ADJUSTER IN THE CONNECTION PATH BETWEEN A SHED-FORMING DEVICE AND A HEDDLE FRAME

The connecting and adjusting device is insertable between an oscillating lever constituting the output of a dobby and a reciprocable rod connecting same to the input of the lift mechanism for heddle frames of a loom. Said device comprises a body structure having slots therein at substantially right angles to each other. One slot is for the reception of one arm of said lever. In the other slot there is located in same embodiments a loosely positioned slideable bearing block. Said bearing block carries a bearing therein to which is connected the driving end of said connecting rod. An arm projects rigidly from said bearing block and means are provided co-operable with said arm for displacing it from a position in center alignment with said slot. Such displacement affects a jamming of the bearing block within said slot and thereby removing any play which might otherwise exist between said bearing block and the walls of said other slot. Supplemental means may be provided if desired, such as interengaging teeth, for further rigidifying the relationship between said arm or said bearing block and the body portion of said device. Alternatively threaded means may be provided for precisely adjusting the position of a snugly but slidably mounted bearing block within said second slot, which can thus accomplish the desired adjusting without the offsetting and jamming relationship above mentioned.

The connection which transfers the movements of a shed-forming device, for example a dobby, onto the associated heddle or the heddle frame of a weaving machine must operate without play, namely on one hand so that the controlled movements are carried out immediately and accurately and on the other hand so that a deflection of the joints does not occur which would lead to cumulative inaccuracies in the sequence of motions. To build the connection of any desired thickness is, however, not possible since the available room is limited by the thickness of the heddle frames which lie side-by-side. In addition, this connection must permit a limited adjustment of the reciprocal position since the shed-forming device is an attachment for a weaving machine and the heddle frames must be adjusted with respect thereto.

14 Claims, 8 Drawing Figures
Fig. 1

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4

5

6

7

A

B

C

D

E

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The invention relates to an adjusting device in the connection path, or linkage, between the oscillating output member of a shed-forming device and a heddle frame or a heddle of a weaving machine. In such device an adjusting lever is mounted movably and fixably on the output member and has a pivot bearing for the connecting rod to the heddle frame mechanism. The device transforms the oscillatory motion of the output member into an approximately rectilinearly extending reciprocal motion and permits the matching and adjusting of the shed-forming device and heddle frame or heddle, namely, with respect to the work path to be described and the distance. It is thereby necessary to make the adjustment on the side of the output member facing away from the connecting rod.

The objective of the invention is to provide such a device which is small enough in thickness to be within the spacing of successive heddle frames, which permits within a simple manner an adjustment in two directions and which transmits without play into different directions the forces which interchangeably act thereon.

One embodiment of the invention is characterized by the presence of a slot in the adjusting lever which slot extends transversely to the output member and in which slot a block carrying the bearing is movably positioned, and means are arranged accessible from the side facing away from the connecting rod for adjusting and securing in position the bearing carrying block.

Various exemplary embodiments of the subject matter of the invention are illustrated in the drawings, in which:

FIG. 1 is a schematic illustration of one arrangement of an adjuster,

FIG. 2 is a side view of the adjusting lever with the sidewall omitted,

FIG. 3 is a cross-sectional view according to the line III—III in FIG. 2 but with the sidewall present,

FIG. 4 is a front view of a second embodiment corresponding to FIG. 2,

FIG. 5 is a cross-sectional view of a third embodiment,

FIG. 6 is a cross-sectional view of same according to the line VI—VI,

FIG. 7 is a cross-sectional view of same according to the line VII—VII in FIG. 5, and

FIG. 8 is a cross-sectional view of a fourth embodiment.

Lever drives 1 are on one side hingedly connected to the heddle frame 2 of a weaving machine and on the other side are hingedly connected to a not illustrated shed-forming control device or dobby, through the connecting rod 3, the bearing 7, the adjusting connector 5 sliding on the rail 6, whereby the rail 6 forms a part of an output lever 4 of said shed-forming device. Movement of the output lever 4 about its suspension point 10 through an angle identified with a, results in the movement A of the heddle frame needed for the weaving operation, namely lift of the heddle frame to effect its up and down movement. The magnitude of a is determined by the structure of the shed-forming device. If now the heddle frame lift A is to be increased, it is sufficient to move the adjusting connector 5 in direction B on the rail 6. For the purpose of reducing the amount of the heddle frame lift A, the connector 5 may be moved in direction C. An adjustment of the heddle frame 2 must not only take place with respect to its lift A but the heddle frame must also be adjustable with respect to its basic position. This can be achieved by moving the bearing 7 in the adjusting connector 5 in direction D or E.

As is known the thickness of the heddle frames, the so-called division, is calibrated (normalized) and is maintained as small as possible so that as many heddle frames as possible will find room in the weaving machine. The entire shed-forming device and thus also the adjusting device of the invention must be provided within this division. This requires particular arrangements of the adjusting and securing members as they are described as examples of the invention in the following discussion of various embodiments. Similar parts have the same reference numerals.

According to FIGS. 2 and 3 the adjusting connector 5 has a guide slot 8 into which the rail is placed and at a right angle thereto a slot 9 which extends on both sides of the guide 8 and in which on one side are positioned the bearing block 17 carrying the bearing 7 and from which block projects the arm 13.

The bearing block 17 is not provided with a sliding fit to respect the slot 9 but it is constructed slightly narrower. One narrow side of the arm 13 and the wall of the slot 9 cooperating therewith have each teeth 19 corresponding to a rack.

The part 15 of the guide 8 behind which there is the slot 16 is held against the lever arm 6 (FIG. 1) by means of the retaining nut 14. A surface pressure is obtained on the lever arm 6 by the part 15 which prevents the lever arm from being damaged by impressions of the retaining nut.

In order to achieve a distortion-free transfer of the movement of the shift lever 4 onto the heddle frame 2, the bearing 7 is arranged with respect to the lever arm 6 on the same side as the pivot point 10 of the shift lever 4. After adjustment of the basic position of the heddle frame by moving the bearing block 17 and thus also the bearing 7 in the slot 9, the arm 13 is swung from the center axis of the slot 9 by tightening the screw 18 which causes the teeth 19 to engage. A slight tipping of the bearing block 17 in the slot 9 on its edge 40 takes place at the same time which results in its jamming in the slot. This jamming of the bearing block assumes that no play will exist in the transverse direction of the slot while the engagement of the teeth 19 assures that no play will exist in the longitudinal direction of the slot.

Thus by using the illustrated adjuster the invention provides that
1. the adjusting lever is moved on the lever arm from the side facing away from connecting rod and
2. is blocked without any damage from the side facing away from the connecting rod by the retaining nut 14;
3. the adjusted bearing is fixed without play in the reciprocal direction of the connecting rod 3 and so fixed also from the side facing away from the connecting rod by means of the screw 18 and the teeth 19, and
4. at the same time any clearance provided between the bearing block 17 and the slot 9 is negated.

In the embodiment according to FIG. 4 the numeral 8 again refers to the guide for the arm of the adjusting lever 5, 9 refers to the slot which extends transversely thereto, 17 identifies the bearing block with the bearing.
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7 of the connecting rod 3 and 13 refers to an arm projecting from the bearing block. The swinging of the arm with the bearing block away from the axis of the slot is also accomplished through the screw 18. The teeth 29 which are provided on the bearing block and on the wall of the slot engage at the swinging motion of the bearing block and result in the no-clearance locking in the axial direction of the slot or in the longitudinal direction of the connecting rod 3.

According to FIGS. 5-7, the threaded nut 20 is arranged on the arm 23 and the threaded nut 25 is arranged on the wall of the slot 9, into which is screwed the threaded bolt 26. Said bolt 26 has both a right and left hand thread. The threaded nuts 20 and 25 have each a lateral slot 28 so that — as illustrated in FIGS. 6 and 7 — during tightening of the screws 18, the threaded nut 20 is clamped into a no-play relationship on and to the bolt due to the bearing of the arm 23 onto the wall 30 of the slot 9. The same happens with the threaded nut 25 on which the arm 23 rests. Simultaneously with the downward pressing of the arm 23 a displacement of the bearing block 17 takes place which effects a jamming and thus a cancellation of any play in the slot 9. Here too, all adjusting steps are taken within the division from the side of the adjusting connector 5 which side faces away from the connecting rod, namely, clamping the rail in the guide 8 by means of the screws 14, adjusting of the bearing 7 with respect to said rail by means of the screw bolt 26 and tensioning of the bearing block 17 in the slot 9 by means of the screws 18.

In the variation of construction of FIG. 8 there is still the adjusting connector 5 in which the slot 9 extends transversely to the guide 8 for the arm 6 of lever 4. The bearing block 17 with arm 33 projecting therefrom is supported at one side of the guide 8 in slot 9 and at the other side of said guide the arm 33 is supported in and on the slide block 34. The adjusting screw 36 is supported in the block 34 and extends through the thread 39 of the adjusting connector 5. By rotating the screw 36 the position of the bearing 7 can be adjusted.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In an adjusting device for use between an elongated output lever of a doby and a heddle frame mechanism, said adjusting device having means defining a pivot bearing for pivotably supporting a connecting rod utilized for connecting said adjusting device to a heddle frame mechanism, the improvement comprising:

said adjusting device having an elongated body, the longitudinal axis of which extends transversely to the longitudinal axis of said output lever, said body having means defining an elongated slot thereon extending generally parallel to said longitudinal axis, said pivot bearing means being slidably received in said elongated slot adjacent one end, said connecting rod extending away from said body and said one end;

adjustable means mounted on said body adjacent an end thereof remote from said pivot bearing means and said connecting rod and connected to said pivot bearing means for adjusting and locking the relative longitudinal position of said pivot bearing means in said slot and thereby the position of said connecting rod relative to heddle frame mechanism.

2. The improvement according to claim 1, wherein said adjustable means consists of an arm projecting from said pivot bearing means positioned in said slot, said arm extending transversely across said body and locking means on said body remote from pivot bearing means connected to said arm for effecting a locking engagement of said arm to said body.

3. The improvement according to claim 2, wherein said locking means includes means for effecting a displacement of said pivot bearing means with respect to said longitudinal axis of said slot.

4. The improvement according to claim 1, wherein said pivot bearing means comprises a bearing block slidably received in said slot and an arm secured to said bearing block and extending outwardly therefrom and terminating adjacent said remote end.

5. The improvement according to claim 4 wherein said bearing block is tiltably received in said slot.

6. The improvement according to claim 5 wherein one of said bearing block and said arm has teeth on a side facing a wall of said slot and said wall of said slot at a corresponding location is also provided with similar teeth engageable with said teeth on one of said bearing block and said arm.

7. The improvement according to claim 4 wherein said body is substantially longer than it is wide and wherein said locking means comprises at least one screw secured in a wall of said slot and engages said arm can be operated from the narrow side of said body.

8. The improvement according to claim 4, wherein said body has a threaded nut adjacent said remote end, said threaded nut being engaged by an adjusting screw which engages at least one of said arm and said bearing block to effect a movement of said bearing block longitudinally of said slot.

9. The improvement according to claim 8, wherein at least one of said bearing block and said arm has a second threaded nut thereon, second said threaded nut being engaged by said adjusting screw.

10. The improvement according to claim 9, wherein said second threaded nut has a longitudinally extending slot therein to define a clamping means acting onto said second threaded nut.

11. The improvement according to claim 1, wherein said body has means defining a guide surface thereon for guiding said adjusting device for movement relative to said output lever and means for securing said adjusting device to said output lever.

12. The improvement according to claim 11, wherein said securing means comprises means for urging said guide surface means into a frictional engagement with said output lever.

13. The improvement according to claim 11, wherein said guide surface means comprises a guide surface and means defining a second slot which is arranged behind said guide surface and extends parallel thereto, said guide surface being flexible into and out of said frictional engagement with said output lever.

14. The improvement according to claim 4, wherein said arm comprises a pair of spaced and parallel arms attached to said bearing block, said output lever being received between said arms and movable with respect thereto.

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