# United States Patent

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## [54] CIRCULAR LOOM

**7 Claims, 2 Drawing Figs.**


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[50] Field of Search ..... 139/13, 1, 16, 296, 297



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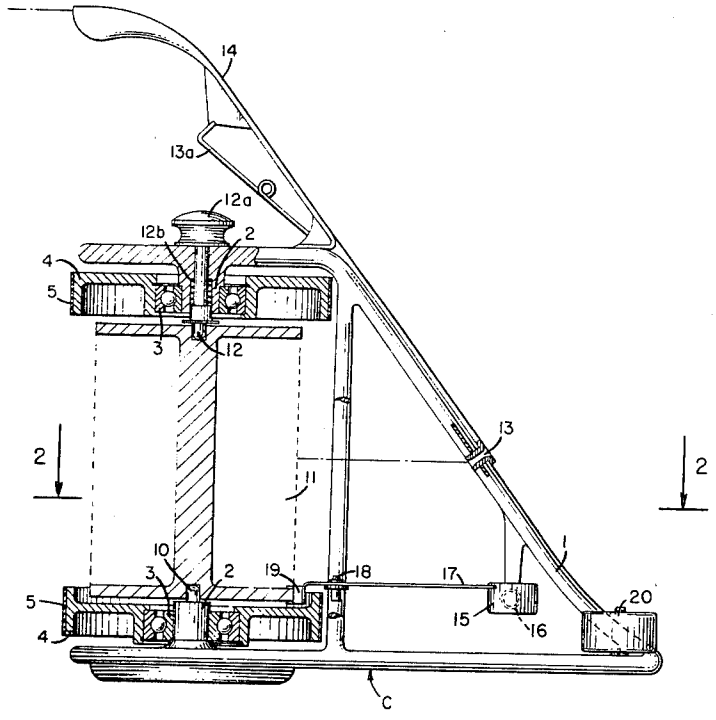
**ABSTRACT:** The crossthread carrier of a circular loom has a frame on which a thread spool and two drums coaxial with the spool are mounted for independent rotation. The drums bear on rollers of a rotating magnetic carrier while the spool feeds the crossthread in a nontwisting manner through a thread guide on the frame. A centrifugally deactivated brake holds the spool against rotation when the crossthread carrier is stationary. A roller mounted on the frame at a distance from the drums bears on a ring surrounding the warp threads to counteract centrifugal force acting on the carrier.

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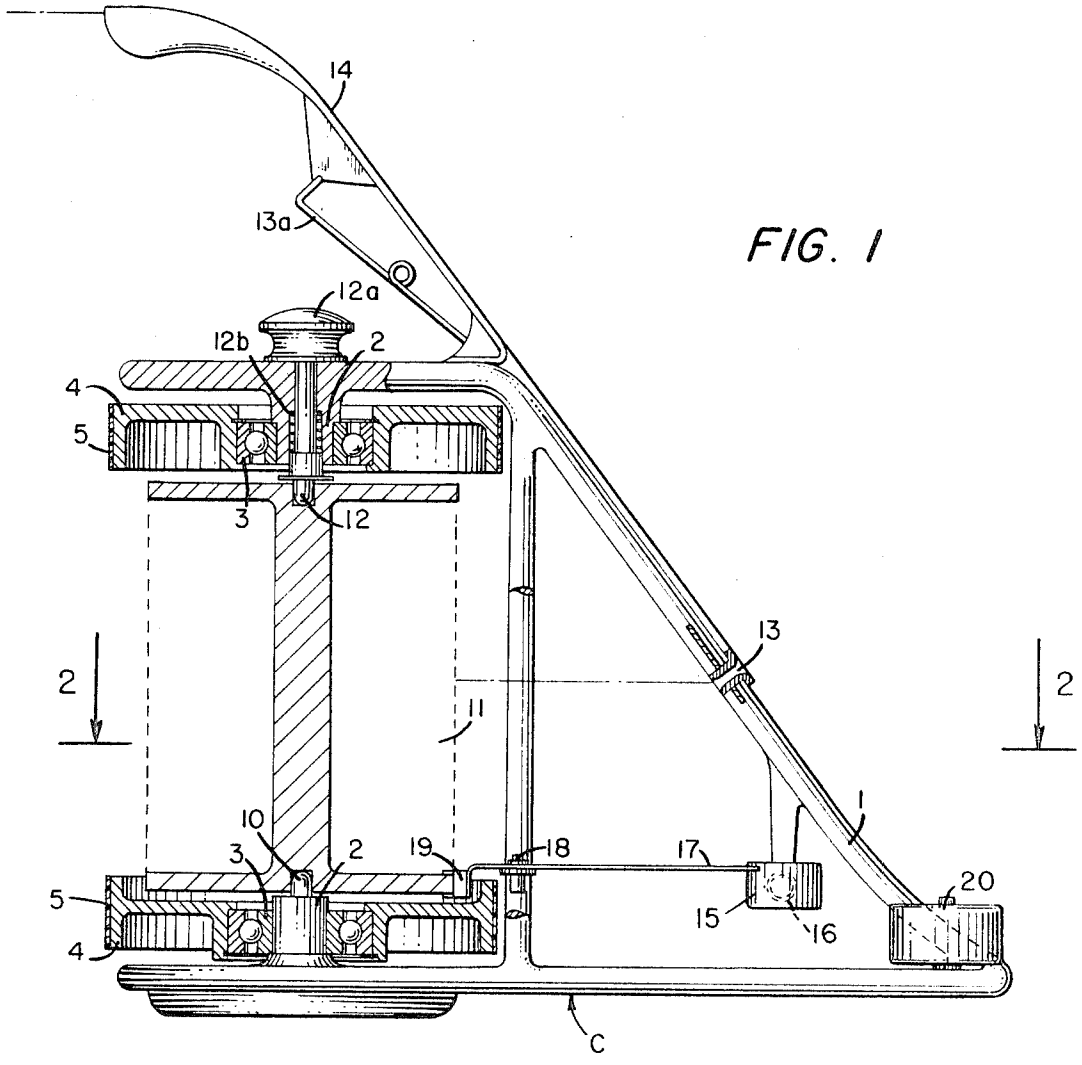


FIG. 1

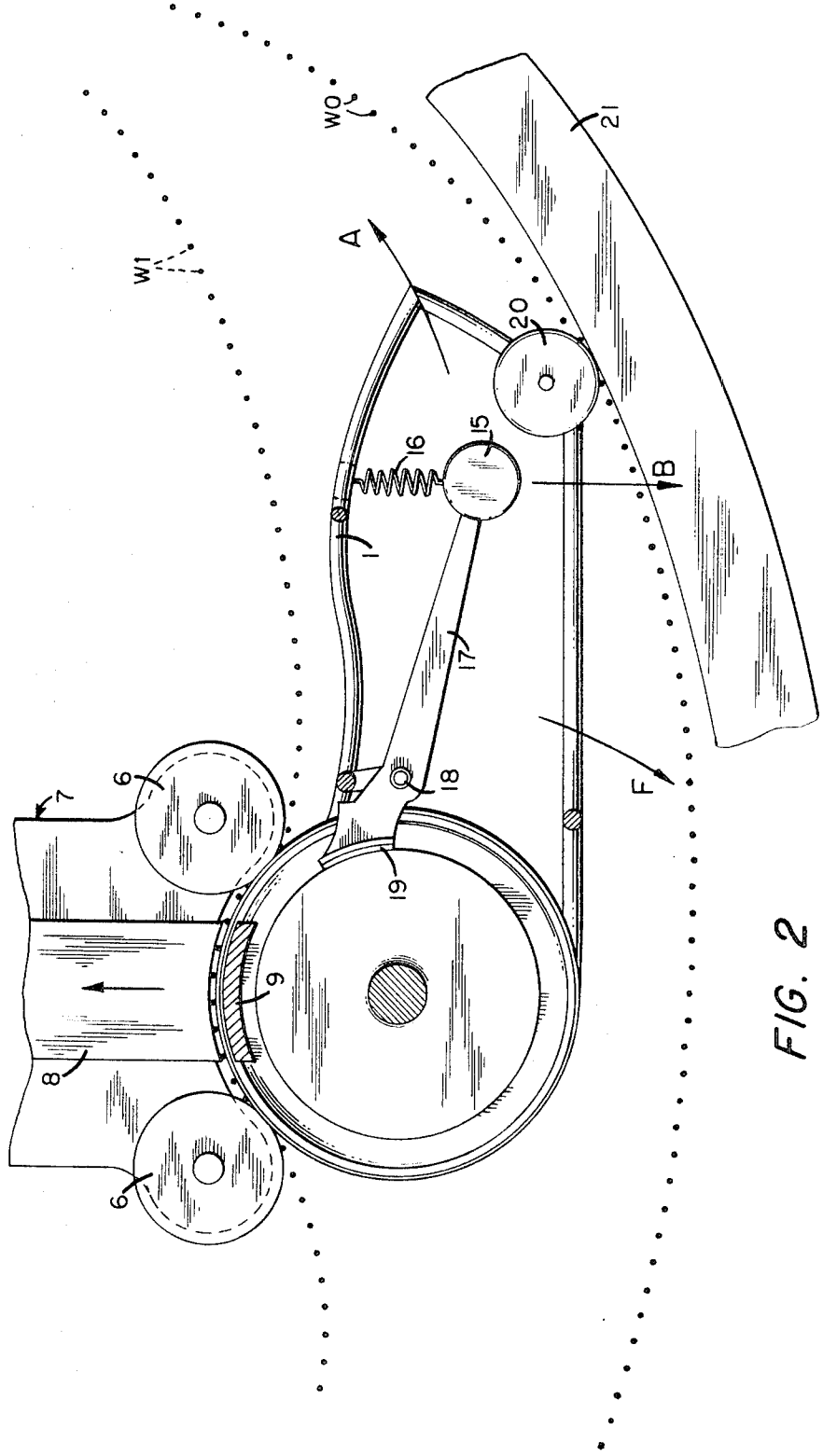


FIG. 2

# CIRCULAR LOOM

The present invention relates to circular looms and in particular, to the crossthread carriers of circular weaving looms that are magnetically driven. The term circular weaving loom is herein used in a generic sense and does not exclude other types of machines that involve the cross laying of threads such as machines for covering wires and cables and other similar machines.

The magnetic driving of the crossthread carrier in a circular weaving loom is already well known. The magnetic drive is composed of a rotating unit fitted with a permanent or electric magnet and four rollers, two driving and two driven, which contact and support a thread spool carrier. This rotating unit rotates inside the loom tangentially to the internal vertical warp threads and attracts the spool carrier cup which travels inside the shed or space between the inner and outer sheets of vertical warp threads and bears against the rollers of the magnetic carrier which impart to it a rotating movement so that it constitutes in effect a satellite.

Because the spool carrier rotates, the thread coming off of the thread spool is subjected to a twisting action which is of no importance when weaving with yarns or threads of circular cross section but is highly objectionable when weaving with flat threads such as raphia, straw or strips or bands of plastic material such as polystyrene or polypropylene. In order to obtain a perfect woven fabric with flat threads, it is necessary for the thread to be laid with no torsion whatsoever because it is only in this way that an opaque fabric can be obtained with a minimum quantity of thread.

It is an object of the present invention to provide a crossthread carrier which is driven magnetically as heretofore but which makes possible the feeding of the crossthread without torsion so that the thread is laid in the shed between inner and outer warp threads without twisting.

Another object of the invention is to provide a circular loom which can be operated at increased speed. In conventional magnetically driven crossthread spool carrier systems of circular weaving looms, the carrier is retained in the shed between the inner and outer warp threads by the warp threads themselves. With this arrangement the loom must be operated at relatively low speeds because the warp threads do not have enough strength to resist the higher centrifugal force acting on the carrier at higher speeds. In accordance with the invention, means is provided for counteracting the centrifugal for acting on the crossthread carrier so that the rotating speed of the loom can be substantially increased.

A further object of the present invention is to provide a braking system for the crossthread spool controlled by the centrifugal force generated by movement of the carrier in a circular path. The braking device in accordance with the invention immediately stops the spinning of the spool as soon as movement of the crossthread carrier stops.

The nature and advantages of the invention will be more fully understood from the following description of a preferred embodiment illustrated schematically by way of example in the accompanying drawings in which:

FIG. 1 is a vertical sectional view of a crossthread carrier in accordance with the present invention showing the manner in which the thread spool is mounted and,

FIG. 2 is a plan view of the thread carrier inside the space or shed between the inner and outer vertical warp threads and showing cooperating portions of the loom.

As illustrated by way of example in the drawings, a crossthread carrier C comprises a main body or frame 1 which is especially designed to be adapted to travel in the space or shed between an inner sheet of vertical warp threads WI and an outer sheet of vertical warp threads WO. The frame 1 is provided with spaced coaxial trunnions 2 on which two drums 4 are rotatably mounted by means of ball bearings 3. The drums 4 are in position to rest on and be supported by rollers 6 of a rotating magnetic carrier 7 so as to be driven by the carrier. The peripheries of the drums are preferably covered with plastic 5 having a high degree of adherence so that the drums roll the rollers 6 without slipping. The contact of the drums 4 against the rollers 6 is assured by the magnetic force of a permanent or electric magnet 8 which is provided in the carrier 7 and attracts an armature or "keeper" 9 which is fixed to the body of the crossthread carrier C. In the case of a permanent magnet, the magnetic force can be controlled by increasing or decreasing the distance between the magnet 8 and the armature 9. In the case of an electromagnet, the magnetic force can be controlled by varying the current in the magnet winding.



A crossthread spool 11 is mounted between and coaxially with the drums 4 in such manner as to be rotatable independently of the rotation of the drums. The rotational mounting of the spool 11 is illustrated in the drawings as comprising small stub shafts or pivots 10 and 12 which are provided respectively at the inner ends of the trunnions 2 and engage in small central recesses in opposite ends of the spool 11. The shaft 10 is fixed with respect to the lower trunnion 2 while the shaft 12 is axially slidable in an axial bore extending through the upper trunnion and the supporting portion of the frame 1. The shaft 12 is thereby retractable by means of a knob 12*a* against the force of a return spring 12*b* to permit the insertion and removal of the spool 11. Thread from the spool 11 passes through a guide 13 and then through a tension control device 13*a* and along the trolley 14 by which it is laid in the shed between the warp threads WI and WO.

By reason of its being supported for rotation in the frame independently of the drums 4, the spool 11 is rotated only by the withdrawal of the thread T from the spool and is completely free of any influence by the rotational movement of the drums 4. Hence, no torsion is transmitted to the thread T which accordingly comes off of the spool 11 and passes through the guide 13 and along the trolley 14 without being twisted.

In order to stop the spool 11 from rotating by reason of its inertia when the loom is stopped, the crossthread carrier C is provided with a centrifugally controlled brake which is actuated to stop rotation of the spool when movement of the carrier is stopped. The brake is shown as comprising a lever 17 which is pivotally mounted on the frame 1 by means of a pivot shaft 18. At its inner end, the lever 17 is provided with a contacting portion or brake shoe 19 adapted frictionally to engage the peripheral edge of one of the rims of the spool 11. At its outer end, the lever 17 is provided with a weight 15 which is positioned so that when the carrier is traveling in a circular path as indicated by the arrow A, centrifugal force acts on the weight 15 in an outward direction as indicated by the arrow B so as to swing the lever 17 about its pivot 18 in a clockwise direction as viewed in FIG. 2 and thereby disengage the brake portion 19 from the rim of the spool 11. A tension spring 16 connected between the frame 1 and the lever 17 tends to swing the lever in the opposite direction so as to bring the brake portion 19 into engagement with the rim of the spool and thereby stop rotation of the spool. Thus, when the loom is stopped and there is hence no centrifugal force acting on the weight 15, the brake lever 17 is held in braking position by the spring 16 so as to hold the spool 11 against rotation. When the loom is in operation and the crossthread carrier C is hence traveling in a circular path, centrifugal force acting on the weight 15 overcomes the force of the spring 16 to wing the brake lever 17 to an inoperative position and thereby free the spool 11 to permit unwinding of the crossthread.

The movement of the crossthread carrier C also creates a centrifugal force in the thread carrier itself tending to turn the body 1 in the direction of the arrow F about the axis of the drums 4. In order to counteract this force, the crossthread carrier is provided with a roller 20 which is rotatably mounted on the frame or body 1 at a distance from the drums 4 in position to bear on a ring 21 which is concentric with the main axis of the loom and closely surrounds the vertical warp threads. The warp threads pass between the freely rotating roller 20 and the ring 21 suffering no damage. Moreover, since the centrifugal force acting on the crossthread carrier is counteracted by the

roller 20 running inside the ring 21, the outer sheet WO of vertical warp threads is relieved from the stress to which it would be subjected if called upon to retain the carrier in the shed. By thus counteracting the centrifugal force acting on the crossthread carrier, it is possible to operate the loom at a higher speed without subjecting the warp yarns to excessive stress.

While a preferred embodiment of the invention has been illustrated by way of example in the drawings and has been particularly described, it will be understood that many modifications may be made in the details of the construction.

What I claim and desire to secure by Letters Patent is:

1. In a circular weaving loom in which a crossthread is introduced between inner and outer circular sheets of warp thread defining a shed, the combination with a rotating magnetic carrier having a magnet and two parallel rollers, of a crossthread carrier comprising a frame, two coaxial drums rotatably mounted in said frame in position to roll on said rollers of the magnetic carrier, a thread spool disposed between said drums and rotatably mounted in said frame to be rotatable relative to said frame and relative to said drums and means for guiding thread from said spool and feeding it between said sheets of warp threads in said loom.

2. A circular weaving loom according to claim 1, in which the rotatable mountings of said drums and said spool comprise spaced coaxial trunnions in said frame, ball bearing supporting said drums respectively on said trunnions, and stub shafts projecting axially from said trunnions and rotatably supporting said spool independently of said drums.

3. A circular weaving loom according to claim 2, in which at least one of said shafts is axially slidable relative to the respective trunnion and is retractable against spring tension to release said spool.

4. A circular weaving loom according to claim 1, further comprising brake means for braking rotation of said spool, said brake means being movable between an active position in which it brakes rotation of said spool and an inactive position, spring means for biasing said brake means to active position and centrifugal means responsive to movement of said crossthread carrier in a circular path in said loom to move said brake means to inactive position.

5. A circular weaving loom according to claim 4, in which said brake means comprises a lever pivotally mounted on said frame, and a brake contact portion on said lever in position frictionally to engage said spool, said spring means comprising a spring acting between said lever and said frame to swing said lever about its pivot to bring said contact portion into engagement with said spool and said centrifugal means comprising a mass on said lever spaced from said pivot in position to swing said lever about its pivot in a direction to disengage said contact portion from said spool by centrifugal force acting on said mass when said crossthread carrier is moving in a circular path in said loom.

6. A circular weaving loom according to claim 1, in which said loom has a ring closely surrounding said outer circular sheet of warp threads, and in which a roller is rotatably mounted on said frame spaced from said drums in position to roll on said outer sheet of warp threads supported by said ring to counteract centrifugal force acting on said crossthread carrier when said carrier is moving in a circular path in said loom.

7. A circular weaving loom according to clam 4, in which said loom has a ring closely surrounding said outer circular sheet of warp threads, and in which a roller is rotatably mounted on said frame spaced from said drum in position to roll on said outer sheet of warp threads supported by said ring to counteract centrifugal force acting on said crossthread carrier when said carrier is moving in a circular path in said loom.