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LOOM FOR WEAVING GAUZES
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Fig. 1

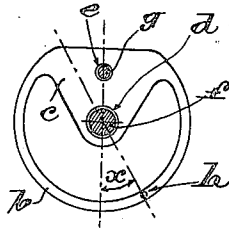


Fig. 2

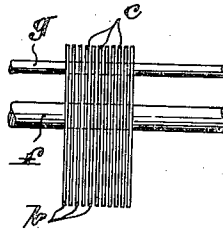


Fig. 3

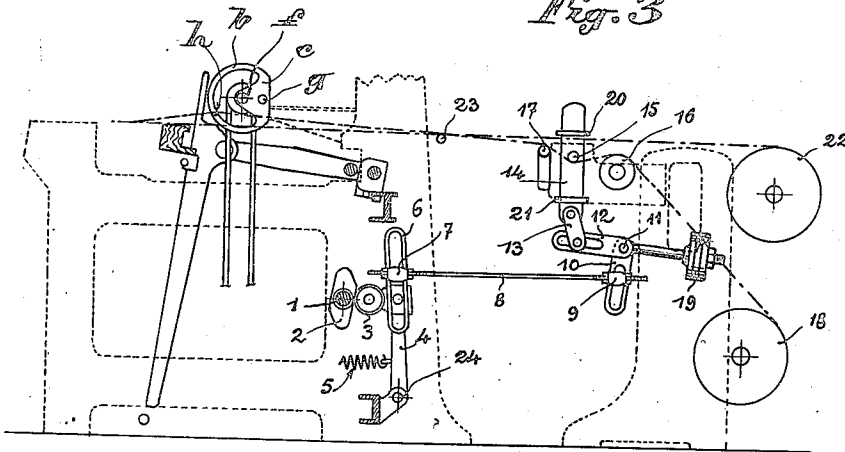
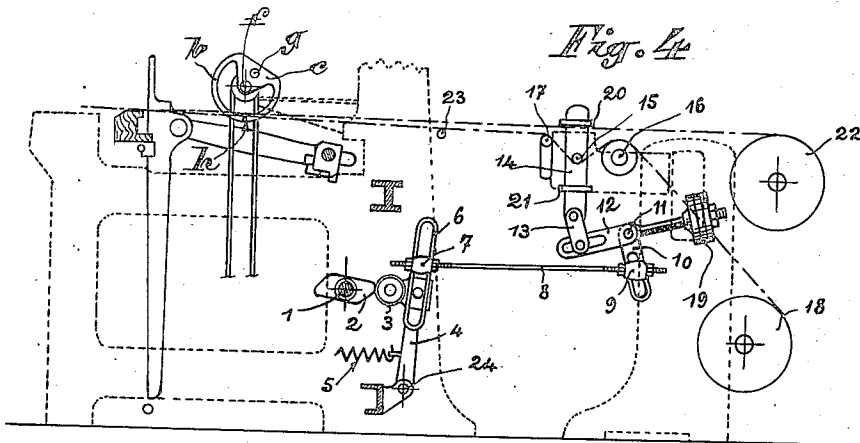


Fig. 4



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LOOM FOR WEAVING GAUZES

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4 Claims. (Cl. 139—55)

The present invention relates to certain devices applied and arranged in a particular manner with a view to weaving plain, patterned or figured gauzes.

5 These devices, which are applicable to all mechanical looms, comprise, as their principal elements, a harness formed of flexible annular mails to which an alternating rotary movement is imparted, and an apparatus for tensioning and slackening the threads, the said apparatus being regulated as desired according to the tension to be imparted to the said threads at the opening of the shed and at the moment when the reed strikes against the fell.

15 The principal features of these devices reside, with regard to the aforesaid annular mails, in that:

(a) They are made of special very thin steel (five-hundredths to five-tenths of a millimetre), so that they are very flexible and may be instantaneously deformed, while owing to the great number which may be arranged in series, it is possible to treat gauze fabrics having a very large set of warp threads, and in particular very fine bolting gauzes;

(b) They are freely mounted on two shafts, the central shaft serving only as a rocking support and the other, which is eccentric, ensuring their drive;

(c) They may be longitudinally displaced on the two aforesaid smooth shafts and instantaneously inclined with respect thereto.

(d) They are perfectly polished on the faces and on the edges in order to avoid any fraying of the threads due to friction;

(e) They comprise in their annular section an eye for the passage of the crossing threads, which is offset from the line passing through the aforesaid supporting and control shafts to an amount sufficient to permit the beating up when the shed is closed, the crossing thread then being at the same height as the straight thread, and above all to permit of a symmetrical opening of the shed at the front and at the rear for the passage of the shuttle;

(f) They are such that during operation, the crossing thread and the straight thread remain constantly below the supporting and driving shafts, the fixed threads remaining constantly in the lower position, except in the case of a special weave.

The oscillating movement of these flexible mails may be controlled either by the taffeta movement of the loom or by a patterning or figuring mechanism, or by any other suitable movement.

With regard to the apparatus for applying and removing tension, it is characterized in that its movement, which is synchronized with the rotary and alternating movement of the aforesaid flexible mails, slackens the threads at the moment

when the shed opens, in order to obviate fatigue of the threads and risk of their being frayed, so that the mails simply have to guide them, these threads being again tightened at will at the moment of the beating up, when they have returned into the straight position, that is to say, when they lie parallel to the straight or fixed threads.

Without this tensioning and slackening apparatus, the mails, as they are very thin, would be liable, in spite of their perfect polishing, either to fray or cut the threads owing to their excessive tension or to be hindered in their rotary movement.

The invention consequently also covers, by way of new industrial products, the looms to which such an arrangement is applied for producing gauze fabrics.

The invention will in any case be readily understood from the following additional description and by reference to the accompanying drawing, which description and drawing are, of course, given chiefly by way of example.

Figure 1 shows a front view of one of the mails of the harness,

Figure 2 shows a portion of the said harness, and

Figures 3 and 4 are diagrammatic elevational views of a loom equipped with the apparatus for applying and removing tension respectively in its two positions.

According to the invention, the harness referred to above is constituted by mails of special very thin and perfectly polished steel, each of which comprises an annular section *b* and a part *c* of triangular or other shape which returns to the centre and serves for suspension and driving thereof.

In this part are provided two holes *d* and *e*, the centre of one of which corresponds to that of the annular section *b*, while the other is eccentric.

These mails are traversed through these holes by two parallel smooth shafts *f* and *g*, the diameters of which are slightly smaller than those of the said holes.

The central shaft *f*, which is rigidly but adjustably secured to the frame of the loom, serves solely as a point of rotation for the mails, which receive their rotational alternating movement from the eccentric shaft *g*.

For special articles, a plurality of driving shafts may be provided should one not be sufficient.

Owing to the features of these mails and their mounting, the harness is very flexible and considerably facilitates the drawing in and the passage of the threads during the weaving, which takes place as in an ordinary loom.

Each of the mails is provided in its annular section *b* with an eye *h*, of round or pointed

shape, through which the crossing thread passes. This eye is disposed at one side of the line passing through the centres of the holes *d* and *e* at a suitable angle *x* which is sufficient to enable the shed to be opened symmetrically at the front and at the rear for the passage of the shuttle.

The straight thread is passed into the large recess limited by the section *b*.

The two threads (crossing and straight) are passed into the same mail.

One of the characteristic features of this harness therefore resides in the fact that each flexible mail is held in its correct position perpendicular to the axis of rotation by the stretched straight thread which serves as a guide for it by forming a support on each side of the plane surface of the section *b* as well as on the lower part of the large recess forming the edge of the annular section.

In addition, the warping operation with silk renders it necessary to displace the warp threads to prevent their overlapping on the warp beam when the beaming takes place. This displacement is imparted to the lap of the threads coming from the drum of the warping machine by a thread-guiding roller actuated by a mechanism which imparts to it a longitudinal displacement which may be varied from 1 to 3 centimetres.

This displacement of the lap of the threads is naturally reproduced on the loom, when the warp is unwound, in the same degree as in the beaming operation. It is therefore necessary, in order that the weaving may be possible, for the mails to be displaced to the same extent as the reed is displaced when sliding in its grooves.

Owing to the guiding and supporting afforded by the fixed threads on the flexible mails, the latter imperceptibly follow, by sliding on the smooth supporting and driving shafts *f* and *g*, respectively, the displacement of the lap of the threads and are automatically brought into their respective positions by flexing and displacement, which is of very great importance.

When weaving with a plurality of warp beams, as it is possible that the variation in the beaming will not be the same or will not be produced at the same moment, the flexible mails are then slightly deformed and take up an intermediate position between that of the fixed threads and that of the crossing threads, and the weaving may be carried out without difficulty.

In the event of grouping together taking place owing to floss or breakage of a thread which becomes mixed with the others, the flexible mails of special steel lie down and form a spring, returning into position when the operator has disengaged the threads grouped together, whereby the risk of damage which might result therefrom is considerably reduced in importance.

Owing to the very slight thickness of the flexible mails, the straight and crossing warp threads which pass through these mails are not, so to speak, diverted and may be regarded as forming a straight line extending from the warp beam to the reed.

The apparatus for tensioning and slackening the threads is arranged in the following manner (Figures 3 and 4):

On the tappet shaft 1 of the loom is mounted a cam 2 of special profile against which there bears a roller 3 integral with a movable lever 4 rocking about the shaft 24 held by a support secured to the bottom of the rear cross beam of the loom. The roller 3 is constantly held in contact with the cam 2 by a spring 5 secured, on the one

hand, to the roller-supporting lever 4 and, on the other hand, to any desired support mounted inside the loom.

To the upper extremity of the lever 4 there is secured by means of a pivot joint 7 in a regulating slot 6, a control rod 8.

The other extremity of the control rod 8 is secured by means of a pivot joint 9 in the regulating slot of a lever 10.

This lever 10 is itself mounted on a shaft 11 rocking in two sleeves bolted to the supports of the frame.

On the rocking shaft 11 there are also mounted two slotted levers 12, in the slots of which two small connecting rods 13 are pivotally connected. The other extremities of these small rods 13 are connected by a shaft to the lower part of two levers 14 adapted to be vertically displaced and sliding in slides 20 and 21. On each of the levers 14 is mounted a sleeve supporting a tensioning and slackening roller 15 adapted to turn freely.

The guide bars 16 and 17 held in two supports secured to the frame may be constituted by two freely turning rollers.

The whole of the movement is balanced about the shaft 11, by removable counter-weights 19, which arrangement permits of alternate very gentle and very rapid vertical movements of the levers 14 supporting the roller 15.

Another arrangement consists in replacing the cam 2 mounted on the tappet shaft 1 by one or more cams placed on a shaft directly dependent on the shaft supporting the mails.

The functioning of this tensioning and slackening apparatus is as follows:

Commencing with the moment when the shed is open (Figure 3), the eye for the passage of the thread being in its highest position on the side of the reed, the roller 15 is in the upper position.

The crossing thread is at this moment sufficiently slackened to enable the flexible mail to raise the thread with a very minimum effort, its action being limited to guiding this thread and placing it in the position which it must occupy to permit the passage of the shuttle.

The shuttle passes and the shed is closed again by rotation of the mail. The roller 15 is then situated in the lower position owing to the action of the cam 2, whose movement is so regulated as to be synchronous with the rotational movement of the mails. Owing to this fact, the tensioning and slackening apparatus again takes up the length of thread which it had yielded at the required moment for the opening of the shed, this taking place simultaneously with the closing of the shed (Figure 4), so that the crossing thread will at no moment be completely relaxed or be subjected to any effort sufficient to incur the danger of its breaking.

At the moment of the beating up, the rotational movement of the mails is considerably slowed up and the crossing thread takes up the limited diametrical position with respect to the eye in the annular section of the mail.

At this moment it may be tightened at will, because there is no longer any danger, as before, of its being frayed or cut on the lower edge of the hole or eye into which it passes.

After the beating up, the shed re-commences to open, at the rear this time, and the crossing thread is progressively slackened until complete opening. At this moment, the shuttle passes. The difference in the opening of the shed, according to whether the rotation of the mails takes place forwards or backwards, is compensated for

the tensioning of the crossing threads by the profile of the cam effecting this tensioning.

After a further passage of the shuttle, the mail recommences its rotational movement in a direction which is opposite to that of the preceding rotation, and the tensioning and slackening apparatus again takes up the quantity of thread which it had yielded at the moment of the opening of the shed to impart the required tension at the moment when the beating up operation takes place and again commences to progressively slacken the length of thread necessary for the next opening of the shed, and so on.

The crossing threads coming from the warp beam 18 pass over the back rest 16, under the roller 15, then over a glass ring or a roller 17 and, finally, over a steel bar 23 secured to the frame of the loom and adjustable in height which determines the position of the lap of the threads. They are then passed into the eye *h* of the annular mail and from there to the reed.

The fixed threads come from the warp beam 22 situated above the warp beam 18 carrying the crossing threads. They pass over the steel bar 23, then through the large recess of the flexible mail and from there direct to the reed.

The fixed thread and the crossing thread of one mail are obviously passed into the same dent of the reed. It is possible to pass several crossing threads or several straight threads into the same mail, the operation taking place under the same conditions as if there were only one straight thread and one crossing thread.

By the addition of an ordinary harness set in motion by a dobby or a similar mechanism, and on which the fixed threads are brought into position, patterned gauze may be produced. In the same way, by the addition of a "Jacquard" type mechanism, figured gauze will be produced.

Finally, as will be readily understood and as is clearly shown in the foregoing, the invention is in no way limited to the single practical form hereinbefore mentioned or to that of its different parts, but on the contrary it covers all constructional modifications entailing application of similar arrangements.

What I claim and desire to secure by Letters Patent of the United States is:—

1. In a loom for weaving close gauzes, a plurality of flat annular mails formed of thin flexible metal having eyes in the annular portion serving for the passage of the crossing threads of the warp and formed with apertures surrounded by the annular portion serving for the passage of the straight threads of the warp, a stationary supporting shaft passing loosely through central openings in said annular mails, an operating shaft passing through distinct openings arranged eccentric to and spaced from said central openings, and means for rocking said operating shaft around said stationary supporting shaft there being means for adjusting the tension of the crossing warp threads in accordance with the movement of the mails.

2. In a loom for weaving close gauzes, a flat disc-shaped mail member constructed of thin flexible metal having a part of its interior cut out to provide an opening bounded by an annular rim portion extending around the greater part of the periphery and a V-shaped tongue portion projecting in said cut out portion over the centre of the mail member, the cut out portion and

tongue having rounded configurations to avoid angular corners injurious to threads and said mail member being provided with a central opening passing through said V-shaped tongue to loosely fit a stationary supporting shaft, a portion upon said mail symmetrical with said V-shaped tongue having an independent eccentric opening to receive an operating shaft and a mail eye situated in the aforesaid annular rim portion at a point which is offset from a line passing through the supporting shaft and the eccentric operating shaft in order to provide sufficient clearance below the operating shaft for the crossing threads and utilize the balancing effect of the weight of the V-shaped tongue.

3. In a loom for weaving close gauzes, the combination of a plurality of very thin and flat, annular mails which are at most one half mm. thick, also very flexible, elastically deformable, smoothly polished and loosely mounted on a central round supporting shaft so as to be freely rotatable on said shaft, there being a large interior portion of each mail cut out to form a clearance portion while leaving the greater portion of the periphery intact and the central section about said shaft directly connected at one side by an integral side portion to said periphery, a second round shaft eccentrically movable in parallelism with respect to said central first shaft and passing through the side portions of said mails between the central portions and peripheries thereof and serving to partially reciprocate said mails in rotary manner about said central supporting shaft, there being an opening in the periphery exteriorly of said cut-out portion of each mail forming an eye for the crossing threads, and the stationary threads passing through said cutout portion, a frame carrying said supporting shaft, means for driving said eccentric second shaft and mails, and a roller upon said frame driven from said means in synchronism with said mails and imparting a slight tension to the crossing threads when the shed opens and a strong tension at the moment of advancement of the gauze.

4. In a loom for weaving close gauzes, the combination of a plurality of very thin and flat, annular mails which are at most one half mm. thick, also very flexible, elastically deformable, smoothly polished and loosely mounted on a central round supporting shaft so as to be freely rotatable on said shaft, there being a clearance opening through each mail, a second round shaft eccentrically movable in parallelism with respect to said central first shaft and passing through eccentric portion of said mails intermediate the central and peripheral portions thereof and serving to partially reciprocate said mails in rotary manner about said central supporting shaft, there being an opening in the periphery exteriorly of said cutout portion of each mail forming an eye for the crossing threads, and the stationary threads passing through said cutout portion, a frame carrying said supporting shaft, means for driving said eccentric second shaft and mails, and a roller upon said frame driven from said means in synchronism with said mails and imparting a slight tension to the crossing threads when the shed opens and a strong tension upon closing the shed preparatory to opening the same in the opposite direction.

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