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Jacquard mechanism.

A jacquard mechanism for a weaving loom, the jacquard mechanism having a plurality of rows of heald retention devices, each row extending in the weft direction and the rows being spaced in the warp direction, at least one group of knife bars (55) comprising a respective knife bar for co-operation with each of retention devices, each knife bar serving to raise and lower a plurality of heald hooks between an upper and lower position for selective engagement with selected retention devices in said row, said one group of knife bars being mounted on a carrier (53) which is raised to an upper position and lowered to a lower position by lifting drive means (50), the carrier being rotatably mounted on the lifting drive means and being connected to rotational drive means (56,61) which cause the carrier to oscillate between a first rotational position at the lower position of the carrier and a second rotational position at the upper position of the carrier.

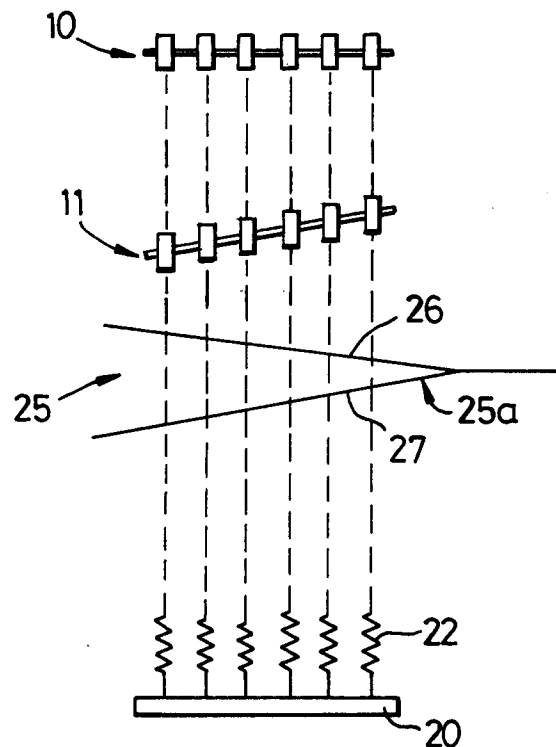


Fig. 1

The present invention relates to a jacquard mechanism for a weaving loom and in particular to a drive mechanism for raising and lowering healds.

In an electronic jacquard mechanism, for example of the type disclosed in our UK patent 2047755, a large number of healds are controlled by a plurality of solenoid operated retention devices. The solenoid retention devices are arranged in rows extending in the weft direction, the rows being spaced in the warp direction.

Usually for each row of solenoid retention devices a pair of knives oscillating 180° out of phase are provided for causing raising and lowering of a respective pair of heald hooks which are connected to an individual heald or selected groups of healds. The pair of heald hooks are connected to one another via a flexible element which is trained about a wheel, the frame carrying the wheel being in turn connected to the heald(s).

Each heald is biased to a lower position by biasing means normally in the form of a spring which is attached at one end to an anchorage frame movably mounted for adjustment on the main frame of the loom and attached at its other end to the heald.

The position of the anchorage frame is adjusted in order to provide the correct biasing tension so that a given heald is always correctly biased to its lower position.

As indicated above for each row of retention devices, there is provided a pair of knives. The knives are arranged in two groups, one group comprising one knife of each pair and the other group comprising the other knife of each pair. Each group of knives is carried by a respective knife carrier frame, the frames being raised and lowered 180° out of phase by a drive mechanism.

The actual lower position of each heald is determined by the lowermost position of the associated knife since the uppermost position of each knife is normally maintained at a constant level in order to ensure correct positioning of heald hooks for operative selection with associated retention devices.

Normally after initial set up of the loom the lowermost position can be adjusted by adjusting the stroke of displacement of the knife carrier frames. However such adjustment although resulting in a more oblique or less oblique shed does not change the shed ratio of the shed, ie. the relative displacement between the front and back of the shed.

It is desirable to adjust the lower most position of the knives in order to change the shed ratio to accommodate for weaving with different types of yarn. For example, if yarns of a hairy nature are used as warp yarns it is desirable for maximum separation of the warp yarns to be achieved at the

fell in order to reduce snagging between adjacent warp yarns. This type of shed can be achieved with the row of knives being located substantially parallel to the warp sheet when in their lowermost position. For other yarns it is desirable to produce a more oblique shed

It is a general aim of the present invention to provide a jacquard mechanism which includes an adjustable drive mechanism for the knives which can be readily adjusted to alter the shed ratio.

According to one aspect of the present invention there is provided a jacquard mechanism for a weaving loom, the jacquard mechanism having a plurality of rows of heald retention devices, each row extending in the weft direction and the rows being spaced in the warp direction, at least one group of knife bars comprising a respective knife bar for co-operation with each of retention devices, each knife bar serving to raise and lower a plurality of heald hooks between an upper and lower position for selective engagement with selected retention devices in said row, said one group of knife bars being mounted on a carrier which is raised to an upper position and lowered to a lower position by lifting drive means, the carrier being rotatably mounted on the lifting drive means and being connected to rotational drive means which cause the carrier to oscillate between a first rotational position at the lower position of the carrier and a second rotational position at the upper position of the carrier.

Preferably a pair of knife bars are associated with each row of retention devices, the knife bars being arranged in two groups of knife bars with one group comprising one knife bar of each pair and the other group comprising the other knife bar of each pair, each group being mounted on a respective carrier, the carriers being oscillated by the lifting drive means 180° out of phase between said upper and lower positions.

Preferably the retention devices co-operate with the hooks when raised to their upper position, the rotational drive means being adjustable to adjust the rotational position of each carrier when at the lower position of the carrier.

Advantageously the lifting drive means for each carrier includes a main lever which is pivotally oscillated between upper and lower positions by a rotary drive means, the carrier being rotatably mounted on the main lever. Advantageously the stroke of oscillation of the main lever is adjustable.

Preferably for each carrier the rotational drive means includes a lever linkage assembly connected at one end to the carrier and connected at the other end to a frame of the jacquard mechanism, the linkage serving to cause said oscillation between the first and second rotational positions by virtue of the movement of said main lever.

Various aspects of the present invention are hereinafter described, with reference to the accompanying drawings, in which

Figure 1 is a schematic illustration of knife bars arranged to produce an oblique shaped shed;

Figure 2 is a schematic illustration similar to Figure 1 of knife bars arranged to produce a parallel shaped shed;

Figure 3 is a schematic illustration of a drive mechanism for producing the shed patterns illustrated in Figures 1 and 2.

Referring initially to Figures 1 and 2, there are illustrated two groups of knife bars 10,11 one being located in an uppermost position and the other being located in a lowermost position. Each group of knife bars 10,11 is raised and lowered by a drive mechanism 50 as illustrated in Figure 3.

In Figures 1 and 2 a respective pair of knife bars, one from each group 10,11 co-operate with a pair of heald hooks (not shown). The healds are in turn attached to an anchorage frame 20 which is adjustably mounted on the main frame of the machine. Each heald is connected to the anchorage frame 20 via a biasing spring 22; the connection between each spring 22 and a pair of heald hooks being shown schematically in Figures 1 and 2 by broken lines.

Formation of a shed 25 is achieved by retention of selected pairs of heald hooks such that healds connected thereto are retained in a raised position and thereby define the upper portion 26 of the shed 25. The remaining heald hooks remain in contact with respective knife bars 10,11 and so reside in a lower position and thereby define the lower portion 27 of the shed.

The lowermost position of each heald is determined during the setting up procedure of the machine such that all warp yarns are located in the same plane when the heald hooks are mounted on the hook knives when one hook knife of the pair is at an uppermost position and the other hook knife of the pair is at a lowermost position.

Thereafter in accordance with the present invention the lowermost position of each heald is adjusted by adjustment of the drive mechanism 50 in order either to adjust the overall separation between the upper and lower portions 26,27 respectively of the shed 25 and/or adjust the relative displacement between the front and rear portions of the shed, herein referred to as the shed ratio.

The drive mechanism 50 according to the present invention includes a pair of drive frame assemblies which oscillate 180° out of phase; one drive frame assembly operating to raise and lower the knife bars of one group and the other drive frame assembly operating to raise and lower the knife bars of the other group. For the sake of simplicity and clarity only one drive frame assembly

51 has been illustrated in Figure 3.

The drive frame assembly 51 includes a pair of support levers 52 (only one of which is shown) spaced laterally from one another. Each lever 52 is mounted via pivotal connection 57 to the frame 64 of the machine. A knife bar support lever 53 is pivotally attached by pivotal connection 58 to the terminal end of each lever 52 and a plurality of knife bar support arms 54 pivotally depend from each lever 53. A knife bar 55 extends between and is supported in opposite support arms 54 mounted on respective levers 52.

Each lever 52 includes a crank arm 56 which is pivotally connected via pivotal connection 60 to a link arm 61. Link arm 61 is also pivotally connected via pivotal connection 63 to the frame 64 of the machine.

A drive arm 70 is attached to each lever 52 via a pivotal connection 72, the drive arm 70 being oscillated via an eccentric drive shaft (not shown) so as to raise and lower lever 52.

The lever 52 is shown in full lines in its uppermost position and in broken lines in its lowermost position.

In order to provide adjustment for the overall displacement between the upper and lowermost positions of the knife bar support levers 53 (and hence the overall separation between the upper and lower portions of the shed) the pivotal connection 72 is adjustable to enable its position to be moved toward or away from the pivotal connection 57. Accordingly, pivotal connection 72 may be defined by a removable pivot pin which is selectively engageable in one of a series of apertures 80 formed in lever 52.

As the levers 52 oscillate between upper and lowermost positions, the crank arm 56 and link 61 co-operate to cause the support levers 53 to rotationally oscillate about pivot 58.

The amount of rotational displacement about pivot 58, for any given one setting of the pivot 72, is determined by the effective length of the crank arm 56 and link 61. The shorter this length the greater the rotational displacement. Adjustment of this effective length is preferably achieved by varying the positional location of pivot 63 relative to the frame 64. Selectable positions are represented schematically at 90 and may be achieved by a removable pivot pin which is selectively engageable in one of a series of apertures formed in the frame 64.

Preferably the selectable positions 90 are arranged in a row extending generally vertical.

In this manner, the rotation position of the support levers 53 when located at the uppermost position is substantially the same irrespective of the position of the pivot 63.

Accordingly, by locating the pivot connection

63 at different positions, the displacement of the support lever 53 at its front end 53a may be varied relative to that at its rear end 53b when at the lowermost position of lever 52. It is thus possible to alter the shed ratio by the simple expedient of selectively positioning pivot connection 63.

Two extremes of shed ratio are schematically illustrated in Figures 1 and 2. In Figure 1 a low shed ratio is shown, ie the front end 53a is located at a rotational high position when at the lower position of lever 52 and thereby defines a front portion 25a of the shed which is generally oblique. In Figure 2 a higher shed ratio is shown, ie the front end 53a is located at a rotational low position when at the lower position of lever 52 and thereby defines a front portion 25a of the shed which is more acute and thereby provides greater separation of the warp threads at the front end of the shed.

Claims

1. A jacquard mechanism for a weaving loom, the jacquard mechanism having a plurality of rows of heald retention devices, each row extending in the weft direction and the rows being spaced in the warp direction, at least one group of knife bars comprising a respective knife bar for co-operation with each of retention devices, each knife bar serving to raise and lower a plurality of heald hooks between an upper and lower position for selective engagement with selected retention devices in said row, said one group of knife bars being mounted on a carrier which is raised to an upper position and lowered to a lower position by lifting drive means, the carrier being rotatably mounted on the lifting drive means and being connected to rotational drive means which cause the carrier to oscillate between a first rotational position at the lower position of the carrier and a second rotational position at the upper position of the carrier.
2. A mechanism according to claim 1, wherein a pair of knife bars are associated with each row of retention devices, the knife bars being arranged in two groups of knife bars with one group comprising one knife bar of each pair and the other group comprising the other knife bar of each pair, each group being mounted on a respective carrier, the carriers being oscillated by the lifting drive means 180° out of phase between said upper and lower positions.
3. A mechanism according to claim 1 or 2, wherein the retention devices co-operate with the hooks when raised to their upper position,

the rotational drive means being adjustable to adjust the rotational position of each carrier when at the lower position of the carrier.

4. A mechanism according to claim 1, 2 or 3, wherein the lifting drive means for each carrier includes a main lever which is pivotally oscillated between upper and lower positions by a rotary drive means, the carrier being rotatably mounted on the main lever.
5. A mechanism according to claim 4, wherein the stroke of oscillation of the main lever is adjustable.
6. A mechanism according to any preceding claim wherein for each carrier the rotational drive means includes a lever linkage assembly connected at one end to the carrier and connected at the other end to a frame of the jacquard mechanism, the linkage serving to cause said oscillation between the first and second rotational positions by virtue of the movement of said main lever.
7. A mechanism according to claim 6, wherein the lever linkage assembly is adjustably connected to said frame in order to vary the stroke of said oscillation.

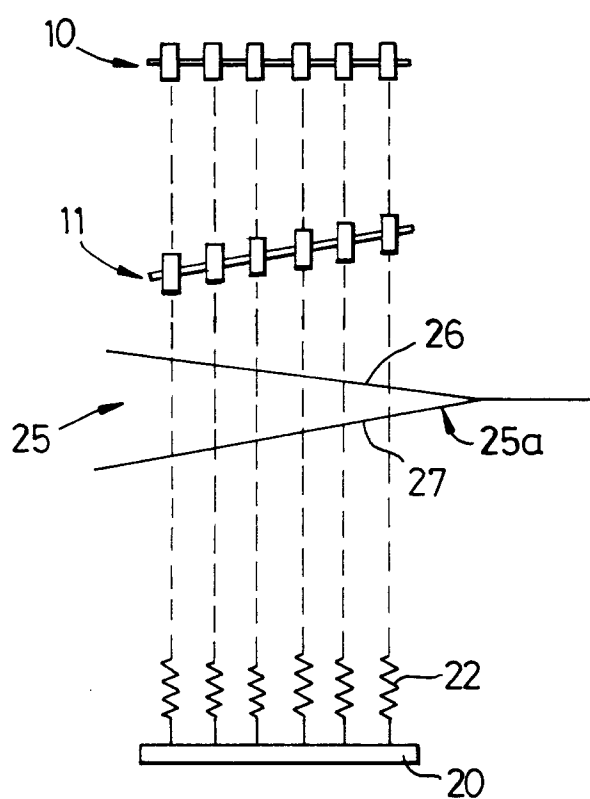


Fig. 1

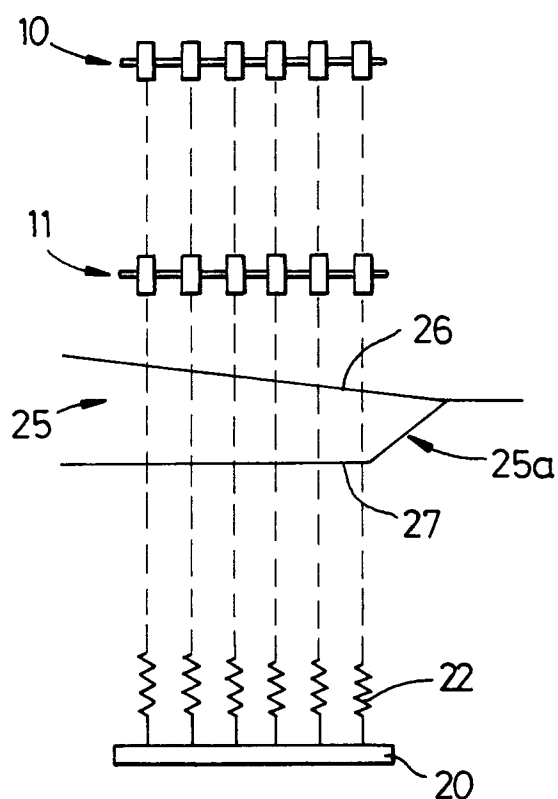


Fig. 2

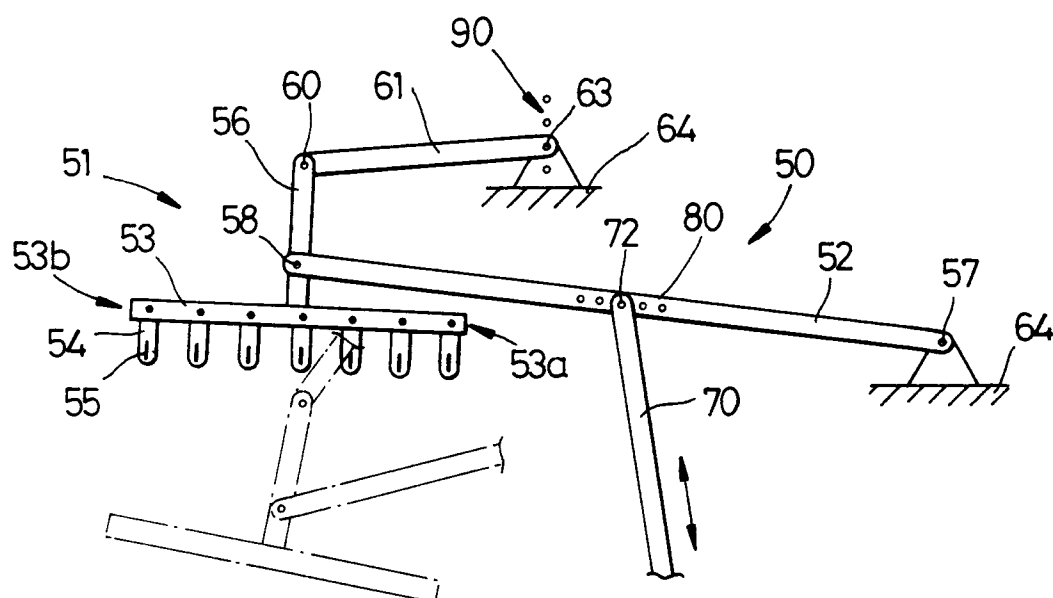


Fig. 3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 30 8446

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)
X,P	EP-A-0 443 969 (STAUBLI-VERDOL) * column 2, line 22 - line 46; figure * ---	1-4,6,7	D03C3/36
X A	FR-A-2 528 078 (TAGLIABUE) * page 3, line 31 - page 4, line 16; figures * ---	1,2,4,5 6,7	
X A	GB-A-986 770 (DRACUP AND SONS) * page 3, line 19 - line 37; figure 5 * -----	1,3,4 6	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			D03C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 16 OCTOBER 1992	Examiner REBIERE J.L.
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			