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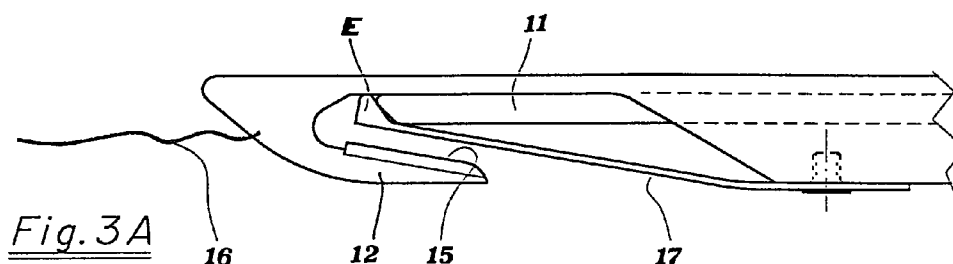
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(54) Drawing gripper for weaving looms

(57) The present invention concerns a drawing gripper for weaving looms, consisting of a gripper body (10), a hook (12) positioned at one end of said body (10), and a movable slider (11) housed into said body (10) and moving lengthwise towards the hook (12). Said drawing gripper also comprises a wedging-in bar (17) projecting from said gripper body (10) and having an end fixed

thereto, the other free end (E) of said bar (17) being positioned between the slider (11) and one side (15) of the end (12B) of said hook (12), against which it is pressed by said slider (11), the weft yarn (16) being inserted and tightened between said free end (E) of the bar (17) and said side (15) of the hook end (12B).



EP 0 822 279 A1

Description

It is common knowledge that, in gripper looms with continuous feed of the weft yarn, said yarn is drawn from the reel or from the weft feeder by a carrying gripper which conveys it to the centre of the shed. Here the exchange of the weft yarn from the carrying gripper to the drawing gripper takes place, and the drawing gripper carries the weft yarn to the outlet of the shed, lets it free or woven in the split selvedge, and then reintroduces itself in the shed in order to start a new cycle.

The present invention refers to a weft yarn drawing gripper for shuttleless looms of the above mentioned type.

In particular, the invention concerns improvements in a drawing gripper, as the one described and illustrated in the Italian patent N° 21291 A/84 in the name of the Applicant, with the object to increase weft yarn gripping efficiency and to thus reduce, on one hand, the risk that the weft yarn may slip out of the drawing gripper during transport at the high speed of modern looms, and guarantee, on the other hand, a correct and safe release of the weft yarn at the end of its path.

Normally, drawing grippers comprise elements to grip and block the weft yarn which - as can be seen from figs. 1 and 2 - consist of a wedge-shaped slider 1 movable lengthwise to the gripper inside a hook 2 lying on a horizontal plane at the starting end of the drawing gripper. The wedge-shaped slider 1 has a flat surface 1A bearing in a guiding position onto a shank 2A of the hook 2, and a blocking surface 1B inclined in respect of the previous one and designed to cooperate with a corresponding surface 2C of the end 2B of the hook. Between the wedge-shaped slider 1 and the body of the gripper, elastic means (not shown) are provided to keep said slider elastically pressed inside said hook 2, so that blocking of the weft yarn can be released by acting onto the wedge-shaped slider in opposition to the elastic means.

The hook 2 and the slider 1 are shaped so that their reciprocally facing surfaces 1B and 2C, cooperating to block the weft yarn, may substantially form a tight dihedral 3.

In this way, the weft yarn inserts itself into the dihedral 3, remaining blocked therein because of the tension to which it is subjected, and it is released upon parting of the two surfaces of said dihedral, obtained by known means as those described in the Italian patents N. 21291 A/84 and 22229 A/87 in the name of the Applicant.

The parting movement of the two opposite cooperating surfaces 1B and 2C takes place almost by sliding, that is, with a minimum component orthogonal to said two surfaces, since the slider moves away along the longitudinal axis of the gripper which, for geometry purposes that will be better explained hereinafter, extends in a direction very close to that along which is positioned the inclined surface 1B of the slider 1.

In fact, in order to increase the effect of weft yarn gripping by the drawing gripper and to thus reduce the possibility that the yarn may be released during transport, the direction in which the tension T acts on the yarn should be close to the bisectrix of the dihedral 3, so as to favour the insertion of the yarn itself. In other words, the smaller the angle α (fig. 1) between the bisectrix of the dihedral and the direction in which the tension acts on the yarn, the stronger the effect of weft yarn "clamping" into the hook 2.

Furthermore, it can be understood at once how the insertion of the weft yarn in the dihedral becomes safer and easier, the more the bisectrix is close to the direction taken up by the weft yarn along the shed.

Therefore, the wedge of the slider is very acute-angled, that is, the inclined surface 1B of the wedge shows a trend close to the moving forward direction of the slider. Favourably, with this configuration, the friction angles prevent a spontaneous opening of the hook-wedge dihedral.

The solution proposed by known technique, namely a drawing gripper equipped with a very acute-angled wedge-shaped slider, which performs in a conventional way a translation along its longitudinal axis, has been widely used but is often unable to guarantee a proper working with all the varieties and types of weft as far as count and weaving pattern.

Furthermore, with the known grippers, it is not possible to reduce, beyond a certain limit, the size of the angle α between the bisectrix of the dihedral 3 and the direction of the weft yarn in the shed, as the hook opening system would not guarantee a correct and prompt opening of the drawing gripper. In fact, as can be seen from a comparison between fig. 1A and fig. 2A, with an equal stroke C of the wedge-shaped slider 1, the wider the angle α , the wider the opening B of the hook being obtained. Consequently, from this point of view, it would be better to have a wide angle α , which would guarantee a quick and prompt opening of the hook, whereas in the end, to open the hook with an angle α tending to zero, the stroke C would tend to infinite.

The need to maintain a narrow angle α therefore represents a great limit, since a faulty opening of the hook can lead the gripper to retain the weft yarn already inserted and to reinsert it (double weft) in the neat beating up, thereby causing serious defects in the fabric.

Thus, the size of the angle α in the solutions proposed by known technique always constitutes a compromise between an efficient closing, with a proper insertion of the weft yarn in the hook, and a prompt and reliable opening in the phase of yarn release.

The object of the present invention is to overcome the problems arising between different requirements, by supplying a drawing gripper which has a very narrow angle α between the bisectrix of the dihedral - formed by the hook and the wedge-shaped slider - and the weft yarn weaving direction and, at the same time, a parting movement of the opposite cooperating surfaces 2C and

1B of hook and slider, along a direction close to normal of these surfaces.

This object is reached with a drawing gripper for weaving looms - consisting of a gripper body, a hook positioned at one end of said body and a movable slider housed into said body and moving lengthwise towards the hook - which also comprises a wedging-in bar projecting from said gripper body and having an end fixed thereto, the other free end of said bar being positioned between the slider and one side of the end of said hook, against which it is pressed by said slider, the weft yarn being inserted and tightened between said free end of the bar and said side of the hook end.

Further objects and characteristics of the present invention will anyhow result more evident from the following detailed description of some preferred embodiments thereof, illustrated on the accompanying drawings, in which:

figs. 1 and 1A are plan views of a drawing gripper according to known technique, with the hook in a closed position and, respectively, in an open position;
figs. 2 and 2A are plan views similar to those of figs. 1 and 1A, showing another drawing gripper according to known technique;
figs. 3 and 3A are plan views of a drawing gripper according to a preferred embodiment of the invention; and
figs. 4 and 4A are plan views of a drawing gripper according to another preferred embodiment of the invention.

The drawing gripper according to the present invention is completely different from the grippers of known technique, because - as well as being formed of a gripper body 10, of a wedge-shaped slider 11 sliding in the body 10, and of a hook 12 shaped at the leading end of the gripper body - it also comprises a flexible wedging-in bar or metal strap 17 (fig. 3). The wedging-in strap 17 is fixed with one end to the gripper body 10, through a screw 14 close to the base of the hook 12, while its other leading end E is free and is placed between the wedge-shaped slider 11 and the end 12B of the hook 12. In this way, the outer surface of the strap 17 engages with the side 15 of the end part 12B of the hook 12, while the inner surface of the strap 17, in proximity to its free leading end E, shows a swelling of suitable shape for cooperating with the wedge-shaped slider 11.

According to the invention, one takes advantage of the flexibility of the wedging-in strap 17, in order to cause it to bend towards the hook shank 12A and thereby impart an elastic action on the wedge-shaped slider 11. Preferably, this is obtained by using a suitably profiled strap made of flexible material, for instance harmonic steel.

This guarantees that the coupling between said strap 17 and the surface of the side 15 of the hook 12

takes place with a very tight dihedral 13, the bisectrix of which forms, with the weaving direction of the weft yarn 16, an angle α being also narrow.

The weft yarn 16 is thus clamped - rather than between the wedge-shaped slider 11 and the surface of the side 15 of the hook 12, as in known technique - between the surface of the side 15 and the strap 17.

According to a first embodiment, the leading end E is wedge-shaped and is apt to cooperate with the wedge-shaped slider 11 in the manner of two conjugate surfaces which form, with the moving forward direction of the wedge-shaped slider 11, a wide angle β .

Thus, in the drawing gripper according to the invention one is able to obtain, as wished, a wide angle β which ensures a broad movement of the leading end E, also for a limited stroke of the wedge-shaped slider 11, which movement turns into a wide and prompt opening of the hook 12. In fact, the strap 17 moves away from the end 12B of the hook 12 along a direction which, in view of the movement of said strap due to its flexibility, is substantially perpendicular to the surface of the side 15.

Now, the working of the gripper according to the invention will be explained, so as to make its description even clearer.

The drawing gripper inserts itself into the shed in a closed condition, with the wedge-shaped slider 11 pressed against the leading end E of the strap 17 by elastic check means (not shown). During weft yarn exchange from the carrying gripper to the drawing gripper, the starting end of the yarn 16 inserts itself into the V-shaped dihedral 13, fitting between the outer surface of the strap 17 and the side 15 of the end 12B of the hook 12. The insertion and blocking of the weft yarn into the dihedral 13 are facilitated and favoured by the low width of the angle α and by the fact that the yarn tension T, being the angle α narrow, is almost totally discharged onto the direct component as the bisectrix F.

The drawing gripper then continues its stroke, drawing the weft yarn 16 therewith up to when, moving out of the shed, a known-type opening mechanism acts on the wedge-shaped slider 11 withdrawing it in the direction of the gripper body 10, which gripper is thus opened. The strap 17, due to its flexibility and released from the wedge-shaped slider 11, bends in fact towards the shank 12A of the hook 12, promptly releasing the weft yarn 16 (fig. 3A). Soon after, the gripper can close again and move back into the shed for a new cycle.

Favourably, the reciprocally coupled surfaces of the hook end 12B, of the wedge-shaped slider 11 and of the strap 17, can be differently shaped so as to obtain the most appropriate motion laws.

Furthermore, the inclined surfaces may be positioned according to different solutions, as for instance:

- a) inclined surfaces between wedge-shaped slider and strap leading end, as described above;
- b) inclined surfaces between wedge-shaped slider

and hook shank, as illustrated in figs. 4 and 4A;
c) combinations between the solutions a) and b).

Thus, the drawing gripper shown in fig. 4A in an open position and in fig. 4B in a closed position, represents another embodiment of the invention, corresponding to the solution of point b) hereabove. In this case, the wedge-shaped slider 11 cooperates with an inclined surface 18 of the hook shank 12A, while the free end of the strap 17 is simply thicker in respect of the remaining flexible portion thereof.

The working of the drawing gripper according to this embodiment is fully similar to that of the gripper described further above. The wedge-shaped slider, having to act against the inclined surface 18 which is fixed, must have two degrees of freedom allowing it to perform a movement which consists of a translation X, along the longitudinal axis of the gripper, and of a displacement in the orthogonal direction Y, determined by the inclination of the inclined surface 18.

Also in this case, the angle α may be chosen as narrow as required, while the angle β of the inclined surface 18 will be sufficiently wide to ensure a prompt and efficient opening.

The different embodiments specified heretofore are apt to satisfy the two opposite requirements mentioned above, thus entirely reaching the objects of the invention.

This is perfectly evident from figs. 3A and 4A, in which a short stroke C of the slider leads to a wide parting B between the side 15 and the opposite surface of the strap 17, thereby promptly and efficiently releasing the weft yarn 16.

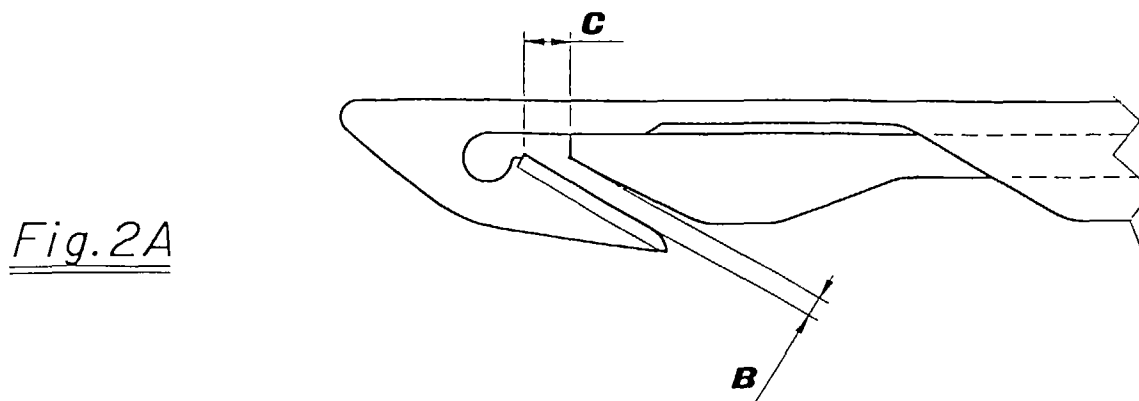
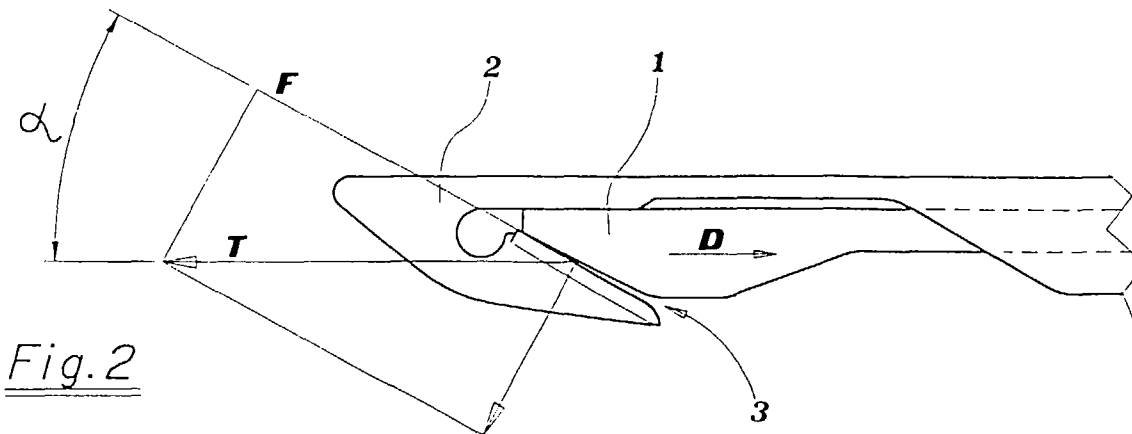
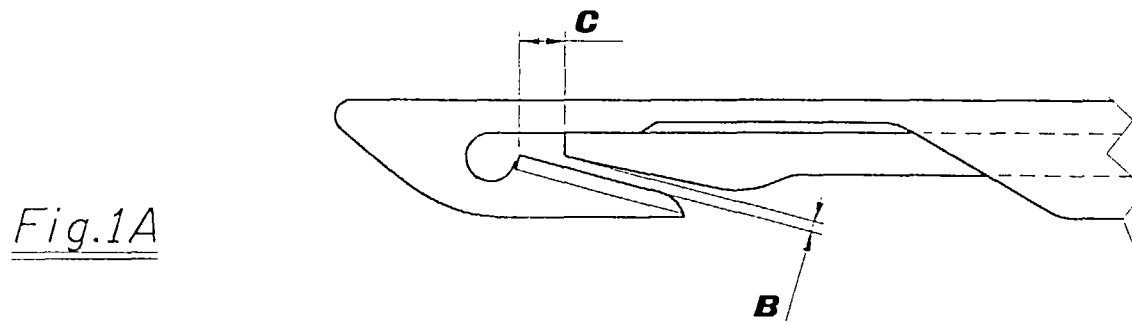
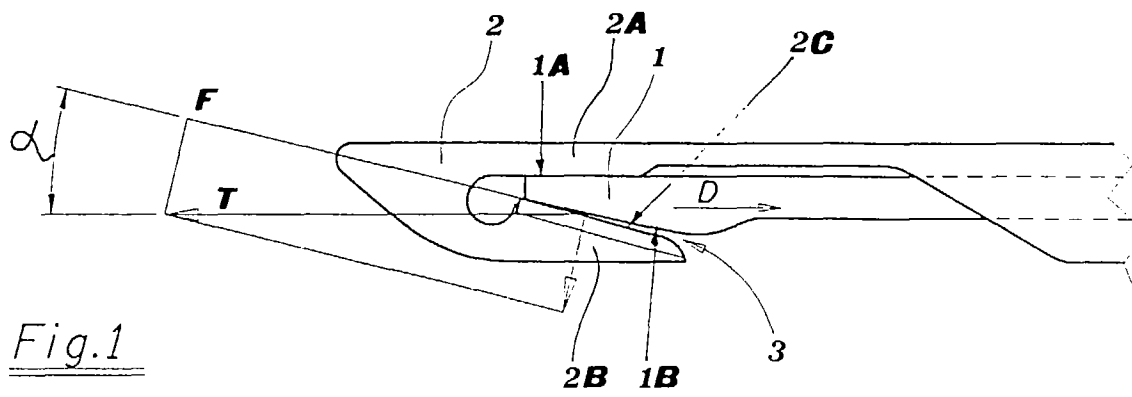
A further advantage deriving from the use of a gripper as described above, is that the surface of the side 15 of the hook end 12B and the outer surface of the strap 17 can be saw-toothed, since the reciprocal parting substantially takes place orthogonally to said surfaces, whereby there is no risk of the weft yarn getting caught between the opposite teeth of the saw-toothed surfaces.

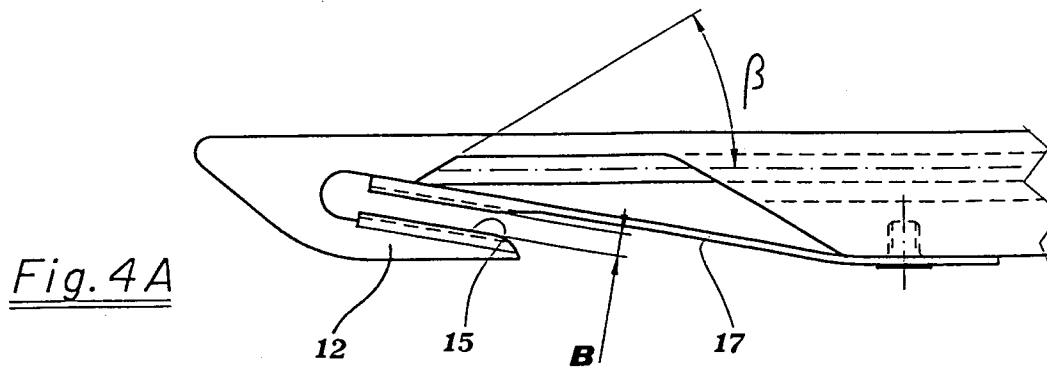
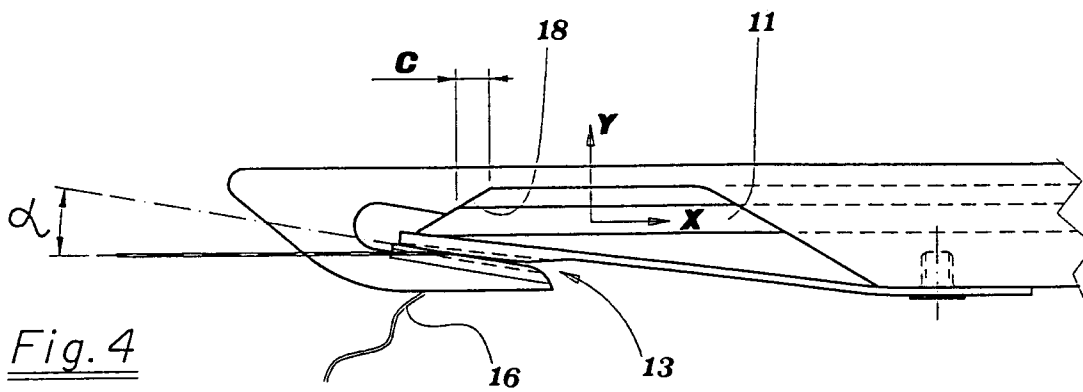
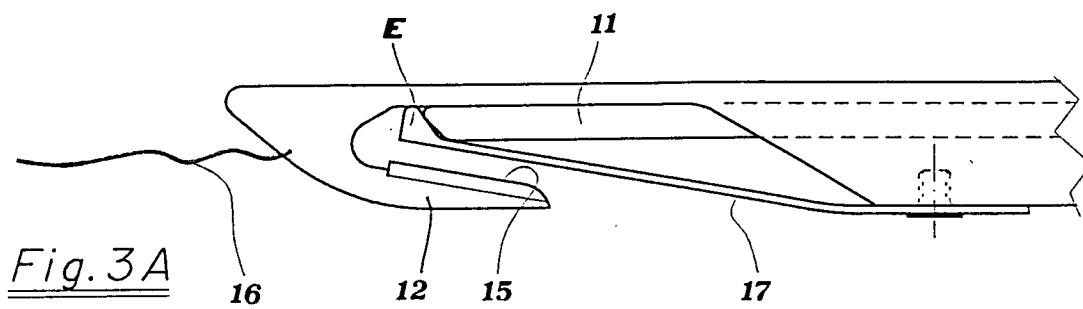
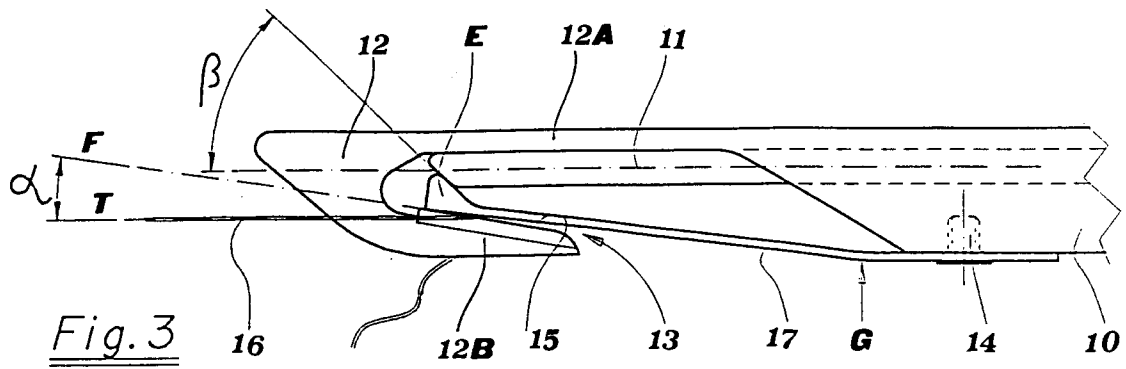
It is anyhow understood that the invention is not limited to the particular embodiments illustrated heretofore, which merely form some non-limiting examples of its scope, but that several variants can be introduced, all within reach of a person skilled in the art, without thereby departing from the scope of the present invention.

For example, although in the description reference is always made to a strap 17, the concept of the invention remains that of adopting a flexible bar interposed between the open side of the hook and the wedge-shaped slider. Therefore, it could be equally efficient to use a rod or bar having a circular or polygonal section with its free leading end having a suitably shaped profile.

Claims

1. Drawing gripper for weaving looms - consisting of a gripper body (10), a hook (12) positioned at one end of said body (10), and a movable slider (11) housed into said body (10) and moving lengthwise towards the hook (12) - characterized in that it also comprises a wedging-in bar (17) projecting from said gripper body (10) and having an end fixed thereto, the other free end (E) of said bar (17) being positioned between the slider (11) and one side (15) of the end (12B) of said hook (12), against which it is pressed by said slider (11), the weft yarn (16) being inserted and tightened between said free end (E) of the bar (17) and said side (15) of the hook end (12B).
2. Drawing gripper as in claim 1), wherein said bar (17) is a flexible metal strap.
3. Drawing gripper as in any one of the previous claims, wherein the free end (E) of said bar (17) has a shaped profile, and said slider (11) has a wedge-shaped end conjugate and cooperating, on one side, with the shank (12A) of said hook (12) and, on the other side, with the shaped free end (E) of said bar (17).
4. Drawing gripper as in claim 3), wherein said free end (E) of the bar (17) is wedge-shaped.
5. Drawing gripper as in any one of claims 1) to 3), wherein the shank (12A) of said hook (12) has an inclined surface, and said slider (11) has a wedge-shaped end conjugate and cooperating with said inclined surface of the hook shank (12A).







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EUROPEAN SEARCH REPORT

Application Number
EP 97 11 1753

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	GB 2 106 550 A (NUOVO PIGNONE) ---		D03D47/23
A	EP 0 504 899 A (SOMET) ---		
A	EP 0 651 082 A (INTERPATENT) ---		
A	EP 0 233 142 A (SULZER) ---		
A	EP 0 207 533 A (PICANOL) -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			D03D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 14 October 1997	Examiner Boutelegier, C
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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