LOOM SHEDDING MECHANISM

Joseph R. Evans, Milford, and John H. Blackburn, Uxbridge, Mass., assignors to Draper Corporation, Hopedale, Mass., assignors of record

Filed Aug. 16, 1965, Ser. No. 479,812

14 Claims. (Cl. 139—79)

This invention pertains to improvements in the shedding mechanism for looms and, more particularly, to those looms with a shedding mechanism of the cam and treadle type.

In looms of the type described, it is common practice to open and close sheds of warp ends with a plurality of harness frames reciprocally movable in generally vertical planes. In many instances the upward movement is imparted to the frames by spring tension means and the downward movement by positive acting means which overcome the upward tension forces and lower the frames to predetermined low points. The instant invention is directed toward improvements in presently known mechanism for effecting pull-down action.

Various constructions are well known in the art for moving harness frames downwardly by the pivotal action directed to a series of treadles. For numerous reasons having to do with cloth construction changes and varying shuttle sizes, an adjustable fulcrum type of treadle has been found advantageous. A known means which combines a rack and gear to adjustably fix the pivotal point longitudinally of the treadle has been satisfactory in many respects. This and other previous constructions have a common disadvantage, however. Due to space limitations they have been pivotedly fixed toward the rear rather than toward the front of the loom. Because of such positioning the opposing reciprocation of the treadles, by which some are drawn down while others go up, acts upon the set of vertical harness frames in a manner reversely to that which is desired. In other words, the treadles are opened to form an angle directed toward the front of the loom, but as these are identical, only one will be explained. A cam follower lever 29 is pivotally supported at its apex upon the shaft 28 (FIGS. 1 and 3). The lever 29 is of angular bell crank formation having one arm 30 upon which a cam follower roll 31 is attached and a second arm 32 for supporting the treadle, generally designated 33, to be explained fully below.

The arm 30 has two sets of matching teeth 34 directed rearwardly when positioned in the loom for indexing a roll bracket 35 (FIG. 5). A pair of bracket teeth 36 on the back of the bracket 35 mate with the teeth 34 for adjusting the position of the bracket 35 longitudinally of the arm 30. Any fastening means such as a bolt 37 may be used to lock these two parts together. The bracket 35 extends rearwardly forming a yoke 38 which journals the roll 31 by its trunnion 39. It will be seen that the roll 31, which will be urged toward the rotating cam 26, will cause the lever 29 to oscillate forward and backward in response to the cam face (FIG. 1). In reference to FIGS. 2 and 3, the treadle 33 is shown having two parallel side panels, each panel being formed by a pair of sheet members 40. The sheet members 40 of each pair are secured together vertically with a measurable separation by a series of treadle pins 41 disposed along one end and a series of spacer collars 42 disposed centrally and along the opposite end of the treadle panel. The treadle pins and the spacer collars may be solidly fas-
tended by a welding operation. The side panels are rigidly interconnected by spacer bars 43 extending through each pair of collars 42 with a further welding operation added to secure the panels together. At the end of the treadle having the two linear series of treadle pins 41 there are no spacer bars 43 in order that this space will be left open (FIG. 2). The separation between the side panels is sufficiently to allow the arm 39, the roll 31, and a portion of the cam 26 to pass between the side panels.

The treadle 33 is pivotally held at a point intermediate its ends by the arm 32 fixed to a bearing 44 held by an expandable roll pin 45 (FIG. 2). The forwardly extending end of the treadle 33 has a roller 46 journaled between the side panels on a roll pin 47. The roller 46 rests and rolls upon a generally horizontally disposed plate 48 which extends between the middle girts 20 and 21. It has been found that in certain instances a sliding end surface is advantageous in place of the roller 46. It is primarily desirable that the forward end of the treadle be supported for movement in a horizontal plane.

The harness frames 27 may be connected with the treadles 33 under the treadle pins 41 by adjustable wire hooks 49 of any suitable type, of which many are available. A protective cover 50 may be secured above the forward ends of the treadles extending between the middle girts 20 and 21.

In operation, the lever 29 is pivoted forward and back in following the dictates of the cam 26. As the arm 32 is lowered, the treadle 33 is pivoted downwardly thus drawing the harness frame 27 to a low position. As the cam face drops away, the lever 29 follows and allows the treadle 33 to be drawn upwardly by any usual mechanism therefor (not shown). In FIG. 1 the extent of movement by the lever 29 and the treadle 33 is shown by means of the solid and dotted line illustration.

The straight lines of treadle pins 41, in treadles which are up and in treadles which are down, form an angle to each other which equals that of the angle of warpshed in the frames 27 above. This angle may be changed when necessary for different shuttle sizes by simply adjusting the bracket 35 longitudinally along the arm 30. Because with the invention all the harness gams in a set are alike, all the treadles in that set will have an equal angular motion. This makes all the treadles interchangeable so that, as the treadle pin 41 wear, a treadle can be switched to another harness in a regular system of rotation.

With the novel means disclosed whereby the fulcrum of each treadle is disposed forwardly of the cam and of the loom, the treadles for all of the frames from the front to the back are moved through an equal pivotal angle. This introduces improvements in cloth quality because of fewer causes for loom stoppage and with smoother shedding action increases in loom speed are also possible.

With this adaptation of the Scott Russell principle of straight-line linkage, harness frames with this invention are drawn downwardly in a straighter path than was previously possible with treadles pivoting through an arc. Less sway in the harnesses results in less chafing of the yarn and a better finished product than was possible with earlier mechanisms.

While one embodiment of the invention has been disclosed, it is to be understood that the inventive concept may be carried out in a number of ways. This invention is, therefore, not to be limited to the precise details described, but is intended to embrace all variations and modifications thereof falling within the spirit of the invention and the scope of the claims.

We claim:

1. Harness frame shedding means for looms which comprises a plurality of treadles, one for each frame, a cam shaft having cams rotatable therewith, one cam for each treadle, a cam follower lever for each treadle pivotally fixed forwardly of said cam shaft, a cam follower roll rotatably supported upon one end of said lever, a second end of said lever being secured intermediate the ends of said treadle for imparting pivotal motion thereto, a first end of said treadle extending rearwardly and having connecting means for said frames, and a second end of said treadle extending forwardly and being freely movable horizontally.

2. Mechanism as defined in claim 1 wherein said cams are all identical with uniform motion being directed toward each cam follower lever.

3. Mechanism as defined in claim 1 which further includes means for adjusting positively the second follower roll upon said cam follower lever.

4. Harness frame shedding means for looms which comprises a plurality of treadles, a cam shaft having cams rotatable therewith, one cam for each treadle, a cam follower lever for each treadle pivotally fixed forwardly of said cam shaft, a cam follower roll adjastably positioned along one end of said lever for rotation thereon, a second end of said lever being secured intermediate the ends of said treadle for imparting pivotal motion thereto, a first end of said treadle extending rearwardly and being bifurcated thus forming two opposing side members, each of said side members having a plurality of connecting means for said harness frames, and a second end of said treadle extending forwardly being freely movable horizontally.

5. Mechanism as defined in claim 4 wherein said follower roll with said one end of said lever together with that portion of said cam being in contact with said follower roll are adapted to pass between said opposing side members.

6. Harness frame shedding means for looms which comprises a plurality of identical treadles each including a pair of parallel side panels, said panels being rigidly connected in spaced apart relationship, a cam shaft having cams rotatable therewith, one cam for each treadle, a bell crank cam follower lever for each treadle pivotally fixed forwardly of said cam shaft, a cam follower member adjastably positioned longitudinally along one arm of said lever, a second arm of said lever being secured intermediate the ends of said treadle for imparting pivotal motion thereto, a first end of said treadle extending rearwardly and having a plurality of connecting means for said harness frames, said cam follower member with said one arm together with that portion of said cam which is in contact with said follower member being adapted to pass between the said side panels at the said first end of said treadle, a second end of said treadle extending forwardly being freely movable horizontally, and a plate member securely fastened to support said second end for movement thereon.

7. Mechanism as defined in claim 6 wherein said second end of the treadle also includes rolling means for contacting said plate member.

8. Mechanism as defined in claim 6 wherein said plurality of connecting means comprises two linear series of treadle pins opposingly fixed to said side panels.

9. Mechanism as defined in claim 8 wherein each one of said side panels includes a pair of vertically supported parallel sheet members, each said pair of sheet members being partially held in separation by one series of said treadle pins.

10. A treadle for a loom having a bifurcated first end and a second end being adapted for generally horizontal movement, a pivotal point on said treadle intermediate said ends, two series of connecting means opposingly disposed on said bifurcated end for actuating a loom harness frame, an angular lever having a first arm attached to said treadle at said pivotal point, a cam follower fixed to a second arm of said lever, said cam follower and said second arm being adapted to oscillate through said bifurcated end, said lever being pivotally supported at its apex.

11. The mechanism of claim 10 which further includes...
means for adjustably positioning said cam follower longitudinally of said second arm.

12. The mechanism as defined in claim 10 wherein the treadle is comprised of a pair of parallel side panels rigidly connected in spaced apart relationship.

13. The mechanism as defined in claim 12 wherein each one of said side panels includes a pair of parallel sheet members, each said pair of sheet members being partially held in separation by a series of treadle pins.

14. Mechanism as defined in claim 10 wherein at least one roller is secured to said second end for movement thereon. No references cited.

MERVIN STEIN, Primary Examiner.

H. S. JAUDAN, Assistant Examiner.