SHEDDING MOTION FOR LOOM

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ABSTRACT

The shedding motion includes pairs of heald shafts with healds adapted for the passage of warp threads therethrough, each pair cooperating with a pair of driving heald levers connected, respectively, to the heald shafts of said pair and operatively associated with a cam moving the respective heald shafts in a vertical plane. Each heald shaft is pivotally connected to a driven lever mounted on the pivot axis of the other one of the driving heald levers, connected to the other heald shaft of the pair. The heald levers are provided with followers interconnected by a bail member to ensure uninterrupted engagement of the followers with the cam.

3 Claims, 2 Drawing Figures
The invention relates to weaving looms, and, more particularly, it relates to shedding motions incorporated in such looms.

The present invention can be employed to utmost advantage in looms operating on a successive shedding, or multiple-shedding principle; however, it also can be employed in ordinary looms.

There are known shedding motions comprising heald shafts arranged in pairs and carrying healds adapted for the passage therethrough of warp threads, and a pair of driving heald levers associated with a cam mounted on the cam roll intermediate of said heald levers, each said heald lever being connected with the respective heald shaft of the pair. In these known shedding motions, the lower portions of the heald shafts are made of an elastic material, and engagement contact between each heald lever and the cam is effected with the help of a spring. Each heald shaft is reciprocable in a vertical plane by means of a guide. Therefore, each cam in this known shedding motion actuates a pair of heald shafts moving in opposition relative to each other.

However, this known shedding motion is not free from a number of disadvantages. As the heald shafts are reciprocated, some degree of slipping of the warp threads in the healds is inevitable, and the contact areas of the driving heald levers and the cam are subject to relatively intensive wear. At relatively high running speeds, the spring-established engagement of the cam with the heald levers fails to ensure accuracy of the movement of the heald shafts in accordance with the profile of the cam, on account of the inertia of the heald shafts, as the radius of the curvature of the cam in the engagement point is diminishing; furthermore, strictly synchronous movement of the two heald shafts is not ensured, either. Moreover, the elastic portions of the heald shafts are liable to break under repeated bending loads.

It is an object of the present invention to eliminate the above disadvantages.

The present invention has for its object to create a shedding motion which should provide for increased operating speeds of the loom, reduce the wear of the warp threads in the eyes of the healds and be of a simplified structure, owing to an improved drive of the heald shafts.

These and other objects are attained in a shedding motion for a weaving loom, comprising heald shafts arranged in pairs and carrying healds adapted for the passage of warp threads therethrough, each such pair of heald shafts being associated with a pair of driving heald levers pivotally connected each to the respective one of this pair of heald shafts, this pair of heald levers being operatively associated with a cam mounted on a cam roll intermediate of this pair of heald shafts, for effecting movement of these heald shafts in a vertical plane, in which shedding motion, in accordance with the present invention, each heald shaft is additionally pivotally connected to a driven lever mounted on the pivot axis of that pair of the heald levers, which is connected to the other heald shaft of the pair, the pair of driving heald levers carrying thereon with followers interconnected by a bail member mounted on the respective spindles of these followers and thus ensuring uninterrupted engagement of the followers with the cam for synchronous flat-parallel transulatory movement of the heald shafts in the vertical plane, the spindles of the respective followers being arranged so that a straight line connecting them passes through the axis of rotation of the cam, the spacing between these spindles being adjustable to provide for taking up any gap or play that might be left between the followers and the cam.

Owing to the uninterrupted engagement of the followers with the cam, ensured by the bail member, it has become possible to increase the speed of the movement of the heald shafts and thus to increase the speed of the loom. Furthermore, the provision of the additional levers is responsible for flat-parallel transulatory movement of the heald shafts in a vertical plane, which has reduced slipping of the warp threads in the eyes of the healds, this slipping causing wear of the warp threads. This reduced slipping is explained by the fact that the eye of the heald is now moving along a path approximating that of the point of contact between the warp thread and the eye in the course of shedding.

To provide for flat-parallel transulatory movement of the heald shafts in the vertical plane, it is advisable that the driving and driven heald levers be of the same length.

To simplify the structure of the shedding motion, it is advisable to arrange the respective pivot axes, each supporting a driving heald lever and a driven heald lever connected to different heald shafts, at the opposite sides of the straight line connecting the spindles of the two followers.

To provide for adjustment of the spacing between the spindles of the two followers, it is advisable to connect the opposite ends of the bail member through a set screw pivotally mounted on one of these opposite ends.

The present invention will be better understood from the following detailed description of an embodiment thereof, with reference being had to the accompanying drawings, wherein:

FIG. 1 is a schematic diagram of a shedding motion;
FIG. 2 is an enlarged view taken along arrow line A in FIG. 1, with the cam removed.

The herein disclosed shedding motion comprises a system of pairs of heald shafts and a set of cams mounted on a cam roll to actuate these heald shafts. Described hereinbelow is one such pair of heald shafts actuated by the respective cam.

The shedding motion thus includes a pair of heald shafts 1 and 2 (FIG. 1) carrying healds 3 through which warp threads 4 pass. The heald shaft 1 has the lower end thereof pivotally connected to a driving or heald lever 5 mounted for pivoting motion about a pivot axis 6. Adjacent to this pivot axis 6, there is mounted on this heald lever 5 a follower 7 engaging a cam 8. The cam is non-rotatably mounted on a driving shaft or cam roll 9 driven by any suitable drive. The heald shaft 1 has the lower portion thereof also pivotally connected to a driven lever 10 having the length equal to that of the heald lever 5, the lever 10 being mounted for pivoting motion about a pivot axis 11 which is also the pivot axis of the second driving or heald lever 12. The last-mentioned lever is pivotally connected to the other heald shaft 2 of the pair at the lower end thereof. The heald lever 12 supports adjacent to the pivot axis 11 thereof the other follower 13 also engaging the cam 8. The respective spindles 14, 15 of the follower 7 and 13 support therebetween a bail member 16 ensuring rigid connection of the two followers, to provide for uninterrupted engagement of the two followers with the cam.
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8. The followers 7 and 13 are arranged on either side of the axis of rotation of the cam 8, a straight line interconnecting these spindles 14 and 15 passing through this axis of rotation. The spacing between the two spindles 14 and 15 is adjustable to provide for taking up any gap or play in the engagement of the followers with the cam 8. The heald shaft 2 is further pivotally connected with the other driven lever 17 mounted for pivoting motion about the pivot axis 6. The length of the lever 17 is equal to that of the heald lever 12.

Owing to the above described interconnection of the heald shafts 1 and 2, there is effected their flat-parallel translatory movement in a vertical plane under the action of a single cam.

Adjustment of the spacing between the spindles 14 and 15 is performed with the help of a set screw 18 (FIG. 2). The set screw 18 is pivotally mounted on a pivot axis 19 supported on one end of the bail member 16. The opposite end of the set screw 18 is threaded and has a slit 20 cut therethrough, through which the other end of the bail member 16 passes. A nut 21 is threaded onto the threaded end of the set screw 18, by means of which the bail member 16 can be either contracted or expanded, to take up any play in the engagement of the followers 7, 13 with the cam 8 which is not shown in FIG. 2.

The herein disclosed shedding motion operates as follows.

Prior to starting the loom, the shedding motion is to be adjusted. The followers 7 and 13 are pressed against the cam 8 by contracting the bail 16 with the nut 21 threaded onto the set screw 18. Then the loom is started, and the cam roll 9 starts rotating together with the cam 8 in a direction indicated with the curved arrow line. First the follower 13 is the driving one and rolls along the periphery of the cam 8 away from the axis of rotation of the latter, since at this part of the operating cycle the radius of the curvature of the cam 8 is increasing. Consequently, the heald lever 12 is swung upward and draws the heald shaft 2 and the driven lever 17 also upward. The other heald shaft 6 is drawn downward by the bail member 16, together with the other heald shaft 1 and the driven lever 10. As a result, the heald shaft 1 and 2 change places, same as the respective warp threads 4.

Upon the heald shaft 2 having reached its topmost position the above operation is repeated in the reverse direction, the follower 7 supported by the heald lever 5 being now the driving one. Now it is the heald lever 12 that is driven by the bail member 16. The cycle ends with the heald shafts 1 and 2 resuming their initial position.

Such combinations including each a pair of heald shafts and a cam are arranged successively across the entire threading width of the loom. To provide for successive shedding, the cams on the cam roll are successively turned at different angles relative to one another about the cam roll 9.

In operation of the loom the heald shafts 1 and 2, owing to their being interconnected by the bail member 16, move in respective paths in a counter-phase, i.e., in opposition to each other, in a flat-parallel translatory movement. The eyes of the healds 3 move along the respective paths approximating those of the contact points between the warp threads 4 and the healds 3 in the course of shedding. In this way friction between the warp threads and the eyes of the healds 3 is minimized. Moreover, uninterrupted engagement of the followers 7 and 13 with the cam 8 eliminates impact loads, as the heald shafts reverse the direction of their movement.

To form a shed having the same shedding angle of the warp threads at both extreme positions of the heald shafts 1 and 2, the heald shaft 1 should have a stroke that is greater than that of the heald shaft 2, since the two heald shafts are differently spaced from the fell of the cloth. This is attained by ensuring the following proportion:

\[ a/b = h/H \cdot c/d, \]

where

- \( a \) is the length of the lever 12 of the heald shaft 2 in mm;
- \( b \) is the distance from the pivot axis 11 to the follower 13 of the lever 12 in mm;
- \( h \) is the stroke of the heald shaft 2 in mm;
- \( H \) is the stroke of the heald shaft 1 in mm;
- \( C \) is the length of the lever 5 of the heald shaft 1 in mm;
- \( d \) is the distance from the pivot axis 6 to the follower 7 of the lever 5 in mm.

What is claimed is:

1. A shedding motion for a weaving loom, comprising: a plurality of pairs of heald shafts carrying healds for the passage of warp threads therethrough, a plurality of pairs of driving levers, each lever in each said pair of said driving levers being pivotally connected with the respective heald shaft in said pair; a plurality of pairs of driven levers, each lever in each pair of said driven levers being pivotally connected with a respective one of said heald shafts; a cam mounted intermediate of the driving levers of each pair and interacting therewith for effecting the movement of said heald shafts in a vertical plane for shedding; a driving shaft carrying said cam; followers having spindles being supported by said driving levers; a bail member mounted on the spindles of said followers and interconnecting said followers providing uninterrupted engagement thereof with said cam so as to effect synchronous flat-parallel translatory movement of said heald shafts in said vertical plane; said follower spindles being arranged so that a straight line connecting them passes through the axis of rotation of said cam; and a plurality of said pairs of driven levers being supported by the pivot axes of driving levers for each pair and being connected with the other heald shaft in the respective pair.

2. A shedding motion as claimed in claim 1, said pivot axes being mounted at the opposite sides of the straight line passing through the follower axis, each said pivot axis supporting one of said pairs of driving heald levers and one of said pairs of drive levers, and being connected respectively with the different heald shafts in each pair.

3. A shedding motion as claimed in claim 1, comprising a set screw for adjusting the spacing between the spindles of said followers, said set screw interconnecting the ends of said bail member and being mounted pivotally on an axis on one of said opposite ends of said bail member.