

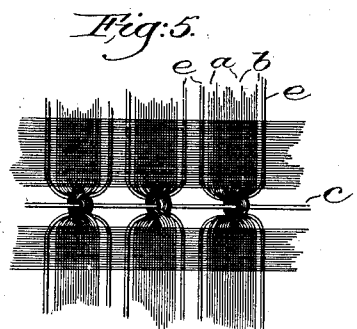
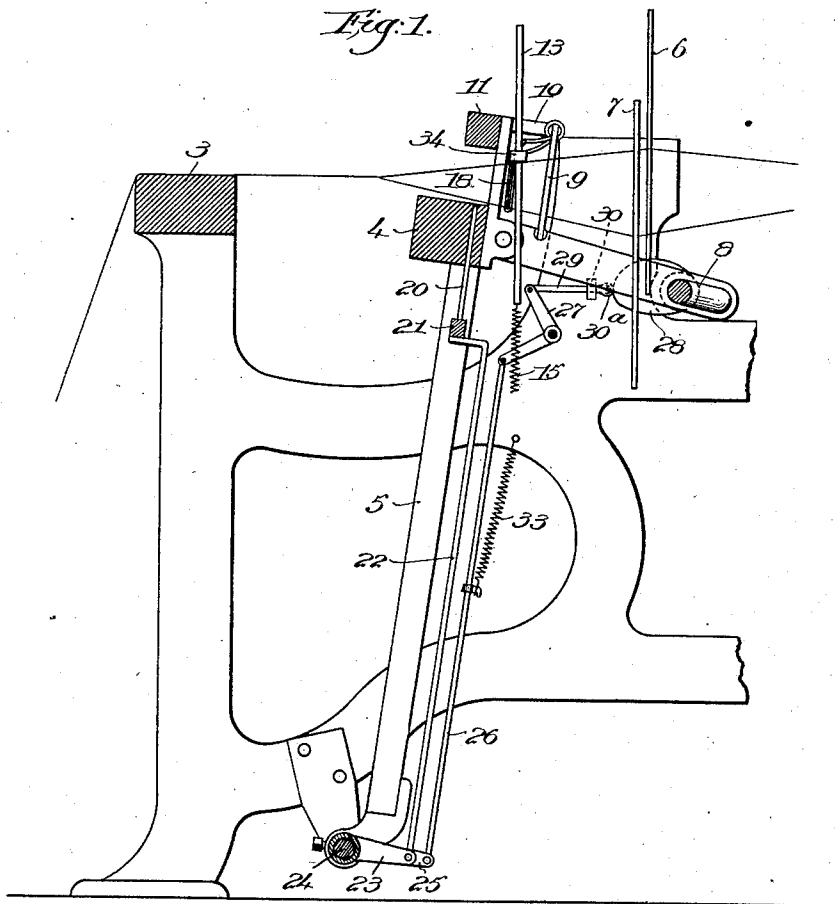
No. 729,012.

PATENTED MAY 26, 1903.

W. TALLANT.  
LOOM FOR LENO WEAVING.  
APPLICATION FILED MAR. 14, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



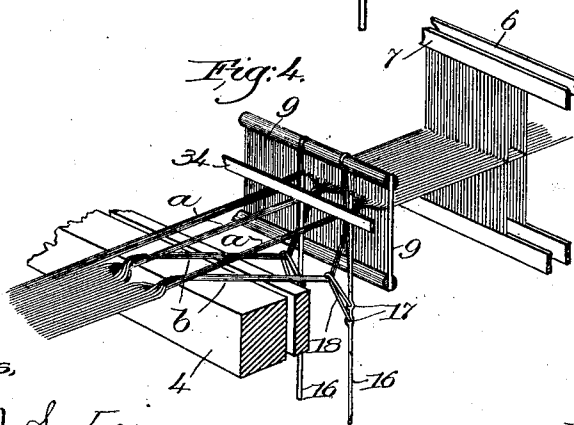
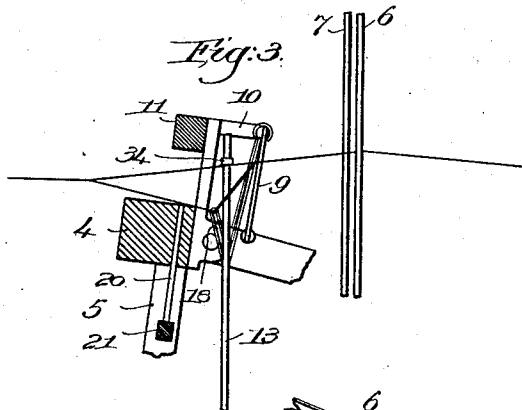
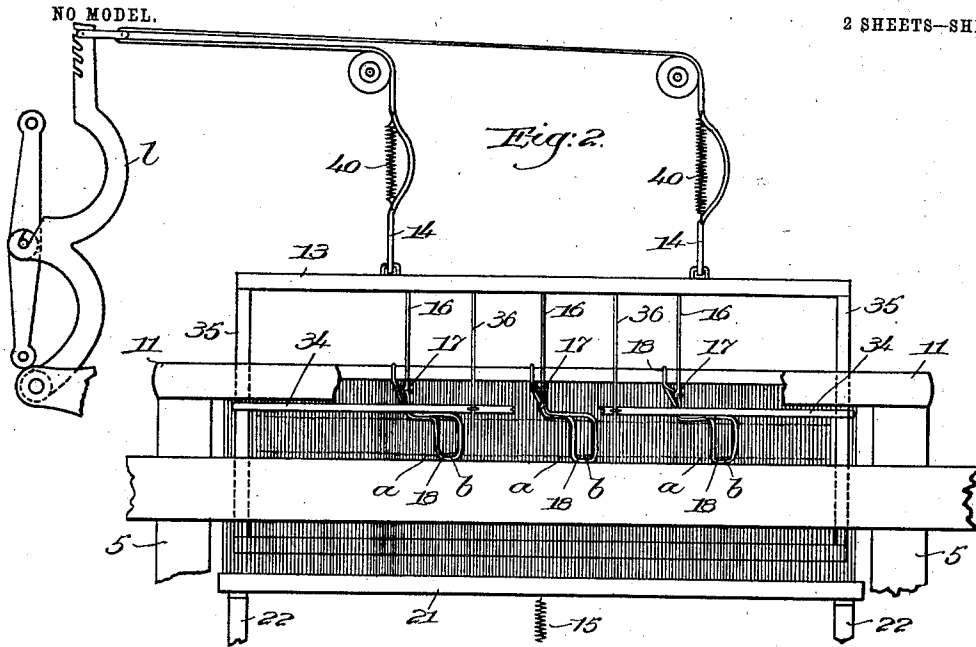
Witnesses,  
Herman J. Sartorius.  
Edmund F. Allen.

Inventor,  
William Tallant,  
by Crosby Gregory  
att'y

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2 SHEETS—SHEET 2.



Witnesses,  
Herman J. Sartoris.  
Edward H. Allen.

Invention by  
William Tallant  
by Crosby Ferguson  
attorney

# UNITED STATES PATENT OFFICE.

WILLIAM TALLANT, OF WALTHAM, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO ARTHUR H. GULLIVER, OF WALTHAM, MASSACHUSETTS.

## LOOM FOR LENO-WEAVING.

SPECIFICATION forming part of Letters Patent No. 729,012, dated May 26, 1903.

Application filed March 14, 1902. Serial No. 98,228. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM TALLANT, a citizen of the United States, residing at Waltham, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Looms for Leno-Weaving, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

In the ordinary so-called "leno-weave" one thread is during the formation of the "leno-shed" crossed over the adjacent warp-thread, whereby the two said warp-threads appear crossed at intervals, this crossing of the warp-threads being commonly accomplished by means of a "doup" operated by a "doup-heddle."

It is the object of my invention to provide a loom of this class wherein instead of single warp-threads being crossed during the "leno-pick" a set of warp-threads comprising a plurality of adjacent threads are crossed over or under a second set comprising a plurality of adjacent warp-threads, one of these sets being carried into one plane of the shed and the other into the other plane during the leno-pick. To accomplish this, I have provided an auxiliary harness-frame which I have termed a "leno-frame," which frame is situated adjacent to and moves backward and forward with the lay, the said frame having one or more doup-heddles, through which dous are passed. Situated directly back of the leno-frame and connected to so as to move with the lay is a reed or separator, through which the warp-threads pass. The reed for beating up the filling is made vertically movable, and suitable mechanism is provided to depress the said reed below the shed when the lay is in its backward position and to raise the reed into operative position as the lay beats up. The dous, which are operated by the doup-heddles, are constructed in the usual loop form and each receives in its loop a set of warp-threads, comprising a plurality of adjacent threads, the said dous each being secured at its upper end to a support having no vertical movement. The leno-frame is operated by any usual pattern mechanism similar to the ordinary harness-frames, and

during plain weaving the pattern mechanism will operate to raise the leno-frame at every pick, whereby the loops of the dous are made loose and large enough to admit of the proper separation of the warps therein for the formation of the shed, while when a leno-pick is to be made the said pattern mechanism will allow the leno-frame to assume its lowest position under the influence of suitable springs and will lift all the ordinary frames. The raising of all the ordinary harness-frames carries all the warp-threads which do not pass through the dous into the upper plane of the shed, and the lowering of the leno-frame tightens the loop of the dous and draws all the threads of the sets passing through the dous across the other sets and down into the lower plane of the shed. After the shuttle has been thrown to lay the filling the lay moves forward as usual, the leno-frame is raised, and the reed is brought into operative position to beat in the filling.

In the drawings, Figure 1 is a vertical section of a sufficient portion of a loom to show my invention. Fig. 2 is a front elevation of a portion of the lay, parts being broken out to better show the construction. Fig. 3 is a vertical section through the upper portion of the lay, showing the position of the leno-frame during the leno-pick. Fig. 4 is a diagrammatic view showing the manner in which the warp-threads are crossed, and Fig. 5 shows the fabric made by a loom embodying my invention.

In Fig. 1, 3 designates the breast-beam of the loom, 4 the lay, 5 the lay-swords, 8 the crank-shaft for operating the lay, and 6 and 7 the usual harness-frames, these parts being of any suitable or usual construction and performing their usual functions.

9 designates a reed or separator through which the warp-threads pass and which is carried by the lay back of the position usually occupied by the beating-up reed. This reed or separator may be supported in any suitable way, and for convenience I have herein illustrated the same as supported by suitable struts or arms 10, projecting rearwardly from the hand-rail 11, though any other convenient way of supporting the separator may be employed. In the space be-

tween the separator and the hand-rail 11 is a leno harness-frame 13, said harness-frame having connected thereto harness-straps 14, which may be connected to any suitable operating means, though I prefer to connect the same to a harness-lever *l*, forming part of the usual dobby, by means of which the ordinary harnesses 6 and 7 are operated. The lower portion of the leno-frame has connected thereto a suitable spring 15, which serves to hold the frame in lowered position when the latter is not raised by the pattern mechanism of the dobby. The leno-frame carries one or more doup-heddles 16, the number depending upon the particular design of the fabric to be woven, each of said doup-heddles having the usual two eyes 17, through which the loop of the doup 18 is passed. One end of each doup is secured to any suitable support which has no movement in a vertical direction, and since in this embodiment of my invention the leno-frame is depressed during the formation of the leno-shed the upper end of the doup will be so secured. For convenience I have shown the doup as secured to the upper end of the reed or separator 9. The loop of each doup is comparatively large, as illustrated in Fig. 2, and it passes over a set *a* of warp-threads, including a plurality of adjacent threads situated next the heddle, and then surrounds or encircles a second set *b*, which also comprises a plurality of adjacent warp-threads. The pattern mechanism of the dobby will be so adjusted that in ordinary or plain weaving, where no crossing of the warps is desired, the leno-frame 13 is to be raised at every pick, as shown in Figs. 1 and 2, while the usual harness-frames 6 and 7 are alternately raised and lowered to form the usual sheds, the doups being loose enough to permit this formation of the sheds without any strain upon the warps, as seen in Fig. 2. During plain weaving, therefore, the warp-threads of each set *b*, inclosed in a doup-loop, are divided between the upper and lower planes of the shed, as well as the warp-threads of each set *a*. When a leno-pick is to be made, however, the pattern mechanism of the dobby raises both the frames 6 and 7 or all the ordinary harness-frames, but does not raise the leno-frame, which is drawn into its lowered position by the usual spring 15, as seen in Fig. 3. The carrying of both or all of the ordinary harness-frames 6 and 7 into their elevated position carries all of the warps of the set *a* into the upper plane of the shed, and the depressing of the leno-frame causes the doup-heddles to slide downwardly upon the loops of the doups and to draw the portions of the loops encircling the sets *b* of warp-threads toward the doup-heddles and into a lowered position, as shown in Fig. 3 and in diagram in Fig. 4. This operation carries each set *b* over across the adjacent set *a* and downwardly into the lower plane of the shed, as will be obvious, the crossing of the two adjacent sets of threads

occurring entirely between the separator 9 and the fell of the cloth. (See Fig. 4.) When in this position, the shuttle is thrown across the shed and the filling-thread *c*, Fig. 5, is laid as usual. At the next pick the pattern mechanism raises the leno-frame and operates the ordinary harness-frames 6 and 7 to form the usual shed for ordinary weaving, as shown in Fig. 1. The above-described operation results in the formation of a fabric such as is shown in Fig. 5.

Where the warp-threads are crossed in sets, as above described, it would be impossible to use the ordinary reed in the lay for beating up the filling, and I have accordingly provided the lay with a pointed or flying reed, which when the lay is in its backward position is carried down below the lower shed, while as the lay beats up the reed is projected upwardly into operative position to beat in the filling. The beating-up reed is designated by 20, and it comprises a suitable base-rail 21, having a plurality of teeth which play up and down in a slot in the lay. The upper end of the teeth are pointed, thus giving to the reed a comb-like appearance and furnishing a construction which can be withdrawn from the warps or projected into the same, as desired. The reed 20 is supported upon suitable supports 22, which are connected to and actuated by a rock-arm 23, attached to a sleeve loose upon the rock-shaft 24 for the lay-swords, and said sleeve has fast thereto another arm 25, which is connected by a link 26 with a bell-crank 27, secured in any suitable way to the frame of the loom. The bell-crank is actuated by means of a cam 28 (shown in dotted lines, Fig. 1) on the crank-shaft 8, said cam bearing against a roll on the end of a link 29, which is connected, in turn, to the bell-crank and which passes through and is held in position by a suitable guide 30. The cam 28 is so shaped and timed that when the crank-shaft throws the lay into its backward position the point or rise of the cam engages the roll 30<sup>a</sup> of the link 29 and operates the bell-crank 27 to draw the reed into its lowered position, as shown in Fig. 1, while as the lay moves forward the rise of the cam passes off from the roll, and the reed 20 is raised into operative position by any suitable means, such as a spring 33. By thus providing means for withdrawing the reed 20 while the lay is in the backward position it will be seen that the reed is entirely out of the way whenever the two sets *a* and *b* of warp-threads are crossed for the leno-pick, as shown in Figs. 3 and 4, but that after the weft *c* is placed in the shed the reed is raised into operative position to engage the weft and beat the same up. When in operative position, the reed should extend above the upper plane of the shed in order to prevent the threads in such upper plane from becoming displaced. It is immaterial whether the reed comes entirely into contact with the upper rail 11 of the lay or not so long as it is carried above the upper

plane of the shed. I would here remark that as soon as the weft *c* has been laid in the leno-shed the pattern mechanism raises the leno-frame 13 sufficiently to release the tension upon the crossed warp-threads and to allow them to assume such a position that as the reed 20 is raised the warp-threads may readily enter the dents thereof. I find it necessary to point the ends of the fingers of the reed 20 in order to facilitate the insertion of the reed into the shed.

In order to prevent the doups from getting caught by the pointed or flying reed, I have provided a bar 34, which is carried by the leno-frame and has a freely-sliding engagement with the end bars 35 thereof. This bar or weight 34 is situated above the warps and normally rests upon the same, said bar serving as a steadying device for the warps when the reed is projected upward through the same.

I will preferably provide a central guide-wire 36, which connects the upper and lower rails of the harness-frames and which passes through a guide-aperture in the central portion of the guide-bar 34.

Since the leno harness-frame 13 is situated between the harness-rail 11 and the comb or separator 9, it has a backward-and-forward movement with the lay, and in order that this movement may not affect the operation of said frame by the usual dobbie I provide the harness-straps 14 with a yielding portion, shown as in the shape of a coiled spring 40, which spring yields sufficiently during the forward movement of the lay to prevent the straps 14 from being subjected to too great a strain.

The space between the hand-rail 11 and the fixed reed or separator 9 is sufficient to accommodate a plurality of leno-frames, and by employing several leno-frames having differently-arranged doups the design of fabric which is produced may be greatly varied. It will also be obvious that the design of the fabric may be varied in other ways, as by using a heavy warp-thread *e* at the edge of the sets *a* and *b* and by employing different-colored warps.

By holding the leno-shed open during several picks the filling *c* may be given the appearance of the cord, or the same result may be accomplished by using a box-loom and having one of the shuttles provided with a heavy filling-thread, this shuttle being thrown through the leno-sheds.

Various other ways in which my invention may be used will readily suggest themselves to those skilled in the art of weaving. While I have herein illustrated the doups as being secured at their upper ends to the fixed support, yet my invention would not be departed from if the lower ends of the doups were thus attached, as in the latter case it would only be necessary to provide means for lowering the leno-frame during ordinary weaving and to raise the said frame during the formation of the leno-shed.

While I have herein shown one embodi-

ment of my invention, yet it will be obvious that many of the details may be varied without in any way departing from the spirit of my invention as expressed in the appended claims.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a loom, a lay, shed-forming mechanism including means to move a set of warp-threads comprising a plurality of adjacent threads into one plane of the shed, and means movable with the lay to carry a second set comprising a plurality of adjacent warp-threads across the threads of the first set and into the other plane of the shed.

2. In a loom, a lay, shed-forming mechanism including means to move a set of warp-threads comprising a plurality of adjacent threads vertically into the upper plane of the shed, and means movable with the lay to carry a set comprising a plurality of adjacent warp-threads over the threads of the first set and down into the lower plane of the shed.

3. A loom having a lay, the usual harness-frames, an auxiliary leno harness-frame movable with the lay, and one or more doups operated by said auxiliary frame, said doups each having a plurality of warp-threads passed therethrough.

4. In a loom having the usual harness-frames, a lay, and an auxiliary harness-frame movable with the lay, said auxiliary harness-frame carrying one or more doups.

5. A loom having a lay, usual harness-frames, an auxiliary leno harness-frame having one or more doup-heddles, and a doup passed through each doup-heddle, said auxiliary harness-frame being situated directly back of and movable with the lay.

6. A loom having usual harness-frames, an auxiliary leno harness-frame having one or more doup-heddles, a doup passed through each doup-heddle and a support to which said doups are secured, said support being held from movement in a vertical direction.

7. In a loom, a set of harness-frames, a plurality of doup-heddles, a doup passed through each doup-heddle and a support to which said doups are secured, said support being held from movement in a vertical direction.

8. In a loom for cross-weaving, a lay, a leno harness-frame movable with the lay, said frame having doup-heddles, and doups secured to a fixed portion of the lay and passed through the eyes of said doup-heddles.

9. In a loom, a lay, a leno harness-frame situated directly back of and movable with the lay, said frame having a plurality of doup-heddles, a doup passed through the eyes of each doup-heddle, said doups having their upper ends secured to a fixed portion of the lay, and means to lower the leno-frame for the formation of the leno-shed, said leno-frame being raised during the formation of the other sheds.

10. In a loom, a lay, a separator situated

back of the lay and secured thereto, and a leno harness-frame between the separator and the shuttle-race.

11. In a loom, a lay, a separator secured to the lay at the back thereof and through which the warp-threads pass, a leno harness-frame between the separator and the lay, a plurality of doup-heddles carried by said frame, and a doup passed through each of the doup-heddles, said doups having their upper ends held against vertical movement.

12. In a loom for cross-weaving, a set of harness-frames adapted to form sheds in the usual manner, an auxiliary leno harness-frame having one or more doup-heddles, a doup passed through each doup-heddle, said doups all having their upper ends secured to a support held against vertical movement, means to lower the leno harness-frame for the formation of the leno-shed, and means to raise said leno harness-frame during the formation of the other sheds.

13. In a loom, a set of harness-frames adapted to form sheds in the usual manner, an auxiliary leno harness-frame having one or more doup-heddles, a doup passed through each doup-heddle, the loop of each doup encircling a set of warp-threads comprising a plurality of adjacent threads, said doups all having their upper ends secured to a support which is held against vertical movement, and means to lower the leno harness-frame for the formation of the leno-shed, said frame being raised during the formation of the other sheds.

14. In a loom, a leno harness-frame having doup-heddles, doups passed through said doup-heddles, and a tension-bar carried by and extending across the harness-frame and capable of a vertical movement relatively thereto, said tension-bar resting upon the warps.

15. In a loom, a lay, a leno harness-frame movable with the lay, a pointed beating-up reed carried by the lay, and means to withdraw said reed from the shed during the formation of the shed.

16. In a loom for cross-weaving, a lay, a leno harness-frame movable with the lay, a plurality of doup-heddles carried by said frame, a doup passed through the eyes of each heddle, a flying reed carried by the lay, and means to withdraw said reed from the shed when the lay is in its backward position, and to project said reed into the shed when the lay moves forward.

17. In a loom for cross-weaving, means to form the leno-shed comprising devices to move a set of warp-threads, comprising a plurality of adjacent threads, into one plane of the shed; means to carry a second set of warp-threads, comprising a plurality of adjacent warp-threads, across the threads of the first set and into the other plane of the shed; a lay; a beating-up reed carried thereby and vertically movable thereon, and means to withdraw said reed from the shed when the lay is in its backward position, and to project the reed into the shed when the lay moves forward.

18. In a loom for cross-weaving, a set of harness-frames adapted to form sheds in the usual manner, the lay, a pointed beating-up reed carried by the lay, a separator-reed situated back of the lay and secured thereto, a leno harness-frame located between the beating-up reed and the separator-reed, and provided with one or more doup-heddles, a doup for each doup-heddle, means for moving said leno harness-frame in one direction at each desired leno-pick and in the opposite direction at every other pick, said doups having their upper ends secured against movement with the leno harness-frame.

19. In a loom for cross-weaving, a set of harness-frames adapted to form sheds in the usual manner, the lay, a pointed beating-up reed carried by the lay, a separator-reed situated back of the lay and secured thereto, a leno harness-frame located between the beating-up reed and the separator-reed, and provided with one or more doup-heddles, a doup for each doup-heddle, means for moving said leno harness-frame downward at each desired leno-pick and upward at every other pick.

20. In a loom for leno-weaving, a lay, having a reed or separator fixed thereto, and means to turn or cross the warps for the leno-pick, the crossing of the warps taking place entirely in front of the reed.

21. In a loom for leno-weaving, a lay, having a reed or separator fixed thereto, and means in front of the reed to form the leno-shed.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM TALLANT.

Witnesses:

ARTHUR H. GULLIVER,  
ARTHUR H. PAUL.