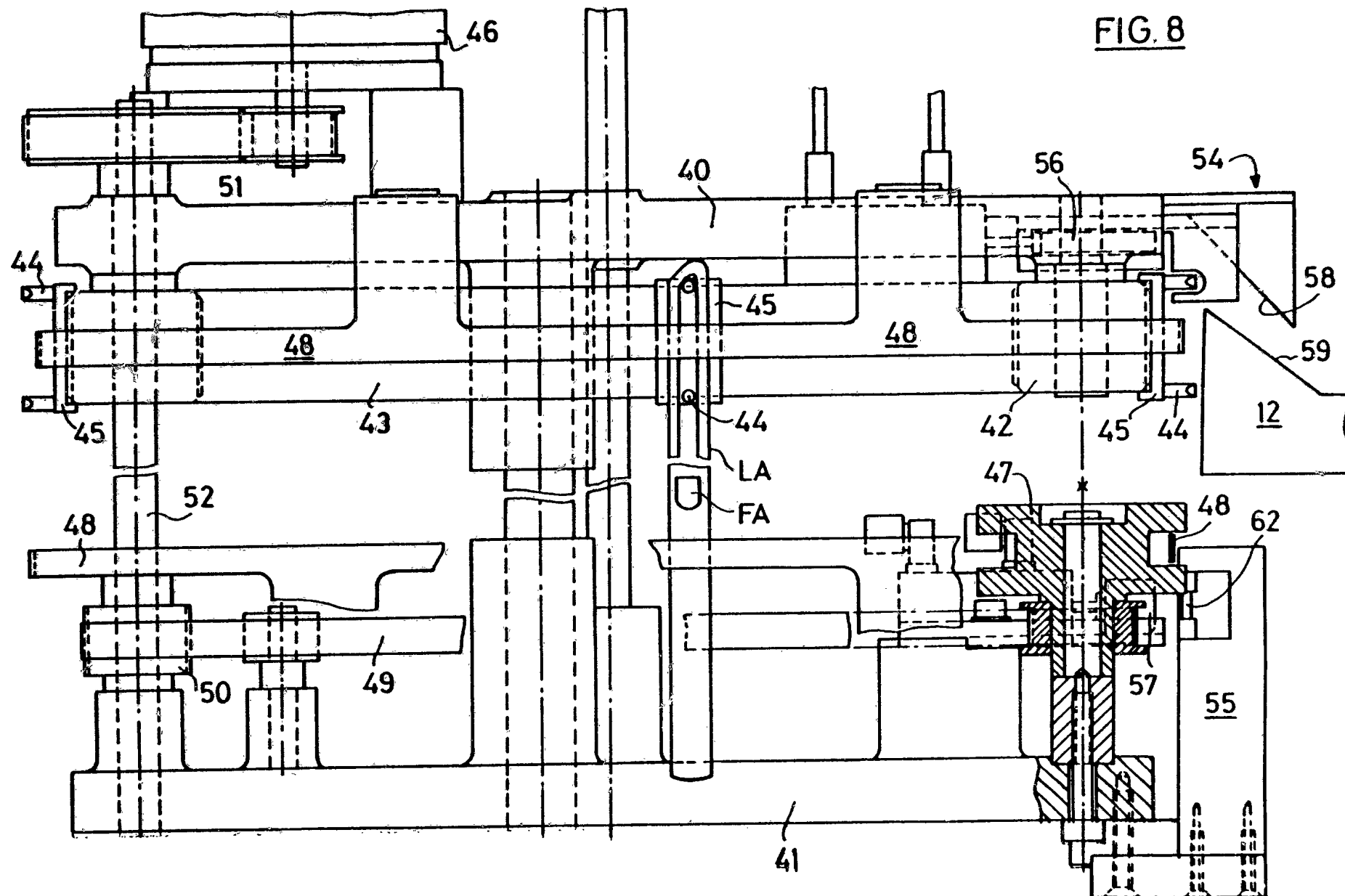


FIG. 6

FIG. 8



INTERNATIONAL SEARCH REPORT

International Application No PCT/CH 91/00190

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int.Cl. ⁵	D03J1/14	
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
Int.Cl. ⁵	D03J	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched *		
III. DOCUMENTS CONSIDERED TO BE RELEVANT *		
Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	EP,A,0 328 680 (NISHIKI) 23 August 1989 see page 2, column 1, line 5 - line 41; figure 7	1
A	EP,A,0 298 616 (TEIJIN SEIKI CO LTD.) 11 January 1989 see page 5, column 7, line 6 - line 50; figure 4	1
P,A	EP,A,0 421 943 (EL & M S. R. I.) 10 April 1991 see page 5, column 7, line 22 - column 8, line 50; figures 1-17	1
* Special categories of cited documents: ¹⁰ "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
8 November 1991 (08.11.91)	9 December 1991 (09.12.91)	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE		

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

CH 9100190
SA 50539

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0328680	23-08-89	JP-A- 1040641	10-02-89
		JP-B- 2042934	26-09-90
		WO-A- 8901066	09-02-89
EP-A-0298616	11-01-89	JP-A- 1020358	24-01-89
		US-A- 4916785	17-04-90
EP-A-0421943	10-04-91	None	

INTERNATIONALER RECHERCHENBERICHT

Internationales Aktenzeichen

PCT/CH 91/00190

I. KLASSEFIZIKATION DES ANMELDUNGS-GEGENSTANDS (bei mehreren Klassifikationssymbolen sind alle anzugeben)⁶

Nach der Internationalen Patentklassifikation (IPC) oder nach der nationalen Klassifikation und der IPC

Int.Kl. 5 D03J1/14

II. RECHERCHIERTE SACHGEBIETE

Recherchierter Mindestprüfstoff⁷

Klassifikationssystem	Klassifikationssymbole
Int.Kl. 5	D03J

Recherchierte nicht zum Mindestprüfstoff gehörende Veröffentlichungen, soweit diese unter die recherchierten Sachgebiete fallen⁸

III. EINSCHLAGIGE VERÖFFENTLICHUNGEN⁹

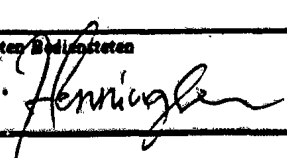
Art. ⁹	Kennzeichnung der Veröffentlichung ¹¹ , soweit erforderlich unter Angabe der maßgeblichen Teile ¹²	Betr. Anspruch Nr. ¹³
A	EP,A,0 328 680 (NISHIKI) 23. August 1989 siehe Seite 2, Spalte 1, Zeile 5 - Zeile 41; Abbildung 7	1
A	EP,A,0 298 616 (TEIJIN SEIKI CO LTD.) 11. Januar 1989 siehe Seite 5, Spalte 7, Zeile 6 - Zeile 50; Abbildung 4	1
P,A	EP,A,0 421 943 (EL & M S. R. I.) 10. April 1991 siehe Seite 5, Spalte 7, Zeile 22 - Spalte 8, Zeile 50; Abbildungen 1-17	1

* Besondere Kategorien von angegebenen Veröffentlichungen¹⁰:

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IV. BESCHEINIGUNG

Datum des Abschlusses der internationalen Recherche	Abschließdatum des internationalen Recherchenberichts
08. NOVEMBER 1991	09. 12. 91
Internationale Recherchenbehörde	Unterschrift des bevollmächtigten Bediensteten
EUROPAISCHES PATENTAMT	HENNINGSEN O. 

ANHANG ZUM INTERNATIONALEN RECHERCHENBERICHT ÜBER DIE INTERNATIONALE PATENTANMELDUNG NR.

CH 9100190
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In diesem Anhang sind die Mitglieder der Patentfamilien der im obengenannten internationalen Recherchenbericht angeführten Patentedokumente angegeben.

Die Angaben über die Familienmitglieder entsprechen dem Stand der Datei des Europäischen Patentamts am

Diese Angaben dienen nur zur Unterrichtung und erfolgen ohne Gewähr.

08/11/91

Im Recherchenbericht angeführtes Patentedokument	Datum der Veröffentlichung	Mitglied(er) der Patentfamilie	Datum der Veröffentlichung
EP-A-0328680	23-08-89	JP-A- 1040641	10-02-89
		JP-B- 2042934	26-09-90
		WO-A- 8901066	09-02-89
EP-A-0298616	11-01-89	JP-A- 1020358	24-01-89
		US-A- 4916785	17-04-90
EP-A-0421943	10-04-91	Keine	