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54 **Weft carrying gripper with axially movable slider, for shuttleless weaving looms.**

57 The present invention concerns a weft carrying gripper for shuttleless looms, of the type comprising clamping means in the form of a pair of longitudinally extending elements in reciprocal contact, a first clamping element consisting of a stiff bar (4) and a second clamping element being in the form of a leaf spring (8) apt to impart a contact pressure on said first element along a plane substantially parallel to the gripper axis. According to the invention, one of said clamping elements is connected to a slider (2)

movable longitudinally in respect of the gripper body, and the other clamping element is fixedly mounted on the gripper body; cam means are moreover interposed between said slider and the gripper body in order to produce a movement apt to draw said clamping element associated to the slider and said fixed clamping element close and apart, in response to the forward and backward movement of the slider.

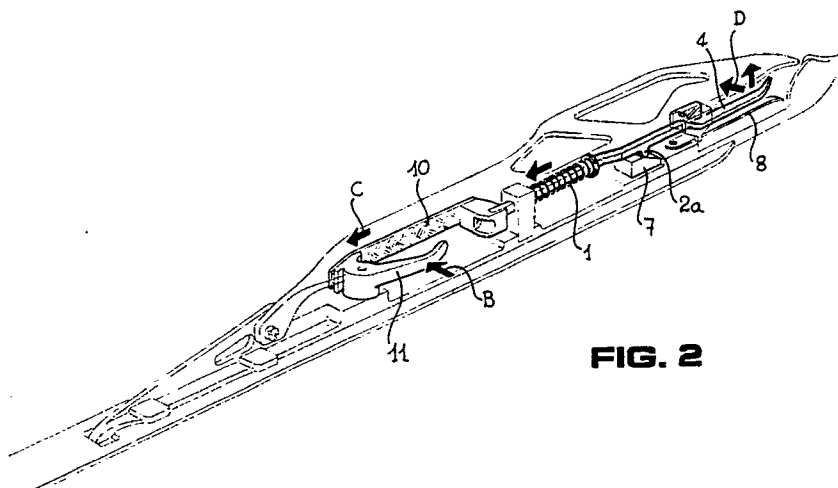


FIG. 2

The present invention concerns a weft yarn carrying gripper for shuttleless looms. As known, grippers are those members in shuttleless looms by means of which the weft yarns are seized at one end of the loom and carried to the opposite end thereof through the warp shed. The carrying gripper seizes the weft yarn from a weft feeding device and carries it to the centre of the shed, while the drawing gripper receives the weft yarn from the carrying gripper, at the centre of the shed, and draws it to the opposite end of the loom.

There are known to be many types of grippers performing this function, all of which have undergone successive improvements differing one from the other as far as even slight constructive details and yet all tending to improve, on one hand, yarn gripping and releasing, and on the other hand, the working life of the gripper. An improved carrying gripper is that described for example in the IT-B-1.095.254 filed by the same Applicant, wherein the weft yarn is clamped between a pair of elements extending in the longitudinal sense of the gripper, one being stiff and the other in the form of a leaf spring. The main advantage of this gripper structure is provided:

- on one hand, by the simplicity of the yarn clamping system which allows to seize the yarn fed from the weft feeder, without having to positively operate any member, but simply thanks to insertion of the weft yarn between said two extending elements, at least one of which is springing; and
- on the other hand, by the fact that the yarn clamping force, determined by the pressure of the leaf spring element, keeps unaltered in time for a long period of use.

This carrying gripper structure, in spite of its excellent working characteristics, suffers nevertheless from the drawback of a difficult cleaning, that is, removing from the gripper any fibres falling apart from the yarn - to a more or less great extent - due to friction.

The problem of cleaning the carrying gripper has actually already been faced and solved, for example by FR-A-2.113.237, which provides a suction device acting in correspondence of the only point where it is possible to clean the gripper when at rest, namely next to the weft feeder where the yarn starts its path along the loom shed. As described in FR-A-2.113.237, in this position the carrying gripper is temporarily kept open and said device acts by sucking and thus removing any dirt and fibres collected on the gripper.

Nevertheless, to answer the requirements of the device according to FR-A-2.113.237, the gripper used herein is of the type essentially differing from that described in IT-B-1.095.254: it is in fact formed of a first fixed and essentially stiff jaw and of a second jaw, equally stiff and hinged on the

first. A spring, acting onto an extension arm of the second jaw, keeps this latter normally rotated in a closed position. When the gripper moves to the starting position, an opening device acts on said extension arm, in opposition to said spring, in order to rotate the second jaw in the open position. A gripper of this type is however not equally efficient as that described in IT-B-1.095.254, for what concerns the main function which it is required to perform, namely the reliable seizing and carrying of the weft yarn.

On the other hand, it is widely known to provide - and precisely in drawing grippers, for their specific working purposes - for one of the two jaws to be opened under control. In said grippers, weft yarn clamping is obtained by contact pressure between the head of a slider, moving longitudinally along the gripper, and a cooperating counteracting surface of the gripper head. The slider head is kept in contact with said counteracting surface by spring means and is moved away therefrom by positively controlled pulling means. Normally, the contact between the slider head and the counteracting surface takes place according to a plane substantially perpendicular to the longitudinal axis of the gripper. In other cases, as for instance in EP-A1-123.005, said contact plane forms instead a very narrow angle in respect of said longitudinal axis, so that - in order to anyhow obtain a fast removal of the slider head from the counteracting surface - the slider is provided to simultaneously perform a longitudinal and a transversal movement, this latter being produced by a suitable wedge surface.

The object of the present invention is hence to realize a carrying gripper of the type described in IT-B-1.095.254, that is, of the type wherein the two jaws consist of two parallel, adjacent, longitudinally extending elements - one of them being in the form of a leaf spring - apt to be opened under control and thus suited for a cleaning operation, for instance of the type described in FR-A-2.113.237. This result is obtained essentially in a carrying gripper for shuttleless looms - of the type comprising clamping means in the form of a pair of longitudinally extending elements in reciprocal contact, a first clamping element consisting of a stiff bar and a second clamping element being in the form of a leaf spring apt to impart a contact pressure on said first element along a plane substantially parallel to the gripper axis - characterized in that, said first clamping element consisting of a stiff bar is mounted on a slider and movable therewith longitudinally in respect of the gripper body, and said second clamping element in the form of a leaf spring is fixedly mounted on the gripper body, and in that, cam means are interposed between said slider and said gripper body in order to produce a movement apt to draw the first stiff bar clamping element

close to the second leaf spring clamping element - in response to the forward motion of the slider - up to imparting said contact pressure, and to draw said clamping elements apart - in response to the backward motion of the slider - to an extent sufficient to allow their cleaning; the movements drawing said clamping elements close and apart being performed when the gripper is free from weft yarn.

In actual fact, the EP-A1-123.005 already discloses - as said - a drawing gripper combined with a slider performing a longitudinal and a transversal movement; nevertheless, this teaching cannot be directly applied to the invention, mainly for the following reasons:

- to start with, the fact that the object of EP-A1-123.005 is a drawing gripper, wherein it is widely known from previous technique to make use of an axially movable control slider, while the invention concerns a carrying gripper, wherein this type of slider has never been adopted;
- furthermore, the fact that in EP-A1-123.005 the contact plane between the two gripper jaws is inclined, so that the opening of the jaws is fundamentally determined by the longitudinal movement of the slider, while the transversal movement is used to speed up an already existing opening movement. It is thus unthinkable that such an arrangement might have solved the problem of opening the jaws in a gripper as that of the present invention, wherein the jaws are parallel to the longitudinal axis of the gripper;
- but above all, the fact that the wedge surface of EP-A1-123.005 acts only during opening of the jaws, and by no means acts during closing thereof (compare the opening position of figure 5 of EP-A1-123.005, to the closing position shown in figure 4), while according to the present invention, the cam controlling the transversal movement of the slider performs a fundamental function just during closing, keeping the longitudinally extending element of the gripper in perfect contact with the opposed leaf spring, which is essential for the correct working of said gripper, as provided for by IT-B-1.095.254;
- and finally the fact that, in the drawing gripper described in EP-A1-123.005, the opening of the jaws is provided in order to (and should hence be of a width such as to) allow releasing the weft yarn, while in the carrying gripper of the present invention the opening takes place when the yarn has already been transferred to the drawing gripper, whereby the opening of the jaws is merely provided to allow cleaning thereof and can thus be of more limited width.

Further characteristics and advantages of the gripper according to the present invention will anyhow be more evident from the following detailed description of a preferred embodiment thereof, il-

lustrated by way of example on the accompanying drawings, in which:

Fig. 1 is a diagrammatic perspective view of the carrying gripper according to the invention, in a weft yarn clamping position; and

Fig. 2 is a view similar to that of fig. 1, showing the carrying gripper in an open position.

As shown, the gripper according to the invention comprises a gripper body P, onto which is mounted a needle or slider 2, sliding longitudinally in respect of the gripper body and constantly pushed in the direction A by a spring 1. At its end positioned on the side of the tip P' of the gripper P, the slider 2 carries a first longitudinally extending clamping element 4, essentially consisting of a stiff bar having the configuration of a ski. The stiff element 4 is connected to the slider 2 through an inclined tooth 3.

The slider 2 is guided through passages formed in two support blocks 5 and 6, fixedly connected to the gripper body P. The passage inside the block 5 is straight and guides the slider 2 with precision; whereas the passage inside the block 6 extends also vertically and has an upper surface in the form of an inclined plane 6', with which is meant to cooperate the inclined tooth 3, as better described hereinafter.

In an intermediate position between the tooth 3 and the spring 1, the slider 2 is moreover provided with a pawl 2a extending downward against a second inclined plane 7, also fixedly connected to the gripper body P and specularly opposed to the inclined plane 6', the function of which is also better described hereinafter.

In opposition to and in contact with the stiff bar clamping element 4 there is positioned a similar clamping element 8, consisting of a leaf spring of shape specularly symmetrical to the element 4. The clamping element 8 is fitted with its inner end 8a into a fixed part of the gripper body P.

At the end opposite to that carrying the clamping element 4, the slider 2 is connected by way of a clamp 9 to an end of a flexible pulling strap 10, the other end of which is fixed onto an operating lever 11.

The working of the aforescribed gripper is as follows: in weft yarn gripping and carrying conditions, the gripper is in the position shown in figure 1, wherein the spring 1 pushes the slider 2 in the direction A. Thanks to the cooperation between the inclined tooth 3 and the fixed inclined plane 6', the pressure of the spring 1 turns into a downward pressure of the free end of the slider 2 and thus determines the contact pressure of the clamping element 4 onto the clamping element 8.

When the gripper moves next to the weft feeder in order to seize therefrom the weft yarn T, this latter inserts itself between the two ski-shaped tips

of the clamping elements 4 and 8. Thanks to the fact that the element 4 is essentially stiff, while the element 8 is in the form of a leaf spring, when said insertion takes place the weft yarn meets with a gradually increasing pressure - from a minimum to a maximum value, going from the ski tip towards the base of the clamping elements - as it occurs at present in the known type carrying grippers equipped with a leaf spring clamping element.

To clean the area between the two elements 4, 8, when the gripper has moved out of the shed - in the slow motion step previous to gripping - the lever 11 is rotated in the direction B (figure 2) thanks to the action of a cam profile (not shown) fixedly connected to the loom, which presses on said lever 11. This rotation causes the strap 10 to move in the direction C, that is, against the action of the spring 1. The slider 2 thus moves backward.

In this backward movement of the slider 2, its pawl 2a slides along the inclined plane 7 and is then pushed with an upwardly directed motion component. The slider 2, and with it the element 4, therefore moves according to the arrows D, shifting backward and upward and thus moving away from the leaf spring 8.

When the element 4 is spaced from the leaf spring 8, cleaning means (not shown, but consisting for example of an air suction device) act by creating an air stream through said two elements, apt to suck and remove the dust and/or any fibre residues found therein.

The main advantages provided by the device according to the invention are:

- on one hand, the fact that the two clamping elements 4 and 8 are always kept perfectly clean, so that weft yarn gripping is always correct and reliable;
- on the other hand, the fact that the pressure of one clamping element onto the other is determined by the action of the spring 1 in cooperation with the tooth 3 and the inclined plane 6': this produces a wedging-in effect which allows an automatic recovery of the slacks determined by wear during the life of the gripper.

It is anyhow understood that the invention should not be considered as limited to the particular embodiment described and illustrated, but that many other embodiments can be provided, differing from the same - particularly for what concerns the longitudinal motion of the slider being turned into a transversal or vertical motion of the clamping element - all within reach of a technician skilled in the art and all thus falling within the protection scope of the invention itself.

Claims

1) Weft carrying gripper for shuttleless looms, of the type comprising clamping means in the form of a pair of longitudinally extending elements in reciprocal contact, a first clamping element consisting of a stiff bar and a second clamping element being in the form of a leaf spring apt to impart a contact pressure on said first element along a plane substantially parallel to the gripper axis, characterized in that,

said first clamping element consisting of a stiff bar is mounted on a slider and movable therewith longitudinally in respect of the gripper body, and said second clamping element in the form of a leaf spring is fixedly mounted on the gripper body, and in that,

cam means are interposed between said slider and said gripper body in order to produce a movement apt to draw the first stiff bar clamping element close to the second leaf spring clamping element - in response to the forward motion of the slider - up to imparting said contact pressure, and to draw said clamping elements apart - in response to the backward motion of the slider - to an extent sufficient to allow their cleaning; the movements drawing said clamping elements close and apart being performed when the gripper is free from weft yarn.

2) Weft carrying gripper as in claim 1), wherein said cam means comprise at least a fixed inclined plane, with which said slider cooperates in its forward movement.

3) Weft carrying gripper as in claim 2), wherein the slider has an inclined tooth connecting the slider body and the clamping element fixed thereto and being apt to cooperate with said fixed inclined plane.

4) Weft carrying gripper as in claim 2), wherein said cam means comprise a second fixed inclined plane, with which a pawl projecting from said slider cooperates in its backward movement.

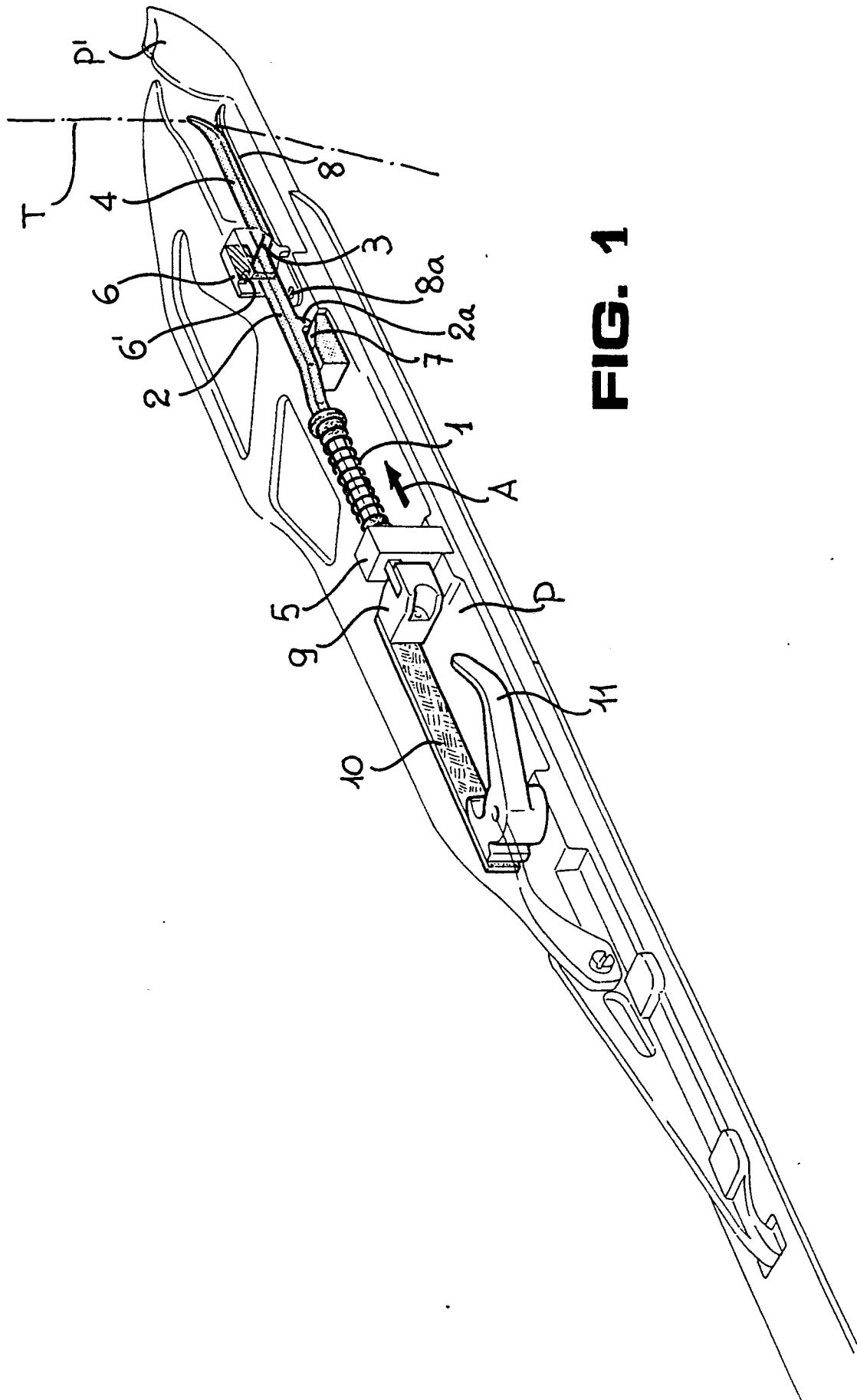
5) Weft carrying gripper as in claim 1), wherein said second clamping element in the form of a leaf spring is fitted with an end into a fixed part of the gripper body.

6) Weft carrying gripper as in claim 1), wherein the back and forth motion of the slider is controlled by an operating rocking lever, through a flexible pulling strap, in opposition to return spring means.

7) Weft carrying gripper as in claim 6), wherein said return spring means push the slider in its forward position and determine the contact pressure between said clamping elements.

8) Shuttleless loom, characterized in that it comprises a weft carrying gripper as in any one of the previous claims.

9) Shuttleless loom as in claim 8), comprising air suction cleaning means, cooperating with the carrying gripper in a position in which the clamping elements of said gripper are mutually spaced apart.

**Fig. 1**

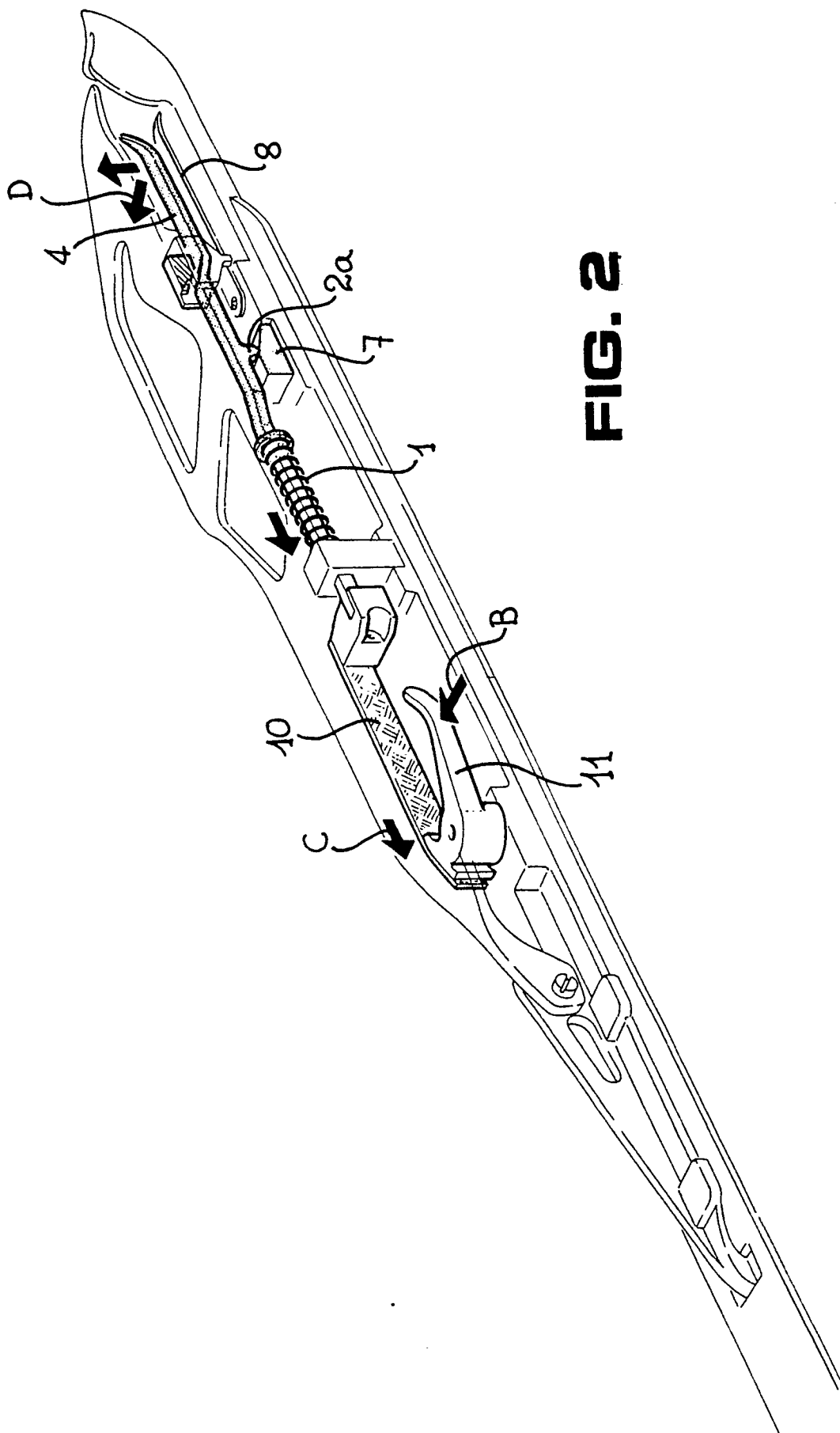


FIG. 2



EP 90 10 6873

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.5)
D,A	EP-A-0123005 (MASCHINENFABRIK SULZER-RUTI AG) * page 3, line 20 - page 5, line 15; figures 3-5 * ---	1-3, 6-8	D03D47/23
A	FR-A-2224569 (FONTANALS S.A.) * page 4, lines 15 - 28; figure 4 * ---	1, 9	
D,A	FR-A-2113237 (GEORG. FISCHER AG) * the whole document * ---	9	
A	EP-A-0266286 (SAMT) ---		
A	EP-A-0233142 (GEBRÜDER SULZER AG) ---		
A	GB-A-2083844 (NUOVO PIGNONE) -----		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			D03D D03J
Place of search THE HAGUE		Date of completion of the search 02 AUGUST 1990	Examiner REBIERE J. L.
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