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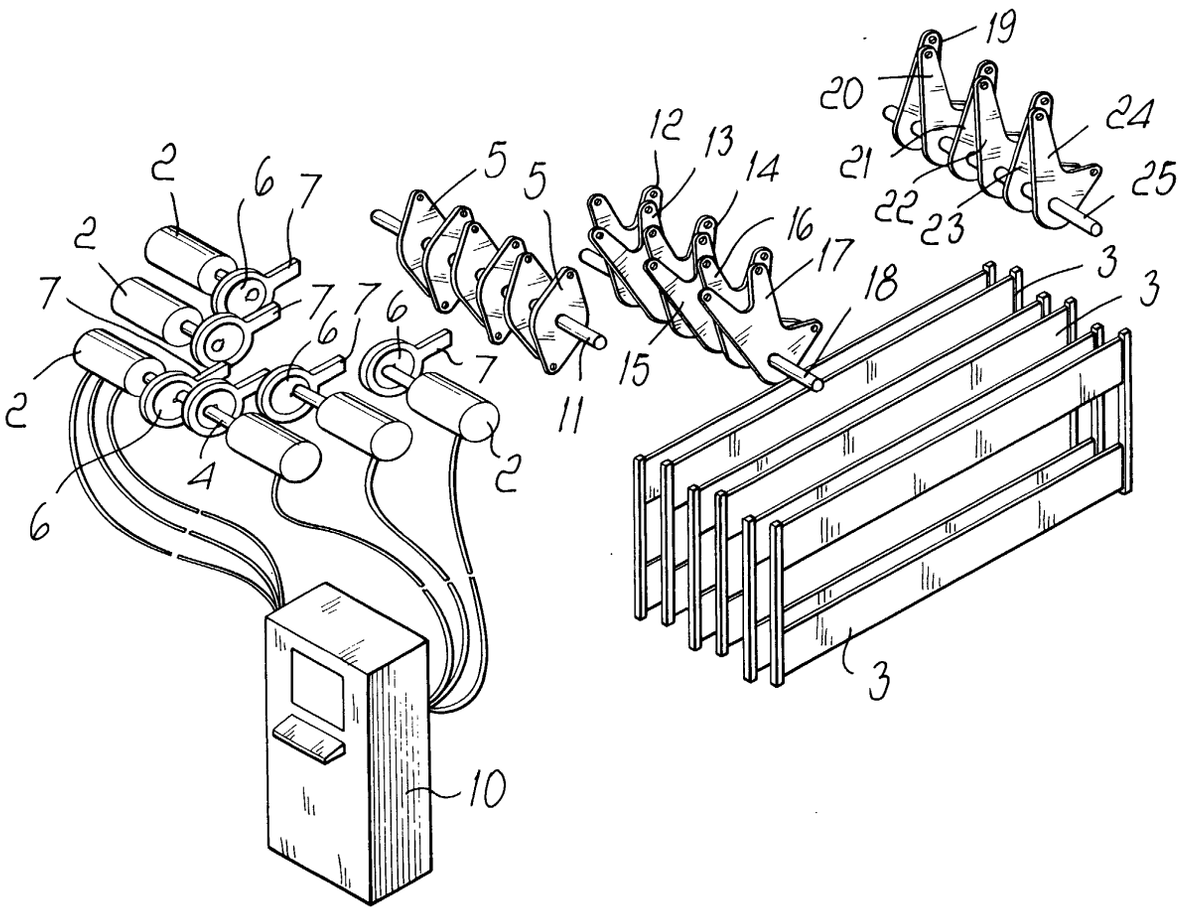
(54) Device for the automatic actuation and adjustment of frames in fabric-making machines

(57) A device for automatic actuation and adjustment of frames in machines for producing fabrics, comprising, for the actuation of each one of a plurality of frames (3), a servomotor (2) which is adapted to actuate eccentric means (6) which are in turn connected to lever means (5) adapted to cause the lifting or lowering of the respective frame (3) for the passage of the weft thread and the consequent weaving.



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Description

[0001] The present invention relates to a device for the automatic actuation and adjustment of frames in fabric-making looms.

[0002] It is known that looms for producing fabrics of any kind have elements which are generally shaped like a parallelogram and are known as frames; such frames internally accommodate the heddles through which the warp threads are threaded.

[0003] The opening and closure of the frames, i.e., their upward or downward movement (with respect to each other) according to a preset sequence, causes the warp threads, arranged on mutually parallel planes, to open synchronously with the opening of the beater of the loom, so as to allow the insertion of one or more weft threads and thus weave the fabric.

[0004] Currently, the frames are moved by means of a machine provided with cams which is constituted by one or more driving shafts on which complementary cams of the oil-bath type having a set profile are arranged. Two complementary cams are required for each frame.

[0005] The rotary motion of the driving shaft, by means of lever systems, is converted into reciprocating motion for the actuation of the frames.

[0006] Depending on the profile of the cams arranged on the driving shaft, one has different starting and stopping times of the frames and a consequently different type of weaving.

[0007] As regards adjustment of the degree of opening of the frames, this is accomplished by means of additional levers which are connected to first and second sets of L-shaped levers adapted to adjust the stroke of the frames.

[0008] However, the above-cited devices designed to move and preset the movement of the frames entail drawbacks.

[0009] First of all, in order to obtain different types of weaving, i.e. for different types of fabric and for different weaving sheds, it is necessary to act on the mechanism of the machine, replacing the complementary cams with cams having a profile which is suitable for the intended type of weaving. Accordingly, the loom is not versatile.

[0010] Another drawback arises from the need to adjust mechanically, by means of levers, the opening of the frames and therefore it is not possible to perform very precise adjustments, in addition to the fact that this type of adjustment requires a certain time for provision.

[0011] Another drawback is that with the devices of the prior art it is not possible to maintain a uniform high tension of more than 10,000 kg for each frame of the warp threads inserted in the heddles.

[0012] Another drawback of conventional devices is the fact that if it is necessary to mutually offset the frames in order to obtain a certain type of weaving, it is difficult to assign offset angles having minimal mutual differences, as required in certain types of weaving, since it is necessary to act on the mechanism of the machine and particularly on the above-cited adjustment levers.

[0013] The aim of the present invention is to provide a device for automatic actuation and adjustment of frames in looms for producing fabrics which allows to move automatically each frame independently of the movement of the other frames.

[0014] Within this aim, an object of the present invention is to provide a device for automatic actuation and adjustment of frames in looms for producing fabrics which allows to obtain any type of weaving.

[0015] Another object of the present invention is to provide a device for automatic actuation and adjustment of frames in looms for producing fabrics which allows to set minimal offset angles between the frames in order to obtain a particular intended type of weaving.

[0016] Another object of the present invention is to provide a device for automatic actuation and adjustment of frames which allows to keep the warp threads under high tension.

[0017] Another object of the present invention is to provide a device for the adjustment of the closed and open shed with simple keyboard-controlled setting with high speeds and warp tensions.

[0018] Another object of the present invention is to provide a device for automatic actuation and adjustment of frames which allows to store in a single program the countless adjustments of the frames, to store countless programs and to retrieve the program at any time.

[0019] Another object of the present invention is to provide a device for automatic actuation and adjustment of frames which is highly reliable, relatively simple to manufacture and at competitive costs.

[0020] This aim and these and other objects which will become better apparent hereinafter are achieved by a device for automatic actuation and adjustment of frames in machines for producing fabrics, characterized in that it comprises, for the actuation of each one of a plurality of frames, a servomotor which is adapted to actuate eccentric means which are in turn connected to lever means adapted to cause the lifting or lowering of the respective frame for the passage of the weft thread and the consequent weaving.

[0021] Further characteristics and advantages of the invention will become better apparent from the description of a preferred but not exclusive embodiment of the device according to the invention, illustrated only by way of non-limitative example in the accompanying drawing, wherein the only figure is an exploded perspective view of the device for automatic actuation and adjustment of frames for machines for producing fabrics according to the present invention.

[0022] With reference to the only figure, the device according to the present invention, generally designated by the reference numeral 1, comprises a plurality of servomotors 2, each of which is adapted to actuate a respective frame 3.

[0023] In practice, each one of the frames of the weaving machine is actuated by a respective servomotor which actuates the frame by means of its driving shaft 4, which actuates lever means 5 through eccentric means 6.

[0024] The use of an eccentric element allows to have, on the frame, high loads which are produced by the tension of the fabric by using relatively small motors.

[0025] The use of a servomotor 2 for each frame 3 allows to provide any type of possible binding with frames and heddles.

[0026] The use of a motor for each frame allows to actuate the frame independently of the other frames and therefore to have independent chosen upward and downward movements of the frame.

[0027] This, as mentioned, allows to obtain any type of binding and therefore to provide weaves which are very different from one another.

[0028] The eccentric means 6 are connected to respective linkages 7, which are in turn connected to the lever means 5, which allow to lift or lower the respective frame 3.

[0029] The servomotors 2 are connected to programming and control means 10 which are the subject of Italian Patent Application No. MI94A-001598 in the name of this same Applicant as the present application, which is assumed included herein by reference and to which reference is made for a more detailed description.

[0030] Through the programming and control means 10, the user can set, from a program, the starting and stopping times of the frames, the degree of opening of the frames, assigning an angular movement to the eccentric elements, therefore without acting on the mechanism of the machine for the production of fabrics.

[0031] The movement of the eccentric elements 6 is transmitted, by means of the linkages 7, to the lever means 5 which are designed to actuate the frames, allowing to open and close them, i.e., raise them so as to make the weft thread pass and lower them for weaving.

[0032] Conveniently, the lever means 5, rotatably mounted on a shaft 11, are connected to a first set of L-shaped levers 12-17 (equal in number to the frames 3 of the loom) which are in turn mounted rotatably on a shaft 18.

[0033] The L-shaped levers 12-17 are therefore respectively connected to a second set of L-shaped levers 19-24 which can rotate about a shaft 25.

[0034] The possibility to set the above-cited parameters allows to have a highly versatile machine which can adapt to the various types of weaving simply by changing parameters, differently from conventional devices in which it is necessary to change the cams so as to choose a cam profile which is suitable for specific requirements.

[0035] The opening and closure of the frames, in the device according to the invention, are actuated electronically, thus eliminating the cam devices and the various lever systems of the prior art.

[0036] This provides, in addition to the already cited advantages, a more precise adjustment of the movement of the frames and accordingly an improved weaving quality.

[0037] Also as regards frame offset, i.e., the possibility to set different times and degrees of opening for each frame for a particular type of weaving, the programming and control means 10 allow the user to directly set, by means of the keyboard, the intended parameters, even if they are very small, again without having to intervene manually on the mechanism of the machine.

[0038] Moreover, the possibility to precisely adjust the movements of the frames allows to maintain a constant tension on the warp threads, which is not possible with the devices of the prior art.

[0039] Another advantage is provided by the fact that according to the invention the movement of each frame requires a single eccentric element, whereas conventional devices require two complementary cams for a single frame.

[0040] The possibility to store, in a single program, the adjustments of the frames, to store countless programs and to retrieve them at any time allows the weaving machine to self-adjust and repeat the fabric with the same qualities, ensuring the repeatability and quality of the product.

[0041] Moreover, the eccentric elements 6 are arranged parallel to each other and mutually offset, in order to be able to arrange the corresponding motors while maintaining the correct distance between the frames 3.

[0042] Substantially, each motor is offset with respect to the motor that is adjacent thereto, in terms of position, and so is the corresponding frame, so as to obtain a compact configuration of the device which comprises a motor for each frame.

[0043] In practice it has been observed that the device according to the invention fully achieves the intended aim and objects, since it allows to obtain a universal adjustment of a machine for producing fabrics without acting on the mechanism of the machine but by acting on parameters which can be set from a program, thus streamlining the operations for passing from one type of weaving to another. At the same time, the precision of the adjustment is improved considerably and the result is a likewise improved weaving quality.

[0044] The device thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept; all the details may further be replaced with other technically equivalent elements.

[0045] In practice, the materials employed, so long as they are compatible with the specific use, as well as the contingent shapes and dimensions, may be any according to requirements and to the state of the art.

[0046] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly

such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

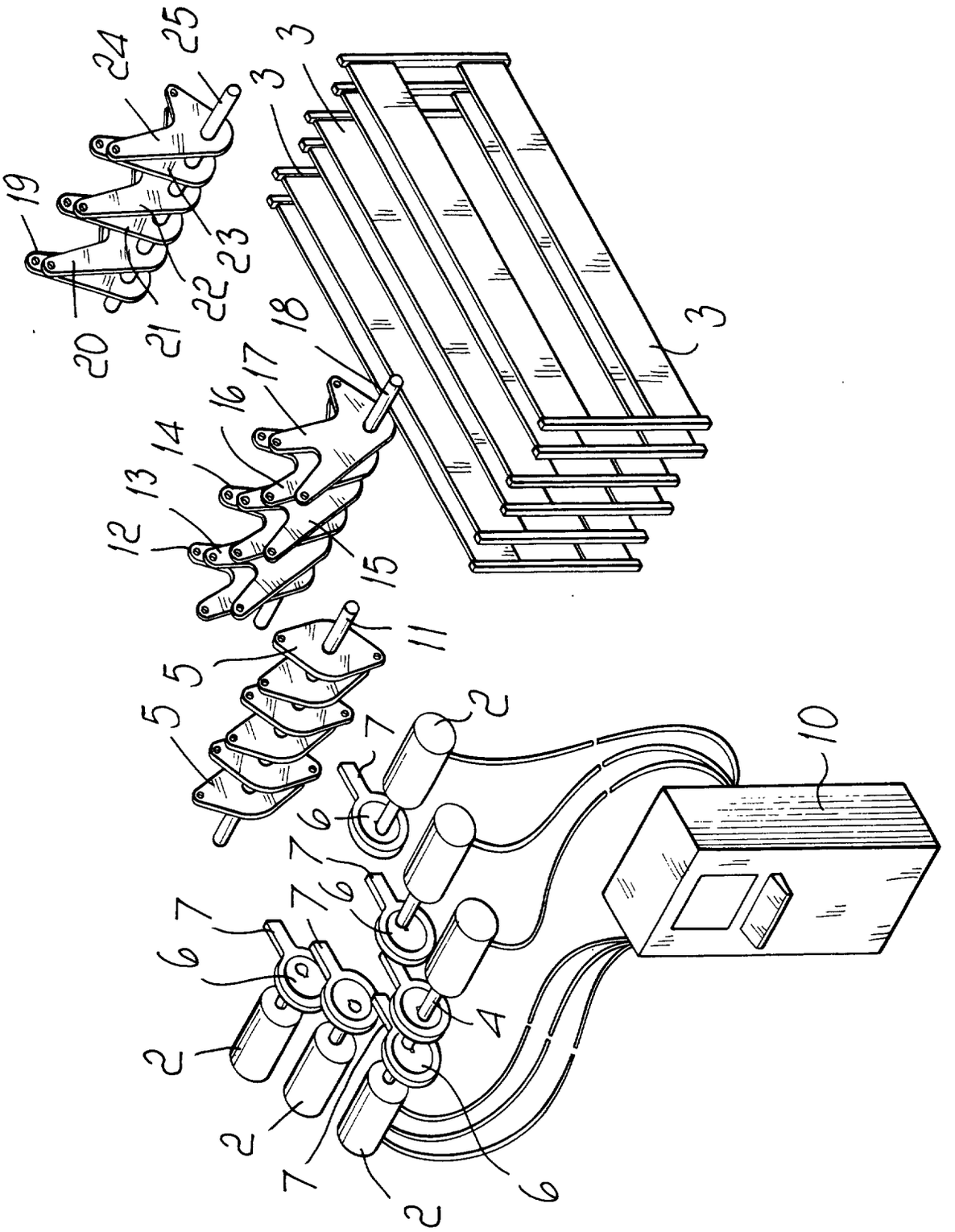
1. A device for automatic actuation and adjustment of frames in machines for producing fabrics, **characterized in that** it comprises, for the actuation of each one of a plurality of frames, a gearmotor which is adapted to actuate eccentric means which are in turn connected to lever means adapted to cause the lifting or lowering of the respective frame for the passage of the weft thread and the consequent weaving.

2. The device according to claim 1, **characterized in that** said eccentric means are keyed on the driving shaft of said gearmotor.

3. The device according to claim 1, **characterized in that** each frame actuation gearmotor is actuated by programming and control means.

4. The device according to one or more of the preceding claims, **characterized in that** said eccentric means are connected to respective linkages which are in turn connected to said lever means in order to lift and lower the respective frame.

5. The device according to one or more of the preceding claims, **characterized in that** said programming and control means, connected to said gearmotors, are adapted to set, by means of a program, the degree of the opening and closure of said frames by entering, by means of a keyboard, appropriate parameters adapted to adjust the stroke of said lever means.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EUROPEAN SEARCH REPORT

Application Number
EP 01 83 0323

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 10, 31 August 1998 (1998-08-31) -& JP 10 130986 A (TOYOTA AUTOM LOOM WORKS LTD), 19 May 1998 (1998-05-19) * abstract; figures *	1-5	D03C13/00
X	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 16, 8 May 2001 (2001-05-08) -& JP 2001 011747 A (MURATA MACH LTD), 16 January 2001 (2001-01-16) * abstract; figure 7 *	1-5	
X	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 13, 30 November 1998 (1998-11-30) -& JP 10 219541 A (TOYOTA AUTOM LOOM WORKS LTD), 18 August 1998 (1998-08-18) * abstract; figures *	1-5	
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A	EP 0 353 005 A (PALMER RAYMOND LESLIE) 31 January 1990 (1990-01-31) * column 4, line 13 - line 24; figure 4 * * column 4, line 55 - column 5, line 19 *	1,3,5	

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	11 October 2001	Rebiere, J-L

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EUROPEAN SEARCH REPORT

Application Number
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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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The present search report has been drawn up for all claims

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THE HAGUE	11 October 2001	Rebiere, J-L

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X : particularly relevant if taken alone
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