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SHEDDING MECHANISM FOR CIRCULAR LOOMS

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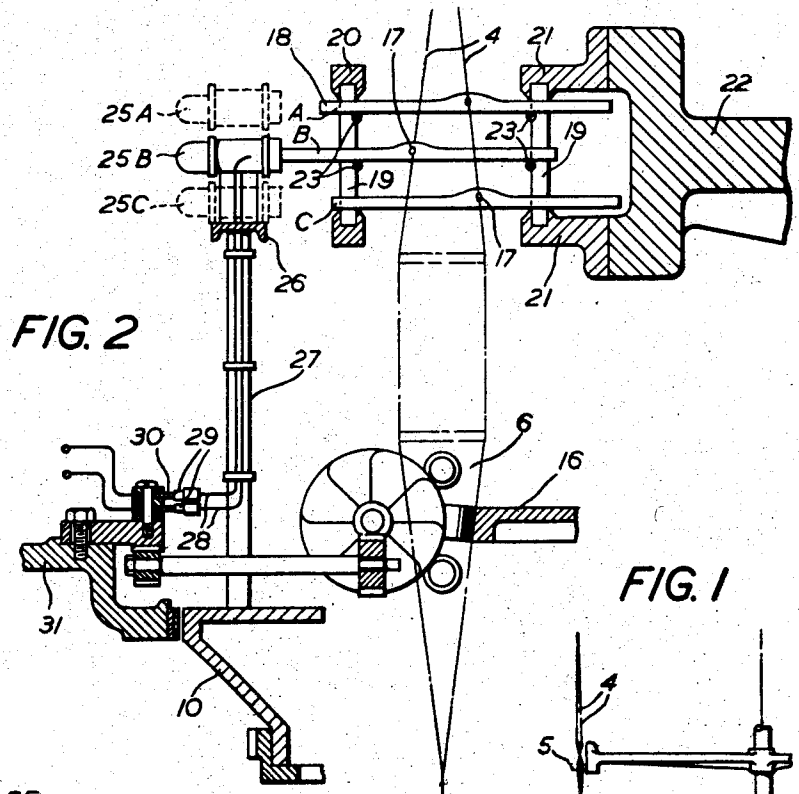


FIG. 2

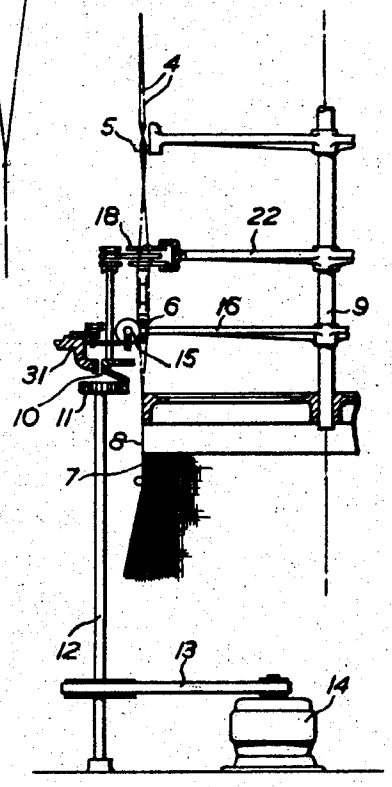


FIG. 1

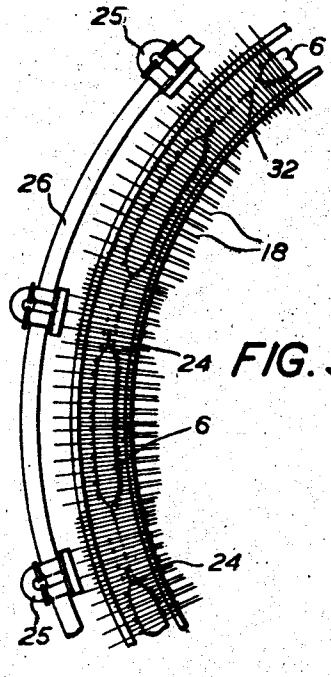


FIG. 3

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SHEDDING MECHANISM FOR CIRCULAR LOOMS

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4 Claims. (Cl. 139—16)

This invention relates to shedding mechanism for circular looms.

The most advantageous construction of circular loom for weaving textile fabrics being one in which the warps proceed substantially cylindrically to the point at which they are woven into fabric so that the diameter of the fabric may be large in relation to the space occupied by the loom, the shedding movement of the warp threads out of their normal line from the supply to fabric must be in a radial or substantially radial direction. The necessity for imparting such movement to the warp threads leads to difficulty in constructing a shedding mechanism for a circular loom, especially as most textile fabrics have the warp threads spaced very close together, which calls for the disposition in a relatively restricted space of a great number of controlling elements necessary to bring about shedding. The difficulty above-mentioned is further increased because these elements have to be reasonably accessible to the operative for the entering of a warp or the tying-in of broken ends.

The apparatus according to the present invention provides in a simple manner for the radial movement of each warp thread and enables effective control to be obtained over all the warp threads even when these are present in very high density.

According to the invention the warp threads are controlled by light flat metal healds mounted on their edges so as to lie radially in a support arranged round the loom, the healds being free to move in the support over a distance somewhat in excess of that necessary to divide the warps into a shed through which the shuttle can pass. The healds are mounted in a plurality of banks, the one support conveniently being adapted to carry all the banks, as will appear later. An electro-magnet is mounted in advance of each shuttle opposite each bank of healds controlling the warp threads that are to be separated at that shuttle from the remainder of the warp threads, the electro-magnet attracting each heald in turn so as to cause it to slide in its support and deflect the warp thread controlled by it out of the normal line of the warp threads. This movement of the healds is effected just in front of the shuttle and the heald remains attracted until the deflected warp thread has passed to the side of the shuttle opposite to that to which the undeflected warp threads pass. When the healds pass out of the field of the electro-magnet, they are free to return to their normal position, the tension in the warp threads effecting this return movement of the healds as the warps reach the rear end of the shuttle. The light flat section of the healds and their edgewise mounting in the support allow them to be flexed readily and easily pushed to one side, so that access can readily be had to any particular heald or healds during threading up.

It is not necessary that the distance between the two sheets into which the warp threads are divided be equal to the width of the shuttle, since the continual passage of the shuttle will force the two sheets of warp threads apart, provided the initial separation was wide enough for the shuttle nose to enter.

The electro-magnets may be arranged outside the warp circle so as to lie adjacent to the ends of the healds projecting outwards from the support; or the magnets may be disposed inside the warp circle so as to lie adjacent to the ends of the healds projecting inwardly from the support.

Where the dobby mechanism is employed in a loom in which the shuttles rotate, the electro-magnets are so mounted that they rotate at the same speed as the shuttles, connection of the magnets to the supply being by means of slip rings.

The invention will now be described in greater detail with reference to the accompanying drawing, which shows the application of the invention to a rotating-shuttle loom.

In the drawing

Fig. 1 shows diagrammatically in vertical half-section a circular loom embodying shedding mechanism;

Fig. 2 shows the shedding mechanism in a view corresponding to Fig. 1 but to a larger scale; and

Fig. 3 shows part of the shedding mechanism in diagrammatic plan view.

Referring to Fig. 1 warp threads **4** are shown directed vertically downwards from a spacing comb **5** past the shuttles **6** to the fell of the fabric **7**, the latter passing over a supporting ring **8** down to a take-up device (not shown) near the base of the loom. The comb **5** and the ring **8** are supported from the stationary centre shaft **9** of the loom.

The shuttles **6** are supported from a rotatable ring **10** driven by means of a gear **11** upon a shaft **12** connected by belt gear **13** to a motor **14**. On the ring **10** are mounted rotatable vane wheels **15** passing through the outer sheet of warps into contact with the shuttle so as to position the shuttle against an interior supporting ring **16** and, because of the rotation of the ring **10**,

causing the shuttles to revolve about the said shaft 9 of the loom.

The warp threads 4 before reaching the shuttles 6 pass through eyes 17 of flat healds 18 mounted edgewise for free radial movement between spacing pieces 19 carried by annular supports 20, 21 outside and inside the warp circle respectively. The inner supports 21 are carried on a spider 22 from the shaft 9. The healds 18 are arranged in three banks A, B, C, the healds of the two upper banks being supported on rings 23 sprung into notches in the spacing pieces 19.

As is indicated by Fig. 2, every third warp thread 4 (represented by dots) of a set of three adjacent warp threads is entered into the eyes 17 of bank A, every second warp thread into the eyes of bank B, and every first warp into the eyes of bank C. The eyes 17 lie in the length of the healds between the supports 20, 21, the flexibility due to the flatness of the healds permitting the healds to be deflected so that each eye, even of the middle bank, is readily accessible for threading up. It will be understood that while in the shedding position shown in Fig. 2 the third and first threads of a set of three are in line with each other and consequently appear in the figure as a single thread, the threads are quite separate and independent of each other, the first thread (passing through the eye 17 of the lowermost heald C) lying directly behind the third thread (passing through the eye 17 of the uppermost heald A).

Positioned outside the warp circle just in advance of the noses 24 of the shuttles 6 are electro-magnets 25, there being a magnet 25A at the level of heald bank A and similarly, electro-magnets 25B, 25C at the levels of banks B and C respectively. These magnets are carried on a ring 26 mounted upon supports 27 on the ring 10, the magnets being connected in series and fed by means of conductors 28 making contact by means of brushes 29 with a pair of slip rings 30 carried by a stationary part 31 of the loom.

The mounting of the electro-magnets on the ring 10 ensures that the magnets rotate round the loom at the same speed as the shuttles 6, and, since the magnets remain continuously energized, each magnet attracts the healds of the corresponding bank just in advance of each shuttle and draws the warp threads threaded in that bank to the outside of the shuttle nose, leaving the remaining threads to pass to the inside of the shuttle nose. Into the shed thus initiated the shuttle pushes its way to insert the weft, all the healds returning under the tension of the warp threads to their normal line 32 at the rear of each shuttle to be re-shedded by the succeeding magnet.

The arrangement shown with one warp in three in regular sequence being attracted by the particular magnet provides for the weaving of 2:1 twill, but it will be understood that other threading arrangements of the warps may be adopted, and also that other numbers of banks than three may be employed for the production of different types of weave. Of course, in the case of the weaving of 2:1 twill involving division of the warps into equal groups of three, the number of shuttles in the loom should be a multiple of three.

What we claim and desire to secure by Letters Patent is:—

1. A multi-shuttle circular loom including means to cause the shuttles to rotate about the axis of the loom and shedding mechanism comprising a heald support, a plurality of banks of magnetic healds mounted radially in the support, and electro-magnets mounted in advance of the several shuttles so as to rotate round the loom at the same speed as the shuttles, the electro-magnets being positioned opposite selected banks of healds so as to attract the healds in said banks and to separate the warp threads controlled by the attracted healds from the remainder of the warp threads.

2. A multi-shuttle circular loom comprising a heald support, a plurality of banks of individually movable magnetic healds mounted radially in the support, electro-magnets for operating the healds, a member between which and the banks of healds there is relative circular motion with respect to the loom axis, and means for mounting the electro-magnets on said member in advance of the shuttles and opposite selected banks of healds so that the healds in such banks are attracted in turn and moved radially progressively around the loom to separate the warp threads controlled by the attracted healds from the remainder of the warp threads.

3. A multi-shuttle circular loom comprising a heald support, a plurality of banks of individually movable flat magnetic healds mounted on their edges so as to lie radially in the support, electro-magnets for operating the healds, a member between which and the banks of healds there is relative circular motion with respect to the loom axis, and means for mounting the electro-magnets on said member in advance of the shuttles and opposite selected banks of healds so that the healds in such banks are attracted in turn and moved radially progressively around the loom to separate the warp threads controlled by the attracted healds from the remainder of the warp threads.

4. A multi-shuttle circular loom, comprising a pair of annular supports, a plurality of banks of individually movable flat magnetic healds mounted on their edges so as to lie radially in said supports, eyes in the healds between the supports to receive warp threads, electro-magnets for operating the healds, a member between which and the banks of healds there is relative circular motion with respect to the loom axis, and means for mounting the electro-magnets on said member in advance of the shuttles and opposite selected banks of healds so that the healds in such banks are attracted in turn and moved radially progressively around the loom to separate the warp threads controlled by the attracted healds from the remainder of the warp threads.

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