

SPECIFICATION

Shedding apparatus for loom

- 5 The present invention relates to a shedding apparatus for a loom.

Conventional shedding apparatus for a loom generally comprises a plurality of heald frames arranged one behind another, a single camshaft disposed below such row of the heald frames and extending alongside thereof, and a set of cam plates of the same number as the heald frames. As all cams are mounted on one and the same camshaft, this shaft is required to be sufficiently long in view of the mechanical properties of such cams, of which the thickness cannot be reduced without the risk of reduced strength. This means that the distance between the nearest and farthest heald frames would become necessarily long. The longer the distance between these two extreme heald frames, the larger becomes the differential in their respective vertical movements or strokes. Modern high-speed shedding apparatus demands an absolute minimum of such distance and differential.

- 25 According to the invention, there is provided a shedding apparatus for raising and lowering a plurality of groups of warp threads in a loom, said apparatus comprising in combination: a housing; a pair of parallel spaced first and second camshafts rotatably supported in said housing; means for driving said first and second camshafts to rotate in synchronism with each other; a plurality of cams mounted alternately on said first and second camshafts; a plurality of cam followers each including a lever pivotally supported on said housing and a roller rotatably mounted on said lever, said lever being urged against one of said cams to cause said roller to rest thereon; and a plurality of heald frames each operatively connected to one of said cam followers and vertically movable in response to pivotal movement thereof in response to rotation of the respective cam to raise and lower a selected group of warp threads.

- 45 The invention will now be described by way of example with reference to the accompanying drawings wherein:-

Figure 1 is a front elevational view, partly in cross section, of a shedding apparatus for a loom embodying the present invention;

- 50 *Figure 2* is a left-side elevational view, with parts broken away, of the apparatus of *Figure 1*; and

Figure 3 is a diagrammatic plan view of cam plates and heald frames, illustrating their positional relationship.

- 55 *Figures 1 and 2* illustrate a shedding apparatus for a loom, generally indicated by the numeral 10. The apparatus 10 includes a pair of parallel spaced first and second axles 11, 12 each nonrotatably supported at opposite ends by front and rear side walls 13, 14 of a housing 15. A pair of first and second sleeves or hollow camshafts 16, 17 are rotatably mounted respectively on the first and second axles 11, 12 through their respective pairs of ball bearings 18, 18 and 18, 18 (only one of the ball bearings being illustrated in *Figure 2* for clarity).

The first and second camshafts 16, 17 are co-rotatably connected to each other by means of a gearing. The gearing includes a drive gear 19 mounted on a drive shaft 20 operatively connected to a motor (not shown), and a pair of first and second wheel 21, 22 mounted on the first and second camshafts 16, 17, respectively. The drive shaft 20 is interposed between the first and second camshafts 16, 17 and extends in parallel thereto. The first and second wheels 21, 22 each have a set of peripheral teeth 23, 24 meshing with the drive gear 19, so that rotation of the drive shaft 20 is transmitted to both first and second camshafts 16, 17 to effect synchronous rotation of these camshafts.

- 80 As best shown in *Figure 3*, a plurality of cams 26 are mounted alternately on the first and second camshafts 16, 17, and axially spaced from one another at equal intervals.

Each cam 26 has a peripheral cam surface constituted by a major-diameter portion 27, a minor-diameter portion 28 disposed diametrically thereto, and a pair of opposed intermediate portions 29, 29 linking these major- and minor-diameter portions 27, 28 (*Figure 1*). On each of the first and second camshafts 16, 17, any adjacent two of the cam plates 26 are angularly spaced at 180° from each other.

- The apparatus 10 further includes a plurality of heald frames 25 arranged one behind another in a line and a plurality of connecting rods 30 extending through a top wall 31 of the housing 15 and axially-slidably supported respectively by a plurality of sleeve-like bearings 32 mounted on the top wall 31. Each connecting rod 30 has an upper end fixed to respective one of the heald frames 25 and a lower end operatively connected to respective one of cam followers 33 through respective one of connecting links 34, as best shown in *Figure 1*.

The cam followers 33 each include a lever 35 pivotally supported on the housing 15 and a roller 36 rotatably mounted on the lever 35. The levers 35 are fulcrummed alternately on a pair of pivot pins 39, 39. A plurality of resilient means 37, each including a pair of coil springs, urge the cam followers against the cams 26, respectively, so that each roller 36 engages with respective one of the cams 26 on its peripheral cam surface. The cams 26 vary in geometry according to the strokes called for the individual heald frames 25, as well known in the art.

- 115 The apparatus 10 thus constructed operates as follows:

As a fabric is progressively woven of warp threads 38 (indicated by dash-and-two-dot lines in *Figure 2*) and weft threads, the first and second camshafts 16, 17 are synchronously rotated by the drive gear 19 respectively through the first and second wheels 21, 22. Simultaneously, the cams 26 on the first camshaft 16 rotate in synchronism with those on the second camshaft 17. This causes each cam follower 33 to pivot upwardly and downwardly according to the geometry of respective one of the cams 26. As a result, the heald frames 25 each are moved up and down responsive to pivotal movement of respective one of the cam followers 33 to raise and lower a selected group of warp threads 38. In each stroke,

the individual heald frame 25 is in its uppermost position as the roller 36 rests on the major-diameter cam portion 27, and is in its lowermost position as the roller 36 rests on the major-diameter cam portion 38.

CLAIMS

1. A shedding apparatus for raising and lowering a plurality of groups of warp threads in a loom, said apparatus comprising in combination: a housing; a pair of parallel spaced first and second camshafts rotatably supported in said housing; means for driving said first and second camshafts to rotate in synchronism with each other; a plurality of cams mounted alternately on said first and second camshafts; a plurality of cam followers each including a lever pivotally supported on said housing and a roller rotatably mounted on said lever, said lever being urged against one of said cams to cause said roller to rest thereon; and a plurality of heald frames each operatively connected to one of said cam followers and vertically movable in response to pivotal movement thereof in response to rotation of the respective cam to raise and lower a selected group of warp threads.

2. An apparatus according to claim 1, wherein said driving means includes a drive shaft, a drive gear mounted on said drive shaft, and a pair of first and second wheels mounted respectively on said first and second camshafts, each of said first and second wheels having a set of peripheral teeth meshing with said drive gear so that rotation of said drive shaft is transmitted to both of said first and second camshafts.

3. An apparatus according to claim 1 or claim 2, wherein any adjacent two of said cams are angularly spaced from each other, on each of said first and second camshafts.

4. An apparatus according to any of claims 1 to 3, further comprising a pair of first and second axles non-rotatably supported on said housing, said first and second camshafts being rotatably mounted on said first and second axles, respectively.

5. An apparatus according to any of claims 1 to 4, further comprising a plurality of connecting rods and a plurality of connecting links, each of said connecting rods having one end fixed to one of said heald frames and the other end pivotally connecting to one end of one of said connecting links, the other end of said one of said connecting links being pivotally connected to one of said cam followers, whereby each of said connecting rods is axially reciprocable responsive to pivotal movement of respective one of said cam followers.

6. A shedding apparatus for raising and lowering a plurality of groups of warp threads in a loom substantially as hereinbefore described with reference to the accompanying drawings.

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15 synchronism with each other; a plurality of cams mounted alternately on said first and second camshafts; a plurality of cam followers each including a lever pivotally supported on said housing and a roller rotatably mounted on said
20 lever, said lever being urged against one of said cams to cause said roller to rest thereon; and a plurality of heald frames each operatively connected to one of said cam followers and vertically movable in response to pivotal movement thereof in response
25 to rotation of the respective cam to raise and lower a selected group of warp threads.
2. An apparatus according to claim 1, wherein said driving means includes a drive shaft, a drive gear mounted on said drive shaft, and a pair of first
30 and second wheels mounted respectively on said first and second camshafts, each of said first and second wheels having a set of peripheral teeth meshing with said drive gear so that rotation of said drive shaft is transmitted to both of said first and
35 second camshafts.
3. An apparatus according to claim 1 or claim 2, wherein any adjacent two of said cams are angularly spaced from each other, on each of said first and second camshafts.
- 40 4. An apparatus according to any of claims 1 to 3, further comprising a pair of first and second axes non-rotatably supported on said housing, said first and second camshafts being rotatably mounted on said first and second axes, respectively.
- 45 5. An apparatus according to any of claims 1 to 4, further comprising a plurality of connecting rods and a plurality of connecting links, each of said connecting rods having one end fixed to one of said heald frames and the other end pivotally connecting
50 to one end of one of said connecting links, the other end of said one of said connecting links being pivotally connected to one of said cam followers, whereby each of said connecting rods is axially reciprocable responsive to pivotal movement of
55 respective one of said cam followers.
6. A shedding apparatus for raising and lowering a plurality of groups of warp threads in a loom substantially as hereinbefore described with reference to the accompanying drawings.