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APPARATUS FOR GUIDING THE HARNESSES OF A LOOM

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Fig. 1

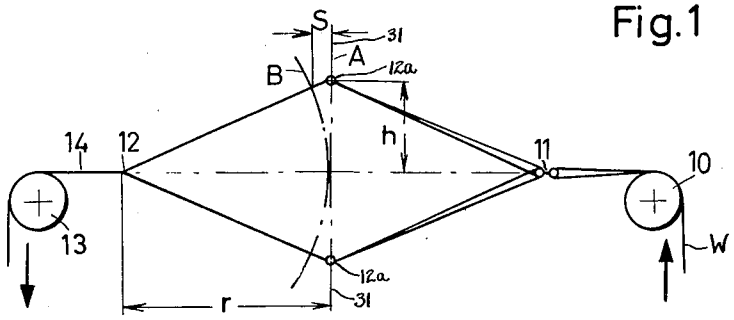
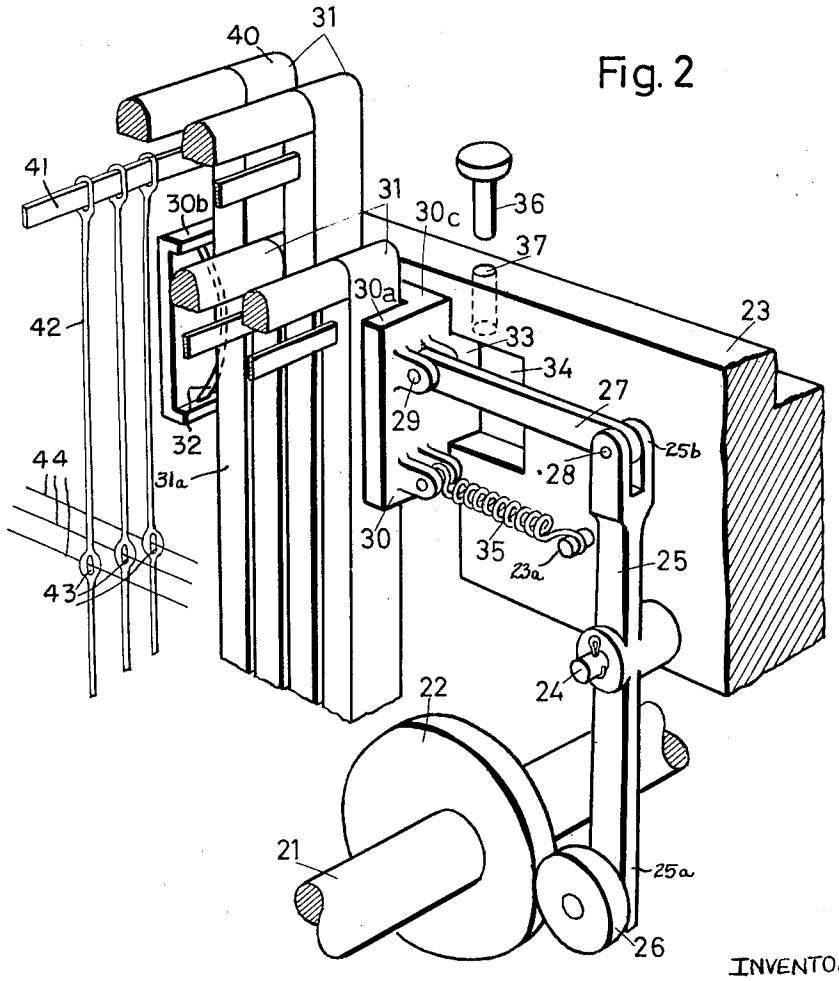


Fig. 2



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APPARATUS FOR GUIDING THE HARNESSES OF A LOOM

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8 Claims. (Cl. 139—82)

The present invention relates to an improved apparatus for guiding the harnesses of a loom.

During shed formation at a weaving loom the harnesses are moved up and down in a straight line in the usual manner. Since, however, the individual warp elements move along a circular arc about the fell or edge of the fabric there appears wear or chafing of the warp threads at the heddle eyes of the harnesses. This wear and the thereby resulting additional tension in the warp threads are mainly to be considered as the cause for warp rupture.

Apparatus is already known to the prior art which reduces the relative movement between the warp and the heddle eyes. Such resort to the technique of inclining the harnesses so that the path of the heddle eyes with closed shed and in the upper shed coincides with the arc described by the warp element. However, such type apparatus has the disadvantage that only the upper shed is improved; in the lower shed, on the other hand, the wear of the warp threads has become still larger.

Accordingly, it is an important object of the present invention to provide a simple apparatus for guiding the harnesses at a loom which overcomes the aforementioned disadvantages.

Another important object of the present invention relates to the provision of an improved apparatus for guiding the harnesses at a loom which substantially minimizes wear of the warp at the region of the heddle eyes.

Still a further important object of the present invention relates to improved apparatus for guiding the harnesses at a loom incorporating guide means for guiding the harnesses in a straight-lined path and movable transverse to the direction of movement of the harnesses, and drive means for displacing said guide means such that the heddle eyes of the harnesses describe at least a circular arc-shaped path.

Generally speaking, the apparatus of the present invention is essentially manifested by the features that the harnesses are guided in a straight-lined or linear path in guide members which, in turn, are movable transverse to the direction of movement of the harnesses and are operatively connected with drive means in such a manner that the heddle eyes of the harnesses each at least approximately describe a circular arc-shaped path.

Other features, objects and advantages of the invention will become apparent by reference to the following detailed description and drawing in which:

FIGURE 1 schematically illustrates the geometry of the shed of a weaving loom; and

FIGURE 2 is a perspective view of a preferred embodiment of the inventive apparatus arranged at each side of the weaving loom.

Describing now the drawing, in FIGURE 1 the warp threads W extend from a non-illustrated warp beam over a calender roll **10**, then between a dividing rail **11** and through the heddle eyes **12***a* of the harnesses indicated more or less diagrammatically at **31** (FIGURE 1) of the loom, in order then to build from the fell or edge **12** of the fabric a portion of the fabric or cloth **14** which is guided about a breast beam **13** and wound-up by means of a suitable non-illustrated mechanism.

In the usual manner the harnesses **31** and their heddle eyes **12***a* describe a straight-lined or linear movement, the path of which is generally represented by reference character A. However, the thread elements which contact the heddle eyes **12***a* when the shed is closed describe a circular arc B about the fell or edge **12** of the fabric and possessing the radius *r*, wherein *r* is equal to the distance of the fell **12** from the harnesses **31**. From FIGURE 1 it can be recognized that the straight-lined path A of the harnesses **31** deviates from the path B of the warp elements at a maximum through the distance S defined by the function:

$$S = r - \frac{r^2}{\sqrt{r^2 + h^2}}$$

wherein *h* represents the upward stroke of the harnesses out of their central or middle position.

In FIGURE 2 there are illustrated details of the apparatus for guiding the harnesses **31**. However, for convenience in illustration there is only shown the guiding apparatus at one side of the loom, yet it is to be understood a similar arrangement is also disposed at the other side, and since the function and physical structures are the same the details hereinafter described are to be considered as also applicable to the non-illustrated portion of the guiding apparatus. Now by referring to FIGURE 2, it will be seen that a crank shaft **21** of the loom carries an eccentric **22**. A double-arm lever **25** is pivotably mounted at a shaft **24** secured to a plate or shield **23** of the loom. This double-arm lever **25** carries a follower or feeler roller **26** at one end **25***a* which engages with the eccentric **22**. A guide rod **27** is articulated through the agency of a pin **28** with the other bifurcated end **25***b* of the lever **25** and is further articulated via a pin **29** to a harness guide means or member **30**. The harness guide member **30** is advantageously of U-shaped configuration and straddles an entire group of harnesses **31** by means of its two parallel legs **30***a* and **30***b*.

By way of completeness in FIGURE 2 there is also shown details of the physical structure of the outermost or rear harness **31***a* of the group of harnesses **31**. This rearmost harness **31***a* comprises the harness frame **40** to which is imparted the shed forming motion. Harness frame **40** carries the crossbar **41** supporting the conventional heddle wires **42** provided with the heddle eyes **43**—analagous to the heddle eyes **12***a* of FIGURE 1—and through which pass the individual warp threads **44** of the chain of warp W of FIGURE 1. To simplify illustration only a few of the heddle wires **42** and only a few of the warp threads **44** are shown in this figure. It should be apparent that the other harnesses **31** embody a similar construction.

A flat or blade spring **32** disposed between an outer harness **31***a* and the leg **30***b* of the harness guide member **30** presses the harnesses **31** against one another and against the other leg **30***a* of the aforesaid harness guide member. An extension or projection **33** located at the external side of the intermediate web **30***c* of the U-shaped guide member **30** slides in a groove or slot **34** of the shield **23**. A tension spring **35** is suspended between this harness guide member **30** and a pin **23***a* of the shield **23**. In the illustrated embodiment it is assumed that the harnesses **31** are each actuated from below in known manner by means of a lever system; an element of this lever system, the harness support, is elastically constructed since it must permit a certain displacement of the harnesses **31** in the direction of the wrap threads for threading or drawing-in ruptured threads.

A pin or plug **36** can be inserted into a bore **37** provided at the shield **23** and placed in the path of the

projection 33 when the harness guide member 30 is located in that dead-center position which corresponds to a scanning or feeling of the largest radius of the eccentric 22 by the feeler roller 26. It will be recalled that a similar apparatus for guiding the harnesses was indicated as arranged at the opposite non-illustrated loom shield or loomside.

The manner of operation of the heretofore described apparatus or mechanism is as follows:

The crank shaft 21 rotates synchronously with the harness movement, that is, with each revolution of the crank shaft there occurs in each case only a single harness change. The eccentric 22 effects that with increaing radius of the eccentric the lever 25 is pivoted by means of the follower roller 26 in counterclockwise direction about the shaft 24. This movement of the lever 25 is transmitted to the harness giude member 30 through the intermediary of the guide rod 27. This guide member 30 then slides back and forth by means of its projection 33 in the groove 34 of the loom shield 23 and thereby displaces the entire package or group of harnesses 31 through the distance corresponding to the difference between the minimum and maximum radius of the eccentric 22.

The tension spring 35 ensures for a pulling back of the harness guide member 30 and thereby for a continuous contact of the roller 26 against the eccentric 22. The difference between the smallest and largest radius of the eccentric 22 corresponds to the path "S" of FIGURE 1, and the form of the eccentric is selected in such a manner that with a radius increase during the time that the shed opens the heddle eyes 12*a* of the harnesses 31 describe the circular arc B (FIGURE 1). The reduction in radius of the eccentric 22 is the mirror image of the radius increase, so that the heddle eyes 12*a* also during closing of the shed move along the circular arc B.

The displacement of the harness guide member 30 is not hindered by the harness support for each harness 31 on account of their elasticity. A binding of the harnesses 31 in the harness guide member 30 is also not possible, since the spring 32 permits of a small inclination of the harnesses 31 in the harness guide member 30.

During the manufacture of certain fabrics not all of the harnesses are always moved. If the harness guide member 30 is further moved in the described manner back and forth then warp thread wear would occur at the heddle eyes of the stationary harnesses. By inserting the pin 36 in the bore 37 of the shield 23 it is possible to lock each harness guide member 30 in its forwardmost position in which the follower roller 26 just no longer contacts the eccentric 22 at the location of the largest radius. The projection 33 is then pressed against the pin 36 by means of the tension spring 35. As a result, each transverse displacement of the harnesses is prevented and the follower roller 26 raised from the eccentric 22.

While there is shown and described a present preferred embodiment of the invention it is to be distinctly understood that the invention is not limited thereto but

may be otherwise variously embodied and practised within the scope of the following claims.

What is claimed is:

1. Apparatus for guiding the harness means of a loom comprising, in combination, harness means having heddle eyes thereat, guide means for guiding said harness means in a straight-lined path, said guide means being mounted for movement transverse to the direction of movement of said harness means, drive means cooperating with said guide means for displacing the latter in order that the heddle eyes of said harness means describe an at least approximately circular arc-shaped path.

2. Apparatus for guiding the harness means of a loom as defined in claim 1 wherein said drive means incorporates a crank shaft and at least one eccentric seated upon said crank shaft.

3. Apparatus for guiding the harness means of a loom as defined in claim 1 wherein said guide means are mounted for movement at right angles to the direction of movement of said harness means.

4. Apparatus for guiding the harness means of a loom as defined in claim 1 further including means for locking said guide means.

5. Apparatus for guiding the harness means of a loom as defined in claim 4 wherein said drive means incorporates at least one eccentric and a feeler roller normally bearing against said eccentric, said feeler roller being operatively connected with said guide means, said locking means being constructed to fix said guide means in a position wherein said feeler roller is raised from said eccentric.

6. Apparatus for guiding the harnesses of a loom comprising, in combination, a plurality of harnesses each having heddle eyes thereat, guide means for guiding said harnesses in a linear path, means mounting said guide means for movement transverse to the direction of movement of said harnesses, drive means operable with said guide means for displacing the latter in order that the heddle eyes of said harnesses describe an at least approximately circular arc-shaped path.

7. Apparatus for guiding the harnesses of a loom as defined in claim 6 wherein said mounting means includes linear slot means slidably supporting said guide means.

8. Apparatus for guiding the harnesses of a loom as defined in claim 6 further including spring means carried by said guide means for pushing said harnesses against one another.

References Cited by the Examiner

UNITED STATES PATENTS

2,408,645 10/1946 Hunt ---------- 139—82

FOREIGN PATENTS

853,427 7/1949 Germany.
189,381 5/1937 Switzerland.

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