

June 7, 1960

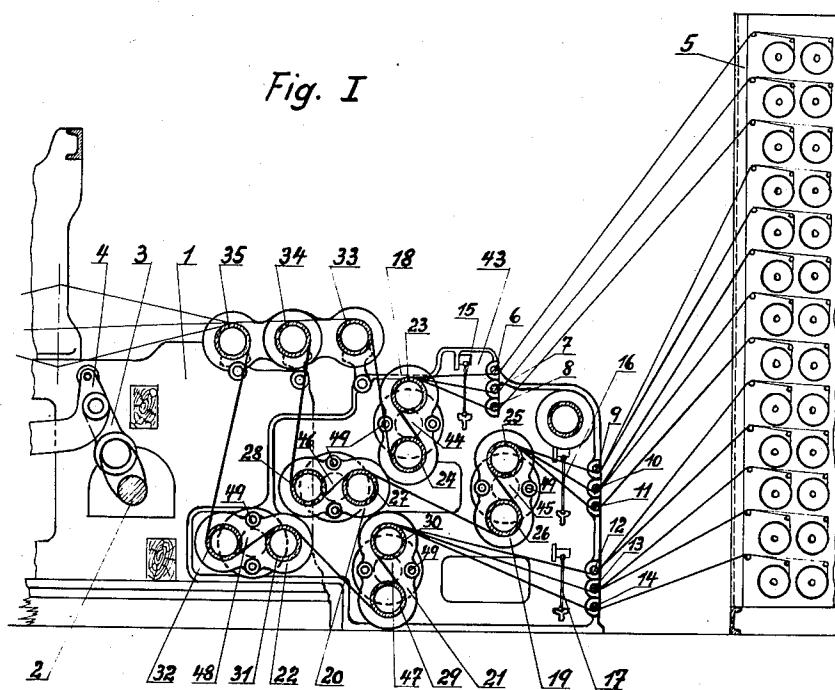
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LOOM FOR WEAVING MULTIPLE-PLY FABRICS

Filed Dec. 13, 1956

3 Sheets-Sheet 1



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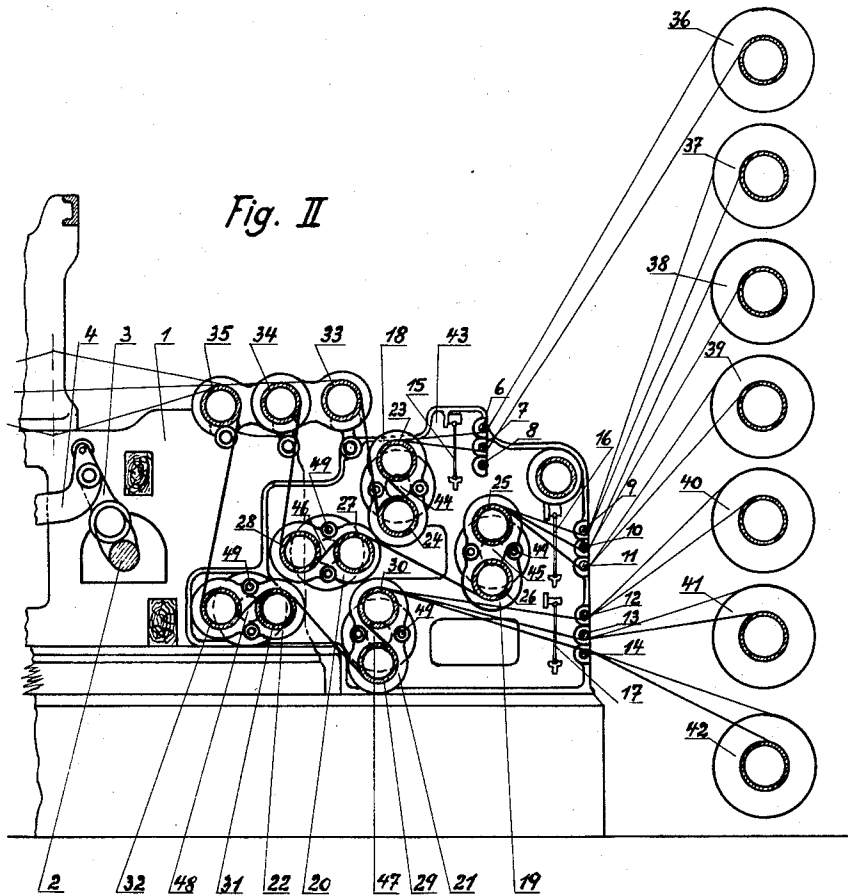
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Fig. III

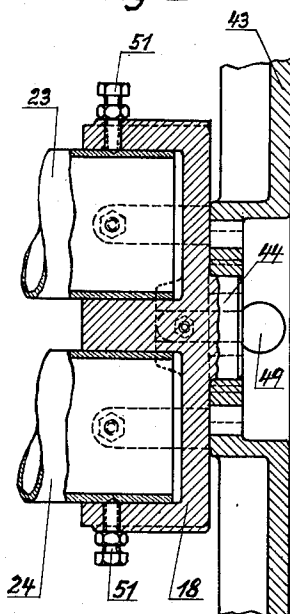
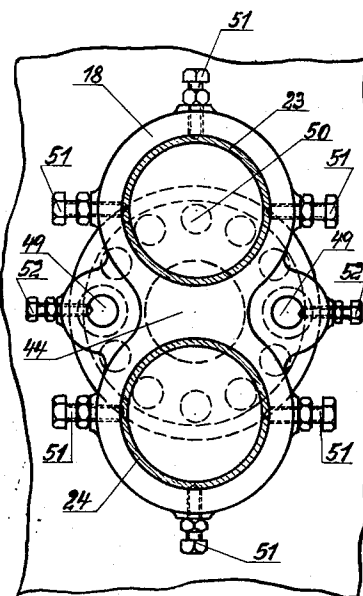


Fig. IV



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LOOM FOR WEAVING MULTIPLE-PLY FABRICS

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3 Claims. (Cl. 139—104)

This invention relates to looms and more particularly to an improved loom for weaving multiple-ply fabrics.

It has already been proposed to adjustably control warp-thread tension by means of cooperating rotative pressure applying rolls and stationary rolls and by controlling weights on depending tension devices on looms. The known tension devices are particularly applicable to looms for weaving single-ply fabrics and cannot be employed in looms for weaving multiple-ply fabrics particularly when weaving heavy materials or fabrics. The known warp-thread tension arrangements on looms cannot be employed along with letting-off devices such as creels or yarn beams which themselves may constitute part of a warp-thread tension control arrangement.

It is a principal object of the present invention to provide an improved loom for weaving multiple-ply fabrics and to provide an improved warp-thread tensioning arrangement thereon which makes it possible for the loom to weave fabrics or materials having a broad range of thicknesses or plies.

A feature of the loom in accordance with the invention is that the loom is provided with a plurality of pairs or twin tension-rolls mounted parallel and spaced on common bearings and are individually adjustably rotatable thereon. The bearings themselves are pivotally mounted and can be selectively rotated to selected angular positions thus moving or carrying as a set, the two or pair of rolls thereon along with them in a given spaced and parallel relationship relative each other. With the warp-thread interlaced through the rolls so as to be disposed on opposite sides of a pair of rolls the tension of the warp-thread can be readily adjusted by rotating the pair of rolls together as a set by rotating the pivotally mounted bearings given increments to selected angular positions and then locked in position by a pin. Moreover, it will be understood that the warp-threads are delivered to the loom in separate groups each corresponding to a particular ply. The sets of tension-rolls are arranged for operating in a plurality of separate groups so that the warp-threads of a given group of warp-threads may be interlaced between the pairs of tension-rolls of two successive sets of twin tension-rolls within a given group so that warp tension can be adjustably determined by the angular positioning of both sets of tension-rolls.

In the event that a multiple-ply fabric is being woven using a binder-warp, which interlaces the single plies and has a different shrinkage coefficient than the ground warp, it is tensioned by interlacing it between the rolls of a single set of special tension-rolls before being led on to the back rests. In this manner heavy fabrics are woven without or with bars, with uniform density and under absolutely uniform tension conditions of the warp-threads being taken from the letting-off devices.

The loom provides for weaving fabrics made of thick yarns or warp-threads by the manner in which the twin rolls can be rotated as a set. Provision is made for weaving lighter fabrics made of light or thin warp threads

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in that the rolls being rotatable individually on the pivotally mounted common bearings can be selectively and adjustably allowed to rotate as the warp is moved longitudinally thereon thus adjustably reducing friction between the individual rolls and the warp moving over them. On the other hand the individual rolls can be individually held in fixed position relative the pivotally mounted bearing means by means of set screws. In this manner the loom is constructed to be adaptable to handling a broad range of yarn or warp-thread materials and is capable of weaving fabrics having a multiplicity of plies.

Other objects, features and advantages of the invention will be understood from the following description and claims in conjunction with the accompanying drawing which illustrate by way of example preferred embodiments of the loom, and in which:

Fig. I is a side elevation view of the loom according to the invention with creels comprising the letting-off devices.

Fig. II is a side elevation view of the loom of Fig. I with yarn beams comprising the letting-off devices.

Fig. III is a sectional fragmentary view, explanatory of the manner in which the tension-rolls are pivotally mounted.

Fig. IV is a side elevation view on an enlarged scale of the arrangement for selectively positioning the tension-rolls at selected angular positions and locking them in place in accordance with the invention.

The loom in accordance with the drawings has side frame members 1 pivotally mounting a crank-shaft 2 for driving crank-arms 3 which by means of an arm 4 drive a lathe (not shown). Spaced from the loom and associated therewith are provided letting-off devices 5 (Fig. I), as for example, creels for delivering warp-threads in individual groups forming the warp-threads for individual plies of the fabric material to be made on the loom. The warp-threads are led over a plurality of guide rods 6-14 as shown and then through other guide means 15-17 comprising guide reeds or perforated plates for positioning the warp-threads longitudinally on tension-rolls 23-32 pivotally mounted as pairs or sets on common bearings 18-22 at each end as herein described. The individual groups of warp-threads are then lead over oscillatable back-rests 33-35 from where the warp-threads pass on to heddle means of a harness (not shown) in known manner. The heddle means are of the well known type described and illustrated in the United States patents to Blamires, 3,18,857; Beatty, 465,515, or Hall, 2,138,155.

It will be understood that the binder-warp is interlaced over only one pair or set of twin tension-rolls 23-24 before being led over back-rest 33. The other individual groups of warp-threads are interlaced through successive pairs or tension-rolls as clearly shown in the drawings.

Referring to the embodiment of the loom in Fig. II which is substantially similar to the loom of Fig. I and wherein the similar elements are numbered the same as the construction of Fig. I in order to simplify the drawings, the loom is provided with a plurality of letting-off devices comprising seven yarn beams or warp beams 36-42 for delivering or letting-off threads in six individual groups as shown so that the loom is able to weave six-ply fabrics. The group of warp-threads forming the binder-warp are interlaced over the one set of twin tension-rolls and the other groups of warp-threads are interlaced over two successive sets of tension-rolls as shown in a manner similar to the embodiment of Fig. I, before being led over oscillatable back-rests 33-35 and to the heddle means as heretofore mentioned. It will be understood that additional sets of twin tension-rolls may be provided in a loom arrangement in order to make it possible to weave even heavier fabrics with more plies than six by making it possible to interlace

the warp-threads on opposite sides of the individual twins of rollers that pass in this manner through more than two successive sets of twin tension-rolls so that the cooperating successive rolls can be individually adjusted to adjust the tension of the warp-threads comprising an individual group of warp-threads for the given plys.

The sets or twin-rolls comprising a pair of tension-rolls are mounted at opposite ends on a common pivotally mounted bearing 18 (Fig. III), pivotally mounted on opposite side frame members 43 (Figs. I, II and III). The bearings are provided with journals 44-48, journal inset rotatably mounted on frame members 43. The frame 43 is provided with a plurality of angularly spaced holes 50 alignable with an equal number of holes in the bearings 18, allowing the twin tension-rolls to be rotated angularly together as a set and locked in a selected angular position by means of a pair of pins 49 insertable into diametrically opposite holes (Figs. III and IV) and are in turn locked in position by set screws 52. In this manner the individual sets or pairs of tension-rolls can be adjusted as a set to selected positions to adjust tension in the spans of warp-threads and can be adjusted in combination with the next successive pair of tension-rolls handling the same group of warp-threads so that it can readily be seen that each group of warp-threads can have its tension adjusted individually allowing for weaving of different materials in each ply that requires different tension adjustments. Moreover, the individual rolls 23 and 24 may be allowed to rotate freely in the bearing head 18 or have the rotation thereof adjusted by means of set screws 51 allowing further control of the tension adjustment for handling light and heavy warp-threads.

In this manner it can be seen that the loom has an improved tension adjustment arrangement that allows it to handle a broad range of multiple-ply fabrics and to weave therein in each fabric warp threads having different shrinkage characteristics and having different tension adjustment requirements. Moreover, the loom is able to weave multiple-ply fabrics with or without binder-warp greatly increasing the versatility of the loom. In this manner the structure of the individual yarn or warp-threads will not be injured, flattened, etc., and the various spans of the individual warp-threads are tensioned at substantially uniform tensions which is particularly important to assure a high quality of fabric or product.

While preferred embodiments of the invention have been illustrated and described, it will be understood that the invention is in no way limited to the embodiments and that many changes may be made within the spirit and scope of the invention as defined by the following claims.

What is claimed is:

1. The combination of a loom for weaving multiple-ply fabrics, a plurality of letting-off devices spaced from the loom and arranged to deliver warp-threads to the loom in individual groups for individual fabric plies, an improved warp-thread tensioning arrangement on said loom comprising, side frame members, a plurality of separate sets of tension-rolls, at least some of said sets of tension-rolls being arranged for operation in a plurality of separate groups, each group comprising a plurality of sets of elongated tension-rolls cooperative to adjustably tension the warp-threads of a particular corresponding group of warp-threads separately from other groups of warp-threads, in operation the warp-threads of at least some of the groups of warp-threads being arranged to pass through successive sets of tension-rolls of a particular respective group of tension-rolls, each set of tension-rolls comprising a pair of tension-rolls pivotally mounted and extending between said side frames for adjustably and separately tensioning the groups of warp-threads, for each pair of tension-rolls common pivotal bearings pivotally mounting the pair of tension-rolls in parallel, and predetermined spaced, fixed relationship

relative to one another, said common bearings being pivotally mounted on said side frames for providing selective angular rotation of the rolls of each pair of tension-rolls together to selected angular positions and independently of all other tension-rolls, means operable at will to determine fixed angular positions of each pair of tension-rolls independently of the other pairs and hold them in selected angular positions relative to the other pairs of tension-rolls, means for guiding the warp-threads from the letting-off devices as separate groups of warp-threads to a corresponding pair of tension-rolls, means for positioning the threads of the individual groups disposed side-by-side transversely of the individual tension-rolls with the threads extending interlaced on the tension-rolls so as to be disposed thereon on opposite sides of the two rolls of each pair of tension-rolls, whereby the tension on the warp-threads is adjusted by rotating the individual pairs of tension-rolls to selected angular positions.

2. The combination of a loom for weaving multiple-ply fabrics, a plurality of letting-off devices spaced from the loom and arranged to deliver warp-threads to the loom in individual groups for individual fabric plies and loom having heddle means, an improved warp-thread tensioning arrangement on said loom comprising, side frame members, a plurality of separate sets of tension-rolls, at least some of said sets of tension-rolls being arranged for operation in a plurality of separate groups, each group comprising a plurality of sets of elongated tension-rolls cooperative to adjustably tension the warp-threads of a particular corresponding group of warp-threads separately from other groups of warp-threads, in operation the warp-threads of at least some of the groups of warp-threads being arranged to pass through successive sets of tension-rolls of a particular respective group of tension-rolls, each set of tension-rolls comprising a pair of tension-rolls pivotally mounted and extending between said side frames for adjustably and separately tensioning the groups of warp-threads, for each pair of tension-rolls common pivotal bearings pivotally mounting the pair of tension-rolls in parallel and predetermined spaced, fixed relationship relative to one another, said common bearings being pivotally mounted on said side frames for providing selective angular rotation of the rolls of each pair of tension-rolls together to selected angular positions and independently of all other tension-rolls, means operable at will to determine fixed angular positions of each pair of tension-rolls independently of the other pairs and hold them in selected angular positions relative to the other pairs of tension-rolls, means for guiding the warp-threads from the letting-off devices as separate groups of warp-threads to a corresponding pair of tension-rolls, means for positioning the threads of the individual groups disposed side-by-side transversely of the individual tension-rolls with the threads extending interlaced on the tension-rolls so as to be disposed thereon on opposite sides of the two rolls of each pair of tension-rolls and other guide means for guiding the threads from the tension-rolls to the heddle means, whereby the tension on the warp-threads is adjusted by rotating the individual pairs of tension-rolls to selected angular positions.

3. The combination of a loom for weaving multiple-ply fabrics, a plurality of letting-off devices spaced from the loom and arranged to deliver warp-threads to the loom in individual groups for individual fabric plies, said loom having heddle means, an improved warp-thread tensioning arrangement on said loom comprising, side frame members, a plurality of separate sets of tension-rolls, at least some of said sets of tension-rolls being arranged for operation in a plurality of separate groups, each group comprising a plurality of sets of elongated tension-rolls cooperative to adjustably tension the warp-threads of a particular corresponding group of warp-threads separately from other groups of warp-threads, in

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operation the warp-threads of at least some of the groups of warp-threads being arranged to pass through successive sets of tension-rolls of a particular respective group of tension-rolls, each set of tension-rolls comprising a pair of tension-rolls pivotally mounted and extending between said side frames for adjustably and separately tensioning the groups of warp-threads, for each pair of tension-rolls common pivotal bearings pivotally mounting the pair of tension-rolls in parallel, and predetermined spaced, fixed relationship relative to one another, said common bearings being pivotally mounted on said side frames for providing selective angular rotation of the rolls of each pair of tension-rolls together to selected angular positions and independently of all other tension-rolls, means operable at will to determine fixed angular positions of each pair of tension-rolls independently of the other pairs and hold them in selected angular positions relative to the other pairs of tension-rolls, means for guiding the warp-threads from the letting-off devices as separate groups of warp threads to a corresponding pair of tension-rolls, means for positioning the threads of the individual groups disposed side-by-side transversely of the individual tension-rolls with the threads extending interlaced on the tension-rolls so as to be disposed

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thereon on opposite sides of the two rolls of each pair of tension-rolls, other guide means for guiding the threads from the tension-rolls to the heddle means, and one of said letting-off devices being arranged to deliver binder warp-threads, said binder warp-threads being arranged interlaced on only one pair of tension-rolls and movable longitudinally relative thereto prior to passing on to the last mentioned guide means, whereby the tension on the warp-threads is adjusted by rotating the individual pairs of tension-rolls to selected angular positions.

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