Jan. 3, 1961 E. PFARRWALLER 2,966,930

TENSIONING DEVICE FOR THE WARP IN WEAVING MACHINES

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Fig. 1

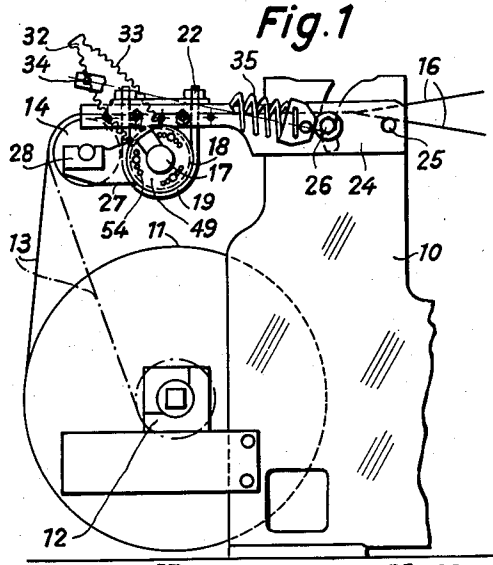
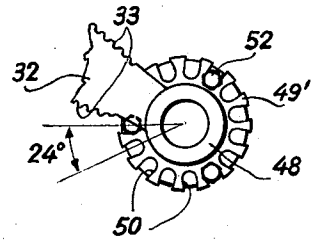


Fig. 7



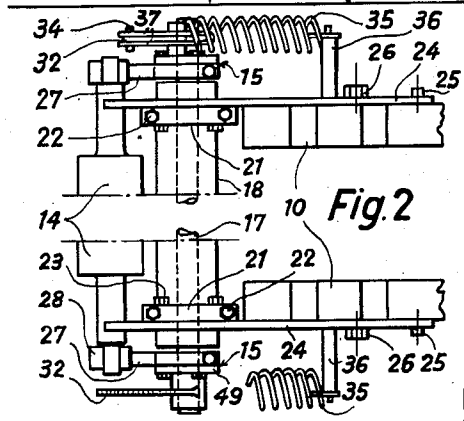
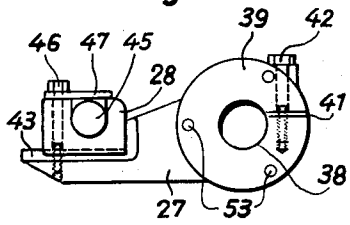


Fig. 2

Fig. 5



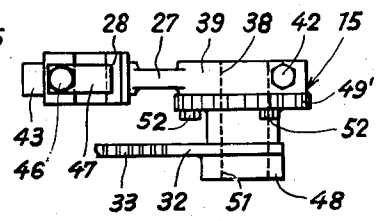


Fig. 6

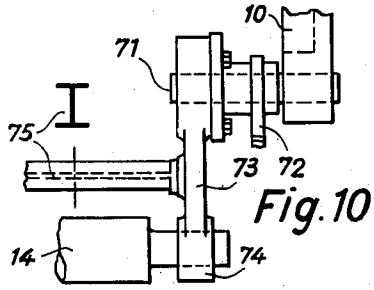


Fig. 10

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TENSIONING DEVICE FOR THE WARP IN WEAVING MACHINES

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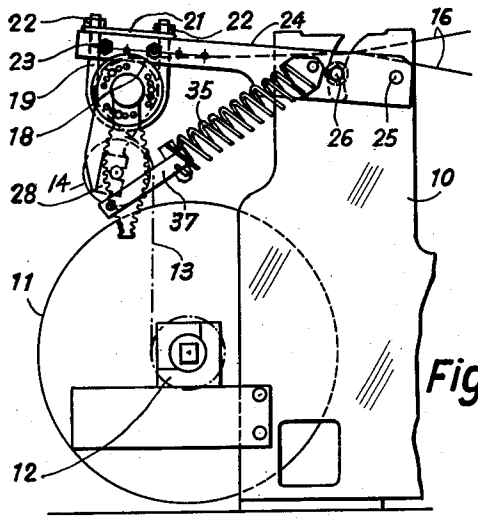


Fig. 3

Fig. 8

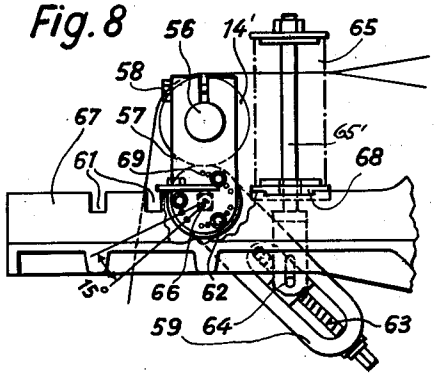
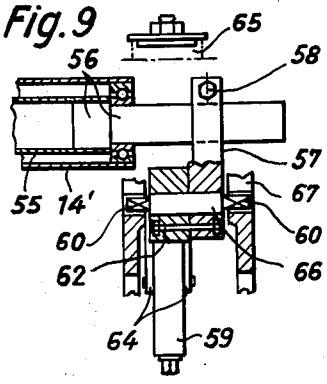


Fig. 9



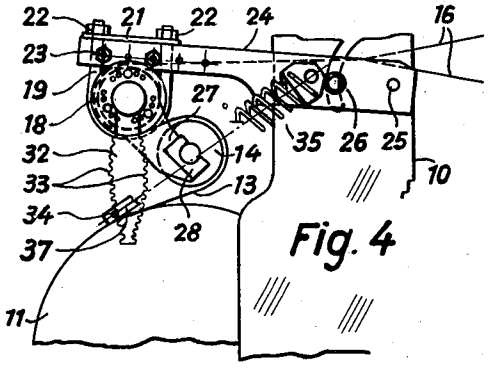


Fig. 4

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TENSIONING DEVICE FOR THE WARP IN WEAVING MACHINES

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9 Claims. (Cl. 139—114)

The present invention relates to a tensioning device for the warp in weaving machines, particularly in weaving machines which can be adjusted for different widths of the fabric.

The device according to the invention includes a tensioning beam which is carried by a plurality of carrier arms which are coaxially rockably supported by the loom frame and which are rigidly interconnected, rocking arms being angularly adjustably associated with and adapted to rock on the same axis as the carrier arms, springs being connected with the rocking arms for rocking the latter and the carrier arms and the tensioning beam supported thereby against the pull of the warp.

The novel features which are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself however and additional objects and advantages thereof will best be understood from the following description of embodiments thereof when read in connection with the accompanying drawing in which

Fig. 1 is an end view of a tensioning device according to the invention;

Fig. 2 is a plan view of the device shown in Fig. 1;

Figs. 3 and 4 are end views of the device shown in Figs. 1 and 2 in different operating positions;

Fig. 5 is a side elevation of a detail of the device shown in Figs. 1 to 4;

Fig. 6 is a plan view of the detail shown in Fig. 5;

Fig. 7 is a side elevation of a part of the device shown in Figs. 5 and 6;

Fig. 8 is an end view of a modified tensioning device according to the invention;

Fig. 9 is a part sectional side elevation of the device shown in Fig. 8;

Fig. 10 is a plan view of a portion of a modified tensioning device according to the invention.

Like parts are designated by like numerals in different figures of the drawing.

Referring more particularly to Figs. 1 and 2 of the drawing, numeral 11 designates a warp beam which rests in bearings 12 mounted in the rear of the weaving machine on side shields 10. The warp 13 which is unwound from the beam 11 is diverted by means of tensioning beam 14 into the horizontal direction prior to forming the rear shed. The tensioning beam 14 is supported by a tensioning device 15. The latter is clamped to a rod-like connecting member formed by a shaft 17 rockably supported in a tubular carrying beam 18. The carrying or support beam 18 rests in U-shaped brackets 19 whose ends are threaded and extend through members 21 to which they are held by nuts 22.

The member 21 is fixed to a support 24 by means of bolts 23. The support 24 swings on a pin 25 extending from the side shield 10 and can be held in the desired position by means of an adjusting bolt 26. Each tensioning device 15 includes a carrier arm 27 provided with a bearing 28 which is open on one side and adapted to receive an end of the tensioning beam 14. Each tensioning device includes an arm 32 provided with notches 33 for receiving a pin 34. The right end of a tension spring 35 is fixed to a pin 36 extending from a support 24. To the left end of each spring a U-shaped bracket 37 is connected whose legs are astride of an arm 32, the ends of the legs being interconnected by the pin 34.

In Figs. 1 and 2 the tensioning device is shown in a position for weaving loose materials, for example voile, in which the weft threads are not beaten up tightly.

Fig. 3 illustrates the device in a position for weaving medium tight fabrics. The warp 13 does not run only around the tensioning beam 14 but also around the stationary carrying beam 18. In contradistinction to Fig. 2 the tensioning beam 14 is below the carrying beam 18 and the support 24 is in an inclined position. The unit including the devices 15 and the connecting means 17 and support means 18 has been turned as will be described later.

By guiding the warp on two beams the area of frictional contact of the warp is increased, increasing the resistance to movement of the warp.

Fig. 4 illustrates the device according to the invention in a position for producing a very tight fabric. The beam 14 is 180° surrounded by the warp 13 which extends also around the beam 18. Since rotation of the beam 18 is prevented by the brackets 19 it considerably increases frictional retardation of the warp. This prevents undesired yielding of the warp when a weft thread is beaten into the shed so that the weft thread is pressed with sufficient force against the fabric until it is bound by the following change of the shed. If the warp yields too much, a tight beating up of the weft threads is not possible.

The tensioning device 15 is shown in larger scale in Figs. 5 and 6. The carrier arm 27 has a hub 39 provided with a bore 38 for receiving the shaft 17. The hub 39 has a slot 41 affording clamping of the hub 39 to the shaft 17 by means of a bolt 42 so that the arms 27 form a unit with the shaft 17. The arm 27 has a saddle portion 43 supporting a bearing 28 for a bearing pin 45 at the end of the tensioning beam 14. The bearing 28 is secured to the saddle 43 by means of a bolt 46 which also holds a plate 47 to the bearing 28 preventing falling of the tensioning beam out of the bearing whose top is open.

The rocking arm 32 to which the spring 35 is connected has a hub 48 including a flange 49′ and a bore 51 for the shaft 17. The arm 32 is freely rotatable on the shaft 17, three studs 52 extending through the flange 49′ and being screwed into bores 53 in the hub 39 which is clamped to the shaft 17.

In the embodiment of the invention shown in Figs. 1 to 4 a flange 49 corresponding to the flange 49′ in Fig. 6 is provided with three groups of five holes 54 so that different relative angular positions of the rocking arm 32 and of the carrier arm 27 can be produced. If the pitch angle at which the holes 54 are set is 15° the arm 32 can be turned 30° from the center hole of each group. If, instead of three holes 53, six holes are provided, the arm 32 can be fixed relatively to the carrier arm 27 all around a circle and a relatively small number of bores are needed in the flange 49 so that the latter is not much weakened although the pitch angle is only 15°. The relative angular position of the arms 32 and 27 is different in the settings of the device shown in Figs. 1, 3, and 4. In this way the direction in which the force of the spring 35 acts on the arm 32 can be changed. The distance of the force from the rotation axis of the device 15 can be changed by inserting the pin 34 into different notches 33 in the arm 32 and any desired tension force can be produced for weaving fabrics of different tightness.

In the design of the flange 49' shown in Figs. 6 and 7 five slots 50 are provided for each stud 52 instead of the bores 54 shown in the flange 49 of Fig. 1. The slots 50 can be made when casting the arm 32 reducing cost of manufacture. The pitch angle of the slots 50 is 24° so that, with three holes 53 in the hub 39, a sufficient number of different relative positions of the arms 32 and 27 is possible around a circle.

In the embodiment of the invention shown in Figs. 8 and 9 a tubular beam 14' is revolvably carried by a shaft like element including a tubular connecting member 55 whose ends are provided with projecting pins 56. A carrier arm 57 is clamped to the pin 56 by means of a bolt 58, a rocking arm 59 being bolted to the flange of the arm 57 by means of bolts 62. The arm 59 is provided with an adjusting spindle 63 for adjusting the position of a strap 64, connected with a compression spring 65 through a rod 65'. The carrier arm 57 and the rocking arm 59 are rotatable on a bolt 66 whose ends have a square cross section, fitting into rectangular slots 61 of a frame element 67 so that the bolt 66 cannot revolve. The spring 65 sits on a plate 68 resting on the frame element 67, the rod 65' extending through the plate 68. For adjusting the relative position of the arms 59 and 57 a plurality of bores 69 are provided in the hub of the arm 59 for each bolt 62.

In the embodiment shown in Fig. 10 a bearing pin 71 is fixed to the frame side shield 10, the pin rotatably supporting a carrier arm 73 for the tensioning beam 14 and supporting a rocking arm 72 which is angularly adjustably connected with the hub of the arm 73. The same mechanism is provided on the opposite side shield 10, the two arms 73 being rigidly connected by means of an I beam 75 to form a unit.

Since the carrier arms 27, 57, and 73 cannot rotate on the shaft 17, the tube 55, and the connecting beam 75, respectively but form a unit therewith, it is not possible that the tensioning beam 14 or 14' can assume a position which is not parallel to the shed or to the carrying beam 18.

When changing the mechanism from the position for weaving loose fabrics (Figs. 1 and 2) to the position for weaving tighter fabrics (Figs. 3 and 4) the beam 18 is disconnected from the loom frame without removing the carrier arms 27. After removal of the bolts 23 the beam 18 is moved to the left (in Fig. 1) and is turned about a vertical axis through 180° to be reinserted between the supports 24. The members 21 are now bolted to the supports 24 which are opposite the supports to which they were previously bolted.

The position of the arms for connecting the springs relatively to the position of the respective carrier arms is defined by the position of bores or slots in the flanges on the hubs of the rocking arms, a deviation of the position of one rocking arm relatively to the other rocking arm being clearly visible so that such a deviation can easily be avoided.

An advantage of the tensioning device according to the invention resides in the fact that a change of the position of the device from that for weaving a fabric of a certain

tightness to that for weaving a fabric of a different tightness can easily be effected with a minimum of dismantling and within a very short time.

What is claimed is:

1. A tensioning device for the warp in a loom for weaving, comprising, in combination, a warp tensioning beam, a plurality of carrier arms rotatably supporting said tensioning beam, connecting means interconnecting said carrier arms and forming a unit therewith, means coaxially swingably supporting said carrier arms, rocking arms individually angularly adjustably connected to said carrier arms for adjusting the relative angular position of said carrier arms and of said rocking arms, and means connected to said rocking arms for counteracting the rocking action of the warp on said rocking arms.

2. A tensioning device as defined in claim 1 including a stationary tubular beam, said connecting means being formed by a shaft rotatable within said stationary tubular beam.

3. A tensioning device as defined in claim 1 including bearings for said tensioning beams, said bearings being individually mounted on said carrier arms.

4. A tensioning device as defined in claim 1 wherein said connecting means is connected to said carrier arms at a point between the axis of said tensioning beam and the rocking axis of said carrier arms.

5. A tensioning device as defined in claim 1, said carrier arms and said rocking arms being coordinated in pairs and individually having hub portions, the hub portion of one of the arms forming a pair including a flange which is angularly adjustably connected with the hub portion of the other arm of the pair.

6. A tensioning device as defined in claim 1, said carrier arms and said rocking arms being coordinated in pairs and individually having a hub portion, a plurality of axial apertures in each hub portion, said apertures being all at the same distance from the rocking axis of said arms, and bolts extending through selected ones of the apertures in the hub portions of individual pairs of said arms.

7. A tensioning device according to claim 6 in which the number of apertures in the hub portion of one arm of a pair is a multiple of the number of apertures in the hub portion of the other arm of the same pair.

8. A device as defined in claim 1 in which said connecting means is formed by a shaft like element connecting the free ends of the carrier arms, said tensioning beam being tubular and rotatably connected to and surrounding said shaft like element.

9. A tensioning device according to claim 8 wherein said shaftlike element includes a tubular portion.

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