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(54) **Electrically-controlled device for programmable weft cutting in weaving looms**

(57) In an electrically-controlled device for programmable weft cutting in gripper weaving looms, of the type comprising two blades (1, 2) to be operated at the time of insertion of the weft (T) into the carrying gripper (P), said blades (1, 2) are controlled by cam means (5 to 8) driven by an electric motor (9) programmable according both to the main motion of the loom and to the textile features of the weft yarn. Said blades (1, 2) are carried

by two oscillating arms (3, 4) and said cam means comprise two cams (7, 8) arranged side by side and mounted coaxially on the shaft (9A) of the programmable motor (9), and the relative cam followers (5, 6) carried by said blade-mounting arms (3, 4). These arms (3, 4) are preferably mounted parallel to each other and side by side, oscillating about the same axis (O), the shaft (9A) of the motor (9) and of the cams (7, 8) being parallel to the oscillation axis (O) of the blade-mounting arms (3, 4).

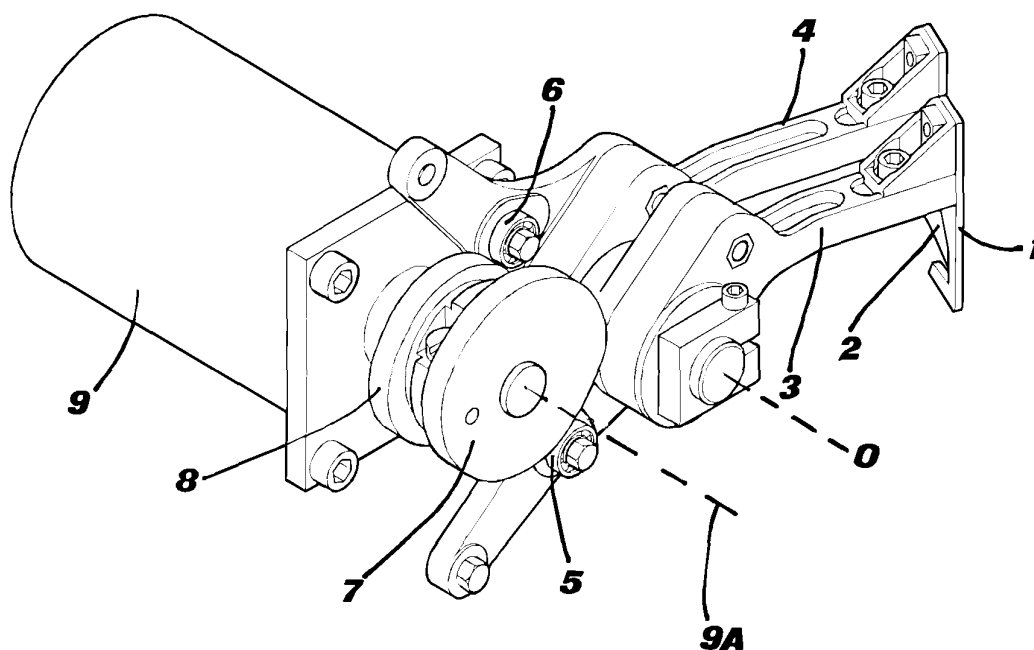


FIG.2

EP 1 498 524 A2

Description

[0001] The present invention relates to an electrically-controlled device for programmable weft cutting in weaving looms.

[0002] It is a fact known to experts that - with improving weaving loom performances both in terms of speed and in terms of the capability to widen the range of weavable yarns - the importance of the manner and of the time in which cutting of the wefts inserted into the loom shed is performed has steadily increased.

[0003] This is particularly true for gripper looms, which are the ones where the range of woven yarns has widened the most, thanks to the introduction of electronic actuators capable of controlling the operation of the main members of the weaving machine according to the weaving parameters.

[0004] Manners and means to increase the versatility of gripper looms acting on the phase displacement have already been suggested: they act either on a programmed or on a real-time phase displacement, between main loom motion and weft cutting, after the weft has been gripped by the carrying gripper.

[0005] As is known, the weft selected by the presenting device is inserted into said looms, between the holding members of the carrying gripper, until it is locked. Depending on the features of the weft yarn, the locking may occur also in a position which is more or less advanced in respect of the holding area of the gripper.

[0006] It is equally known that the cutting device operates in a point of the weft portion which is tensioned between the line of the false selvedge and the weft-holding member of the carrying gripper, while said gripper moves towards the inside of the shed. Now, depending on the weft cutting instant, the weft portion gripped by the holding member of the carrying gripper slides more or less markedly along the side of the holding member according to the size (count) and to the nature of the weft yarn. In other words, the geometric layout taken on by the weft yarn in respect of the gripper is a function of the size features and of the textile nature of the weft yarn.

[0007] In essence, so far, in each individual case, the instant has been established in which the weft must be cut, in particular acting on the weft cutting assembly, to anticipate or delay weft cutting in respect of a nominal reference value, which is linked to the steady speed of the loom and to the type of weft.

[0008] The choice of said positive or negative phase displacement has hence been linked (see for example EP 839,938) to the type of weft selected by the colour selector or by the weft selector, as well as to the position of the carrying gripper in the weaving cycle and to the rotation angle of the main shaft of the loom. The result should be particularly effective wherever the weft gripping system mounted on the carrying gripper consists of a pressure-operated elastic system, such as the one providing a weft holding lever pushing on the body of

the gripper itself. In said system, as a matter of fact, it is advantageous to insert the weft for a portion varying according to the weft count and weft type, in order to avoid both the danger of mistransfers to the drawing gripper, due to too high a holding force preventing deep insertion, and weft loss in the first portion of the distance covered by the gripper, due to the insufficient pressure imparted by the holding member.

[0009] However, the suggestions detailed above have never brought satisfactory results. As far as the Applicant is aware, up until now controlling the cutting device was the job of straight-line electric motors acting directly onto the two blades of the device itself, with the result that the control response was not sufficiently quick and the controls were excessively stiff. It was also very difficult to monitor the controls in such an accurate and fine-tuned manner as would be desirable, again due to the direct operation of the cutting device blades by the straight-line electric motors.

[0010] The present invention instead solves the problem in the most effective and satisfying way, by resorting to an original and innovative combination of the traditional control technique of the cutting device with the new concepts described above.

[0011] According to the invention, the weft cutting device of a gripper loom provides that the two blades thereof are driven by cam means operated by an electric motor which is programmable according both to the main motion of the loom, and to the textile features of the weft yarn.

[0012] Preferably, said blades are carried by two oscillating arms and said cam means comprise two cams arranged side by side and mounted coaxially on the shaft of the programmable motor and relative cam followers on said arms.

[0013] In a particularly preferred embodiment of the invention, said blade-mounting arms are mounted parallel and side by side, oscillating about the same axis, the shaft of the programmable motor and of the cams being parallel to the oscillating axis of the blade-mounting arms.

[0014] The invention will now be described more in detail - merely by way of example - with reference to a currently preferred embodiment thereof, illustrated in the accompanying drawings, wherein:

[0015] fig. 1 is a diagrammatic representation of the weft cutting device according to the invention, and of the application thereof to a gripper loom; and

[0016] fig. 2 shows more in detail, in a perspective view, the weft cutting device according to the invention and the motor for the operation thereof.

[0017] With reference to the enclosed drawings, the electrically-controlled device for the programmable cutting of the weft in gripper weaving looms according to the invention comprises in a known manner two blades 1 and 2 to be operated at the time of insertion of the weft T - fed by one of the rods A of a presenting device - into the carrying gripper P of a weaving loom.

[0018] As is apparent from fig. 2, the two blades 1 and 2 of the device are carried by two corresponding arms 3 and 4, which are mounted parallel and side by side, oscillating about the same axis O. On the arms 3 and 4, cam followers 5 and 6 are provided, onto which two cams 7 and 8 act, mounted coaxially on the shaft 9A of a programmable electric motor 9.

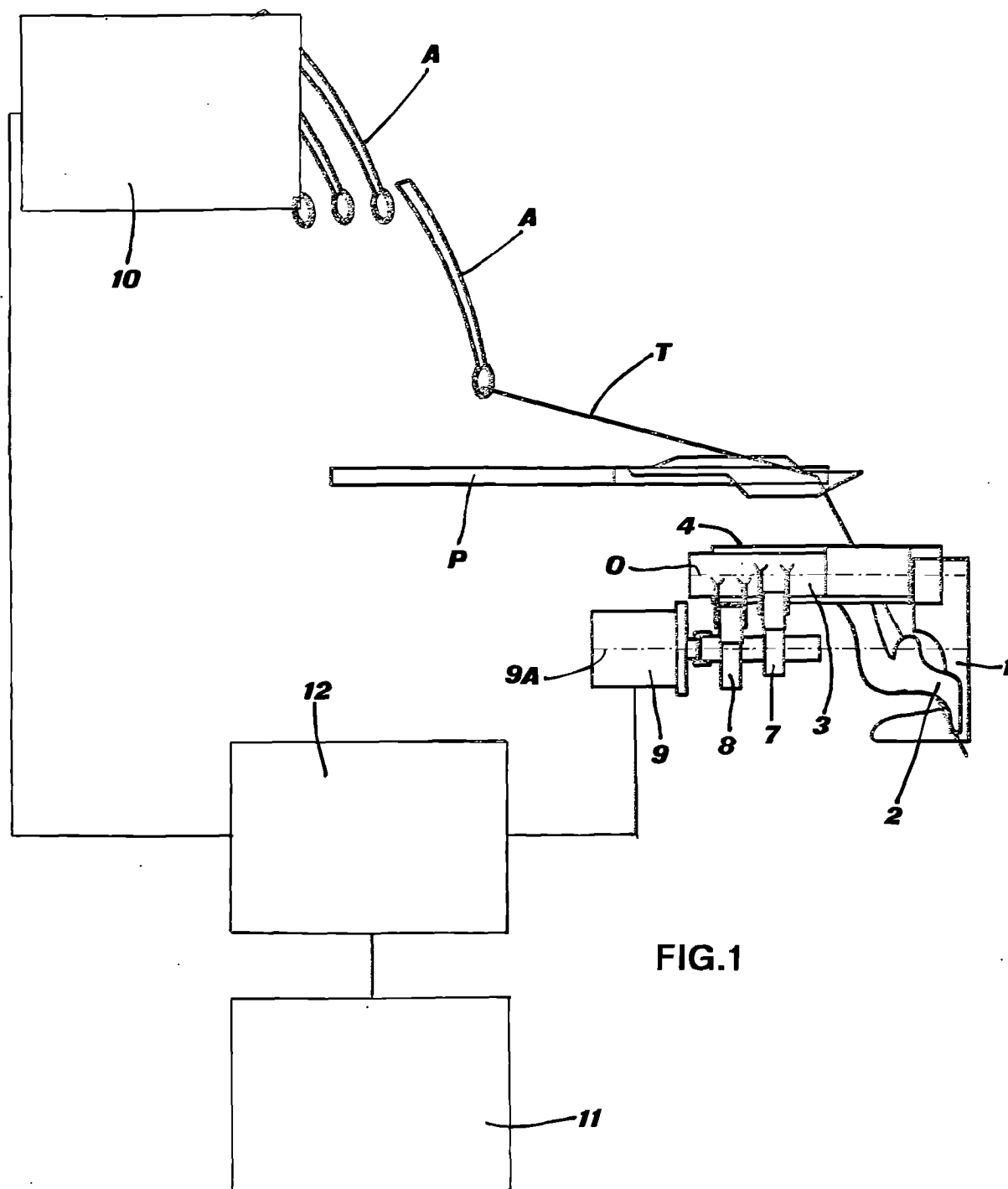
[0019] This motor is electronically controlled according to the general motion of the loom and to the textile features of the weft yarn (weft count and yarn nature, among others), as is diagrammatically shown in fig. 1. In this drawing the block 10 represents the hardware of the presenting device and comprises sensors of the position of the rods A presenting the weft T. The block 11 manages the data concerning the general motion of the loom; furthermore, data relating to size (count) and nature of the yarn used as weft for the weaving are set therein. The data originating from the block 10 and from the block 11 are transmitted to the block 12, which processes them to control the functioning of the motor 9 and to programme the instant in which the cutting blades 1 and 2 are operated to perform the cutting of the weft T.

[0020] The good functioning of the device (which could not be obtained with the electrically-controlled solutions of the prior art mentioned at the beginning of the present description) is due to the fact that the motor 9 does not operate directly onto the blades 1 and 2 - with low inertias, high pickup requirements in order to adapt to the laws of motion of the loom and the resulting high powers of the motor which are difficult to reconcile with those of the miniaturisation of the device on the whole and of the electric motor in particular -, but acts through the cam means 5 to 8, which create an excellent fly-wheel effect, increasing the inertias at play in the control of the levers 3 and 4. This allows, on the one hand, to make the controls of the blades 1 and 2 smooth and gradual, as well as extremely accurate in the timing, and on the other hand to reduce the power of the motor 9 and consequently its size and its manufacturing and running costs. Furthermore, the importance of the cutting speed being apparent in order to prevent - especially for wefts with a significant weft count - the weft from being torn in its final fibres after an initial cut, using cams to control the motion of the two blades can have the result that, during the usable cutting period, the speeds of the two blades (with the same direction but opposite sense) add to each other to form the total cutting speed. This allows not to concentrate the stress onto one blade only and onto its corresponding cam-roller assembly, i.e. to obtain a high cutting speed, without stress increase and with a single motor of limited power. For all these reasons, the electrically-controlled device for programmable weft cutting in gripper weaving looms according to the invention is at the same time more effective, more compact and less expensive than those already devised, despite the more elaborate and consequently less foreseeable combination which distinguishes it therefrom.

[0021] It is understood that the invention may be carried out also according to different embodiments from that described in detail, without departing from the scope of the present invention. For example, as an alternative to the cam means illustrated and described above, front cam means may be used, acting again onto said blade-mounting arms; in such case the shaft of the programmable motor would have to be provided in a perpendicular setting to the oscillating axis of the blade-mounting arms.

Claims

1. Electrically-controlled device for programmable weft cutting in gripper weaving looms, of the type comprising two blades to be operated at the time of insertion of the weft into the carrying gripper, **characterised in that** said blades (1, 2) are controlled by cam means (5-8) operated by an electric motor (9) programmable according both to the main motion of the loom and to the textile features of the weft yarn.
2. Device as claimed in claim 1), wherein said blades (1, 2) are carried by two oscillating arms (3, 4) and said cam means comprise two cams (7, 8) arranged side by side and mounted coaxially on the shaft (9A) of the motor (9) of a programmable type and relative cam followers (5, 6) carried by said blade-mounting arms (3, 4).
3. Device as claimed in claim 1) and 2), wherein said blade-mounting arms (3,4) are mounted parallel to each other and side by side, oscillating about the same axis (O), the shaft (9A) of the motor (9) and of the cams (7, 8) being parallel to the oscillation axis (O) of the blade-mounting arms (3,4).



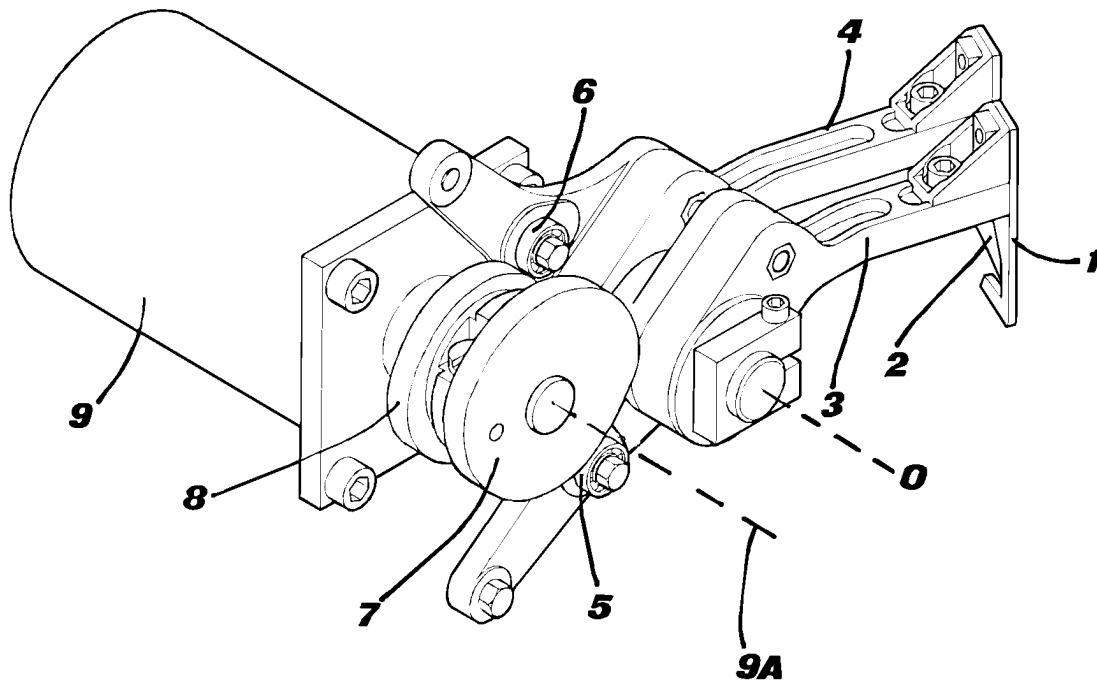


FIG.2