Feb. 3, 1970 F. LUTZ 3,493,013

MANUFACTURE OF A LENO INTERLACING

Filed March 11, 1968 8 Sheets-Sheet 1

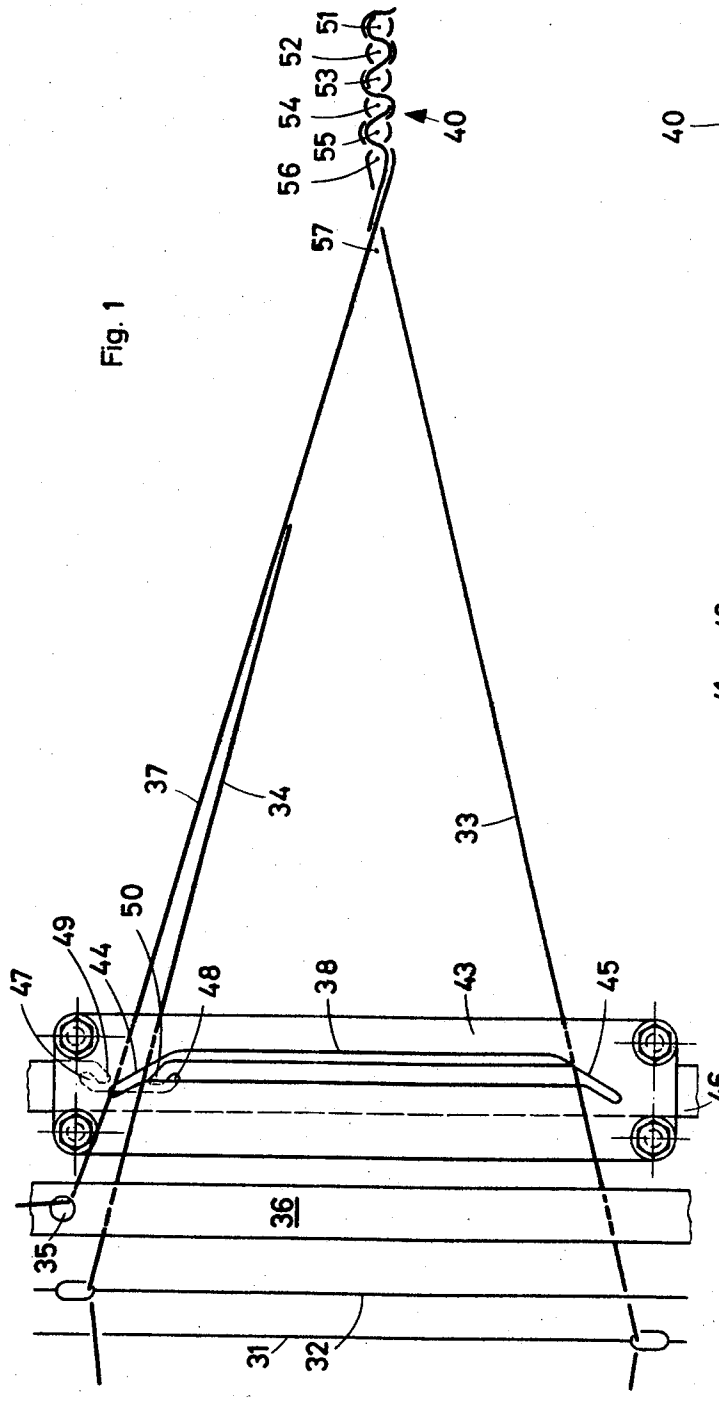

Fig. 1

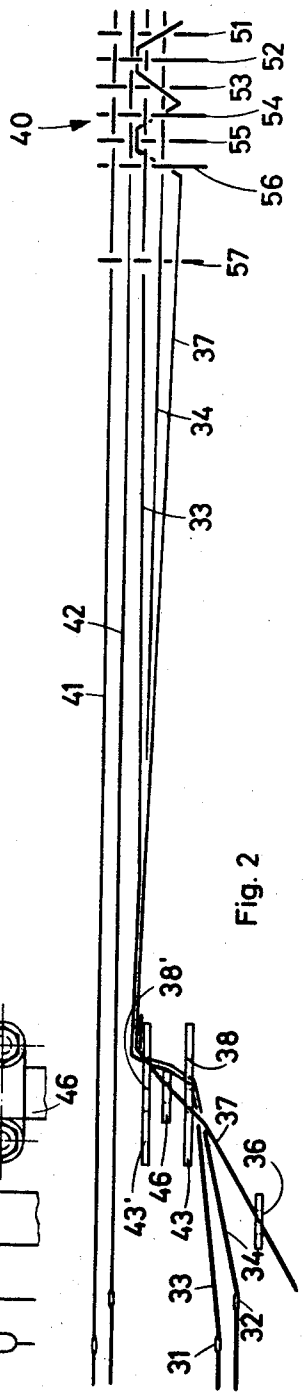

Fig. 2

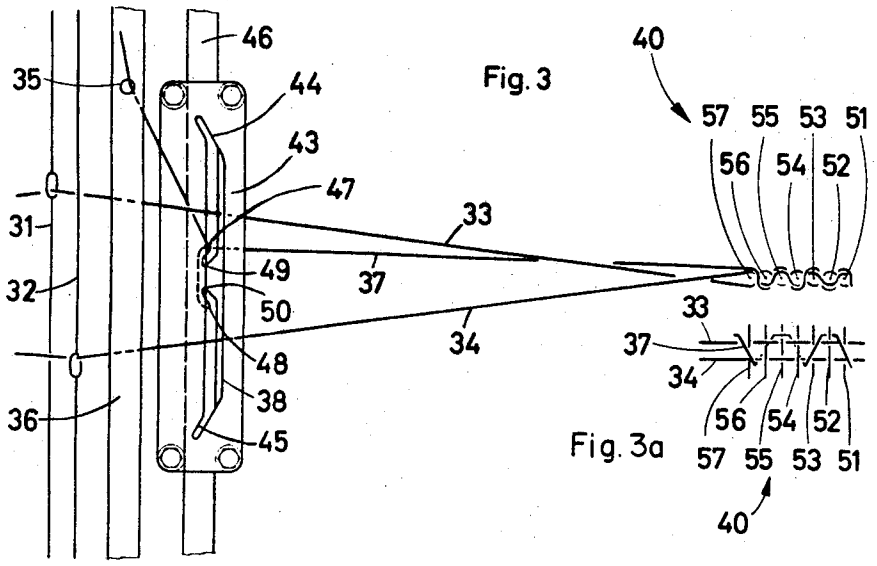

Fig. 3

Fig. 3a

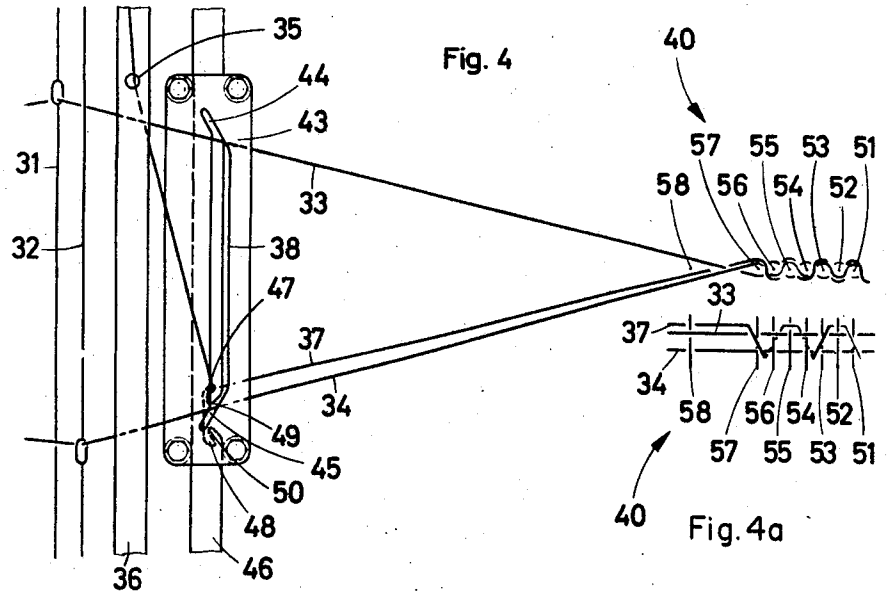

Fig. 4

Fig. 4a

MANUFACTURE OF A LENO INTERLACING

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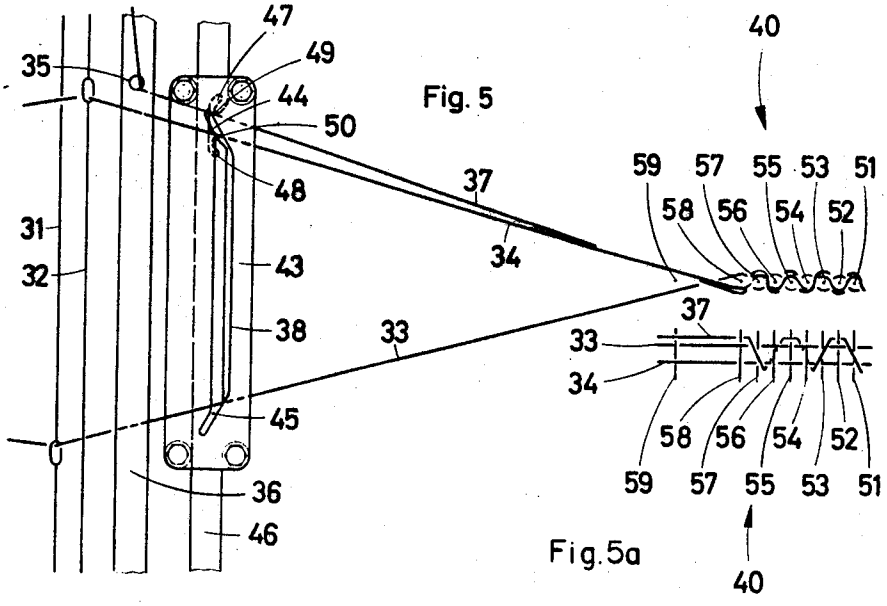

Fig. 5

Fig. 5a

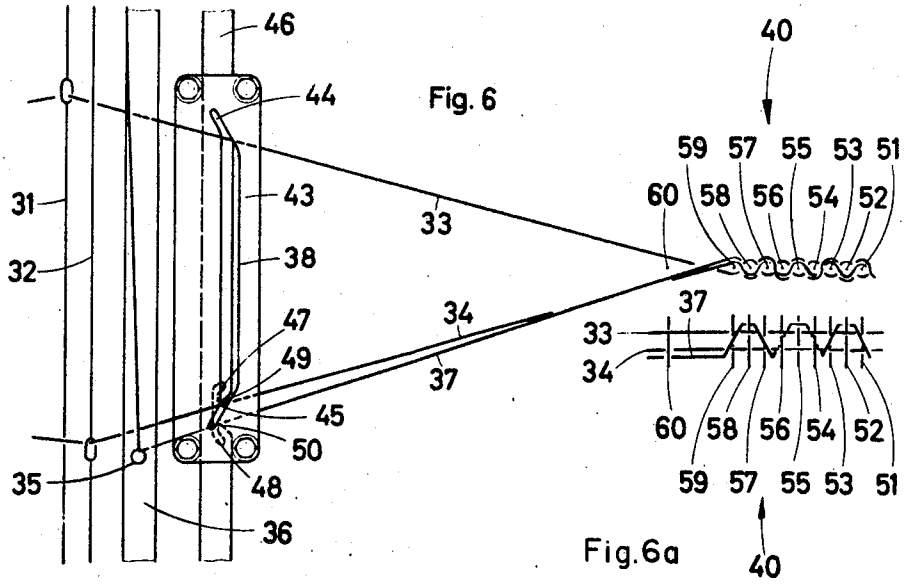

Fig. 6

Fig. 6a

MANUFACTURE OF A LENO INTERLACING

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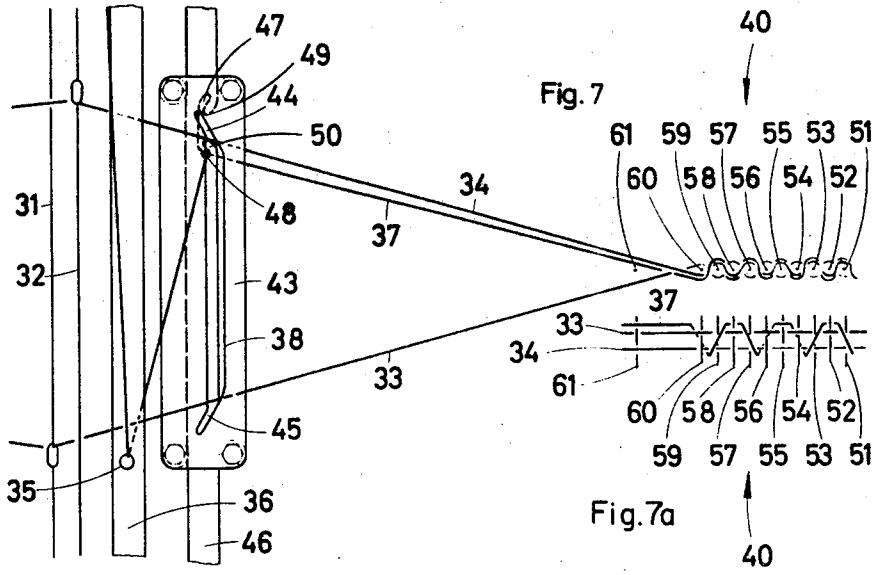

Fig. 7

Fig. 7a

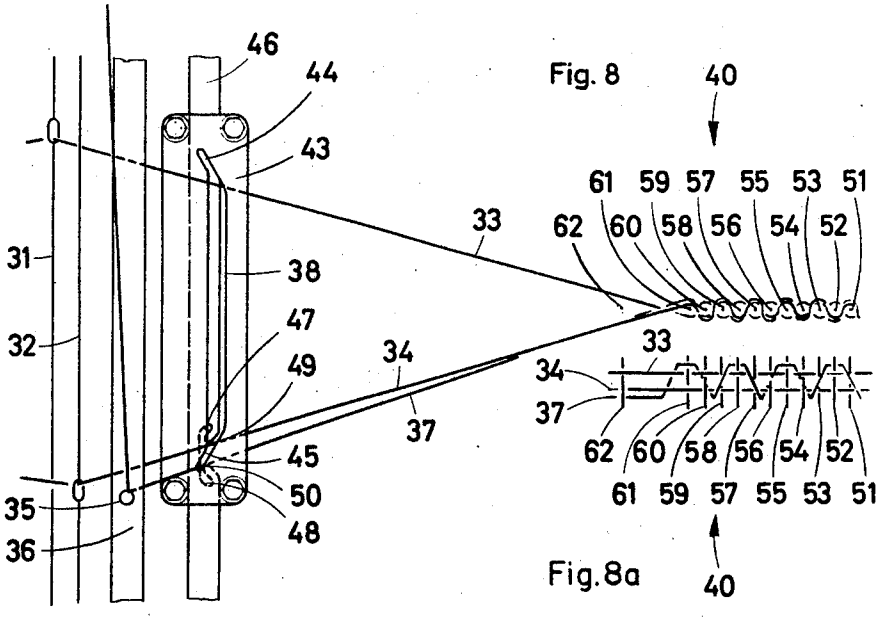

Fig. 8

Fig. 8a

MANUFACTURE OF A LENO INTERLACING

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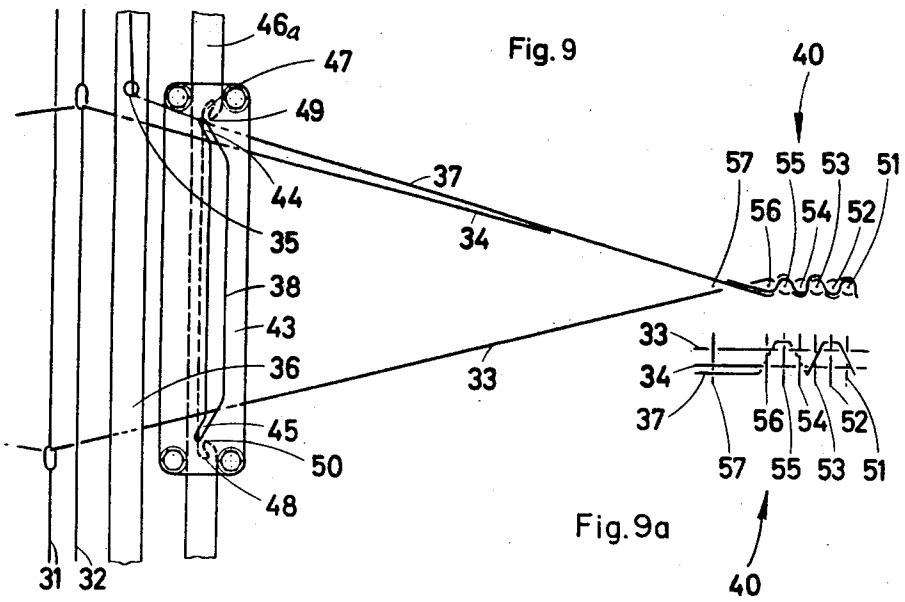

Fig. 9

Fig. 9a

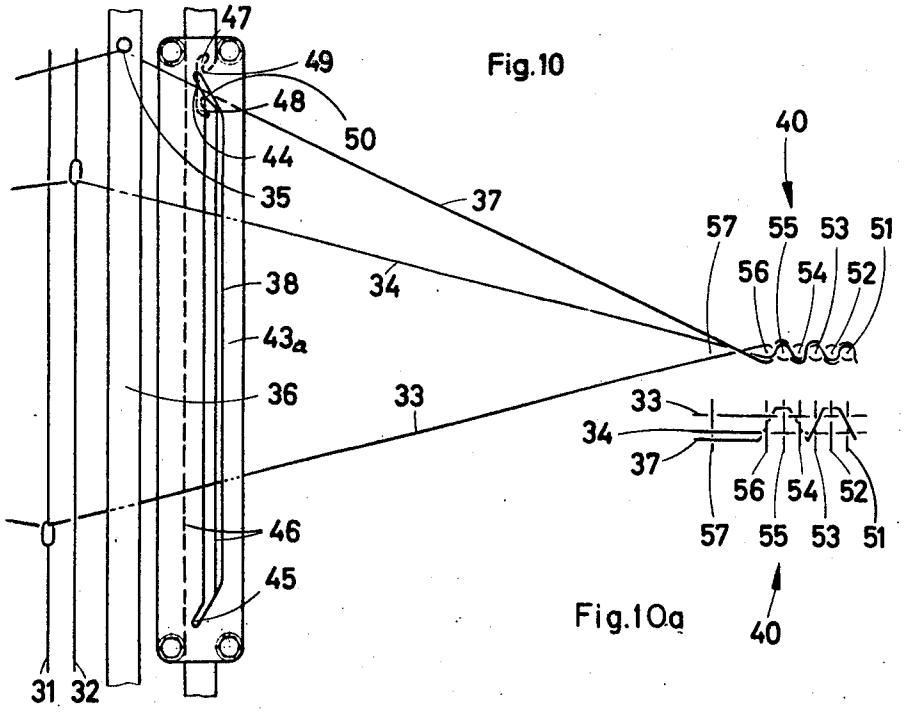

Fig. 10

Fig. 10a

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MANUFACTURE OF A LENO INTERLACING

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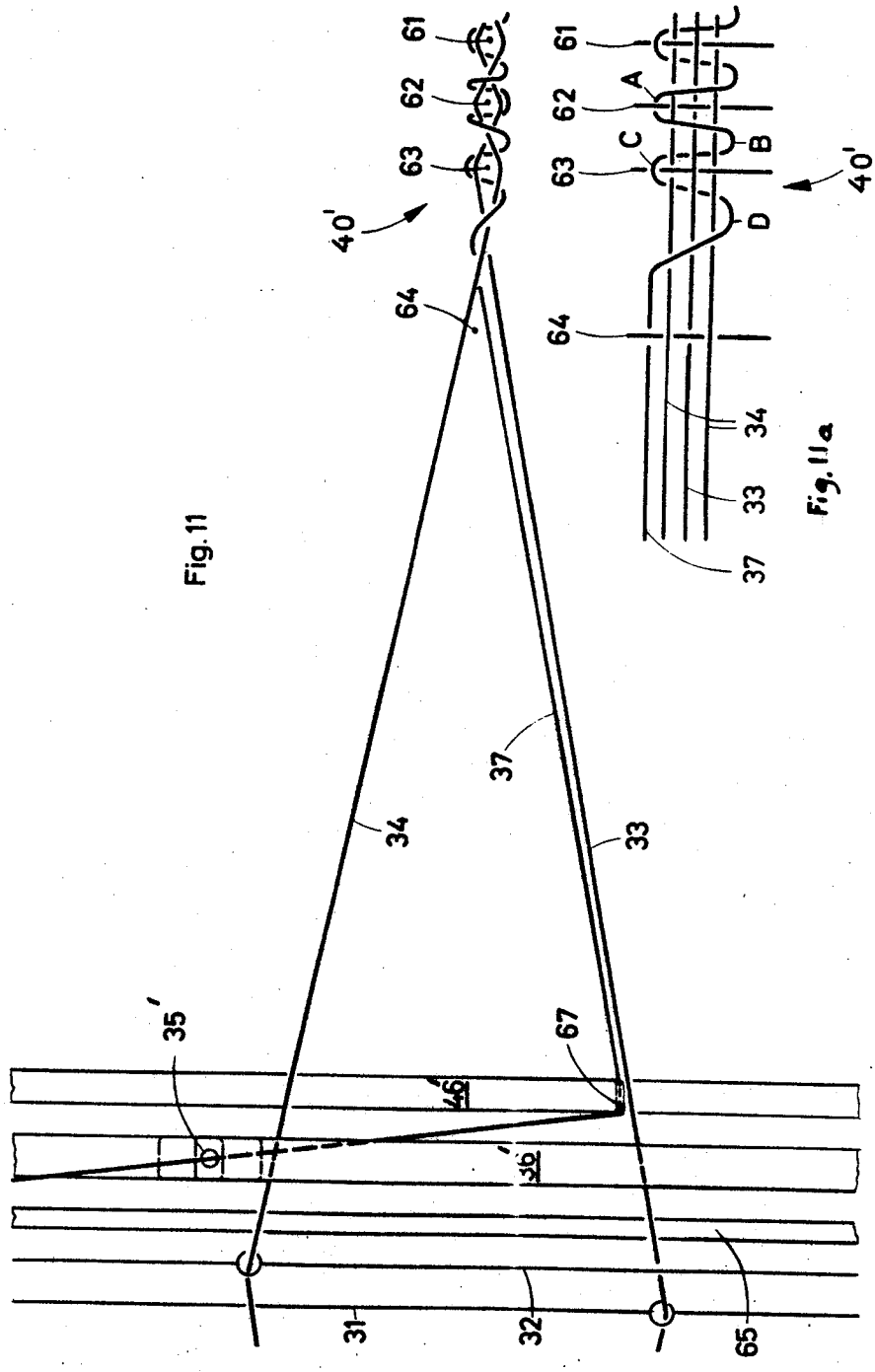

Fig. 11

Fig. 11a

MANUFACTURE OF A LENO INTERLACING

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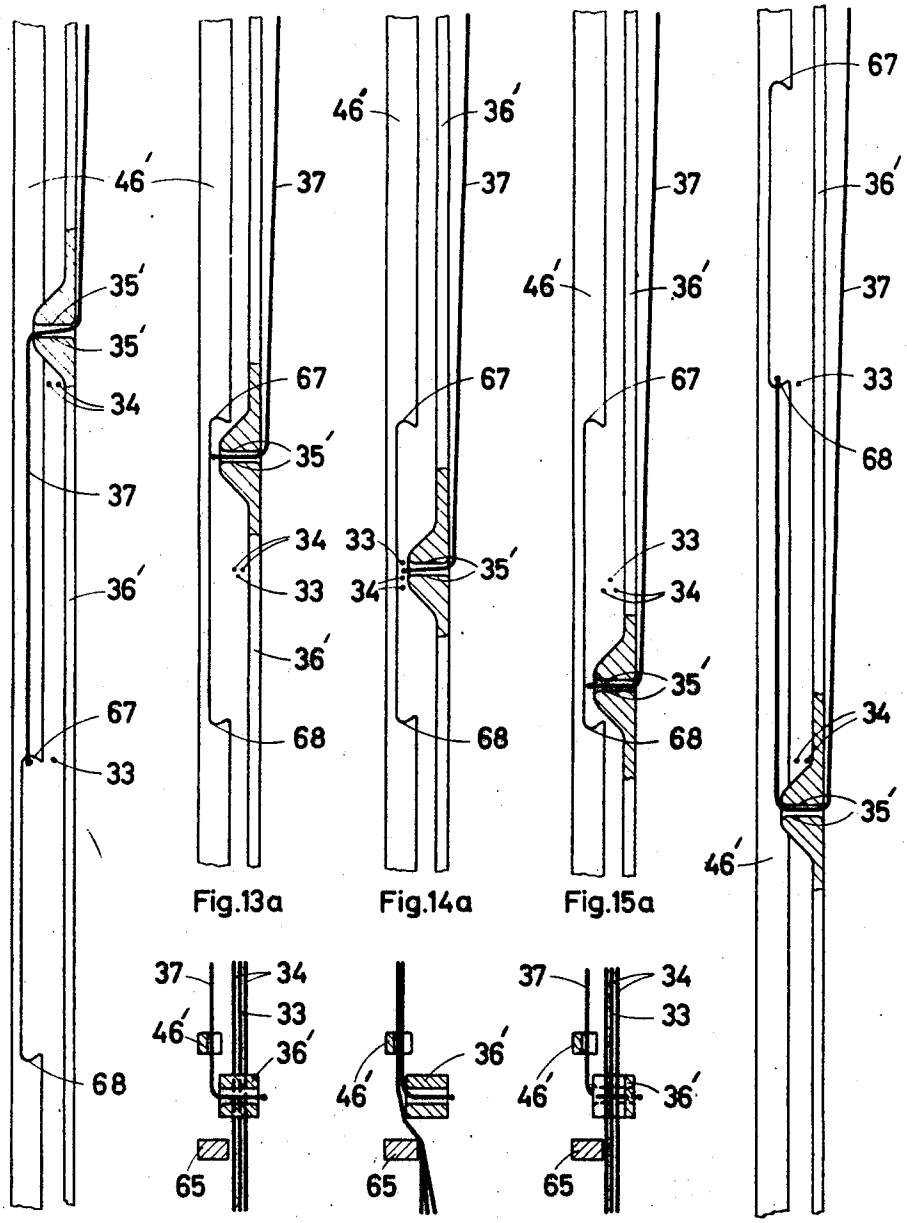

Fig.12 Fig.13a Fig.14a Fig.15a Fig.16

Fig.13b Fig.14b Fig.15b

MANUFACTURE OF A LENO INTERLACING

Filed March 11, 1968 8 Sheets-Sheet 8

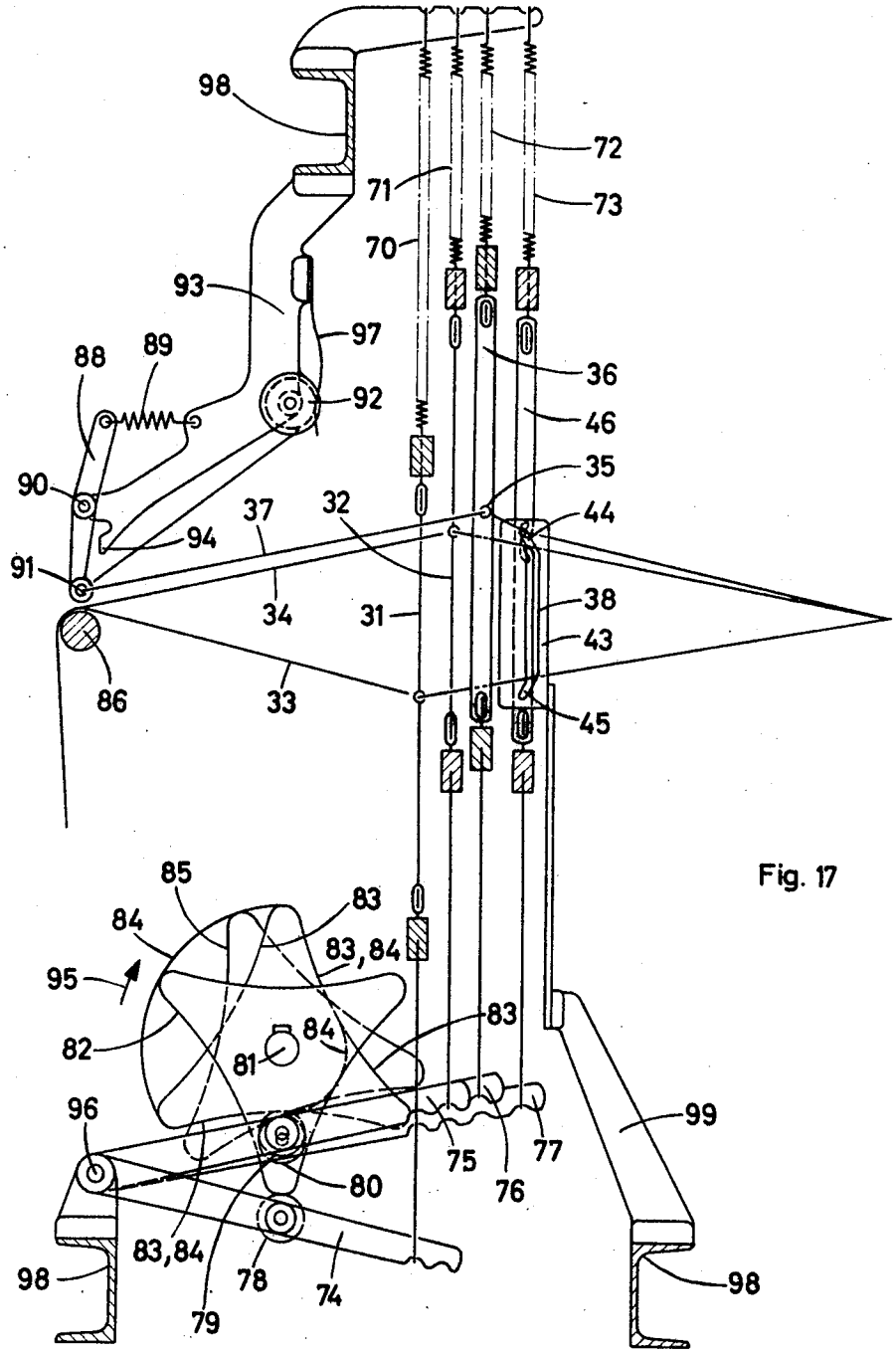

Fig. 17

United States Patent Office 3,493,013 Patented Feb. 3, 1970

3,493,013

MANUFACTURE OF A LENO INTERLACING

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Filed Mar. 11, 1968, Ser. No. 712,177
Claims priority, application Switzerland, Mar. 10, 1967, 3,497/67
Int. Cl. D03c 11/00; D03d 25/00, 23/00
U.S. Cl. 139—54 14 Claims

ABSTRACT OF THE DISCLOSURE

An arrangement for the manufacture of a leno interlacing having a leno thread wrapped around a predetermined number of warp threads which includes first and second thread guide means, each reciprocal in a direction of movement of the healds on a loom for actuating a leno thread. The first thread guide means is disposed on one side of the predetermined number of warp threads and the second thread guide means is disposed on the other side of the warp threads. Two entrainment means are arranged on the second thread guide means so that during the reciprocal movement of this means, one entrainment means entrains the leno thread in the one direction of movement and the other entrains the leno thread in the other direction of movement. An intermediate space is also provided between the two entrainment means wherein the leno thread is freed from the entrainment means. A method of forming the leno interlacing and the resulting leno interlacing are also disclosed.

The present invention relates to a method for the manufacture of a leno interlacing or pattern in which by actuating a crossing or leno thread in the direction parallel to the direction of movement of the heald shafts of a loom a predetermined number of warp threads have a leno thread wrapped about them, the arrangement or apparatus for carrying out the method and the leno interlacing made thereby.

Various types of arrangements for the manufacture of leno weaves are known. These generally have healds which move parallel to their longitudinal direction and with the aid of which crossing threads are displaced in accordance with a program. It is also already known, for the manufacture of selvedges, to draw off two crossing threads from continuously rotating yarn bobbins and to entwine the crossing threads with each other while simultaneously inserting weft threads between them.

Attempts are continually being made to improve such leno weaves. In particular, the weaves are to be of such a nature that no slipping takes place between the threads which have been intertwined with each other, i.e., the threads are retained in their mutual position in such manner as to be non-displaceable to the maxium extent. This is of decisive importance particularly when the leno interlacing is used for a selvedge.

Advantageously the present invention makes possible the manufacture of an extremely strong and firm leno interlacing which is suitable both for leno fabrics, for outer selvedges and also for between-selvedges.

Thus this invention, contemplates a method of producing a leno interlacing as heretofore described further characterized in that the leno thread is selectively moved to and fro both on one side of the predetermined number of warp threads and also on the other side of the predetermined number of warp threads, and the leno thread is permanently retained on said one side and, on said other side, selectively retained or released.

This invention furthermore is directed to an arrangement or apparatus for the manufacture of leno interlacing by which a predetermined number of warp threads are embraced by a leno thread, the arrangement comprising a first and second yarn or thread guide means adapted to be reciprocated in the direction of movement of the healds for actuating the leno thread, said first thread guide means being disposed on one side of the predetermined number of warp threads and the second thread guide means being disposed on the other side of the said predetermined number of warp threads said second thread guide means having two entrainment means whereby during the reciprocating movement of said second thread guide means one of said entrainment means entrains the leno thread in the one direction of said movement and the other entrains the leno thread in the other direction of said movement, said second thread guide means also having between the two entrainment means an intermediate space in which the leno thread is free from the entrainment means and which is open in the direction towards the predetermined number of warp threads.

In addition, this invention is concerned with a leno interlacing wherein a predetermined number of warp threads are embraced by a leno thread characterized in that the leno thread lies, in the form of a U-shaped loop, alternatingly over the predetermined number of warp threads and below the predetermined number of warp threads, the curved portion of the loops extending over the warp threads and also of the loops extending under the warp threads, being wound about a weft thread and the wound-around portions of the U-shaped loops wrapped about the weft threads being located on the same side of the leno interlacing.

Due to the provision of two yarn or thread guide means of the type heretofore described, it becomes possible to lay the crossing thread selectively in the one or in an opposite direction about the warp threads which are to be embraced or to travel through with the leno threads alternatingly under and over the warp threads. It is possible to completely wrap around the warp threads, a weft thread being inserted after each such wrapping-around. Thus, with the arrangement according to the present invention, it becomes possible to produce a very large variety of leno interlacing.

At the same time, the arrangement has only rectilinearly displaced parts, which may consist of thin strips, tapes or finished healds. Thus, the arrangement according to the invention is simple and a strong construction, and may be designed to be extremely narrow in the weft or pick direction. In this way, spreading-apart of the warp threads (which might possibly result in marking of the fabric, i.e., in weaving flaws) is practically avoided. Furthermore, when the arrangement according to the invention is employed, any possibility of hindering of the warp threads during shedding is quite readily avoided.

The invention will now be described in greater detail with reference to the embodiments shown in the drawings in which:

FIGURES 1, 2, 3, 3*a*, 4, 4*a*, 5, 5*a*, 6, 6*a*, 7, 7*a*, 8 and 8*a* show, in diagrammatic form, an embodiment of the arrangement or apparatus of the invention, its mode of operation and the leno interlacing made thereby;

FIGURES 9, 9*a*, 10 and 10*a* show two variants of the embodiment shown in FIGURE 1 and the leno interlacing made thereby;

FIGURES 11 and 11*a* show a further embodiment of the arrangement of the invention in a lateral elevation and the leno interlacing made thereby;

FIGURES 12, 13*a*, 13*b*, 14*a*, 14*b*, 15*a*, 15*b* and 16

her illustrate the mode of operation of the embodi-
it shown in FIGURE 11;
IGURE 17 shows, in diagrammatic form, an embodi-
it of a drive for the predetermined number of warp
ads and the crossing thread.
n all the figures, like reference numerals designate like
nents.
IGURE 1 shows an arrangement or apparatus for the
nufacture of a leno fabric or a leno selvedge in eleva-
1 and FIGURE 2 shows a plan view of the same ar-
gement. The two healds **31** and **32** are moved individu-
, but may also be associated with the standard shafts
the weaving machine. The healds move the warp
eads **33** or **34**, respectively. A crossing or leno thread
is guided through the eyelet **35** of the yarn guide **36**
hich comprises a first yarn guide means). The threads
end from the above-described elements **31**, **32** and **36**
ough a slot arrangement or means, comprising the
ight slotted portions **38**, **38'** and the ends **44**, **45**, to
fabric **40**. In order to indicate that the arrangement
strated serves for the formation of a lateral selvedge,
litional warp threads **41** and **42** are only shown in
GURE 2. These threads represent the end of the shed.
e slots forming the portions **38** and **38'** are formed by
ngated plates or thread guiding means **43** and **43'**.
ch slot comprises a rectilinear portion **38** (or **38'**) and
curved ends **44** and **45**.

On a weaving loom, the fabric is normally at the for-
rd part of the machine. Thus, in the drawings, in the
rmal direction of viewing the loom, the fabric **40** de-
mines the position of the forward part of the loom.
owever, when describing the present invention, it is to
assumed that "forward" and "behind" are defined in
ation to the views of the figures showing lateral eleva-
ns, so as to simplify the mode of expression used in the
scription.

The leno thread **37** travels from a leno thread supply
ot shown) on the forward side of the first yarn guide
guide means **36** (i.e., in front of the guide as shown
FIGURE 2) through the eyelet **35**, behind the yarn
ide **36** and in front of the plate **43**, through the curved
d **44** of the slot, through the plates **43**, **43'** and from
ate **43'** to the fabric **40**. The warp thread **34** extends
rough the eyelet of the heald **32**, through the slot por-
ns **38**, **38'** and from the latter, behind the plates **43** and
', to the fabric **40**. The warp thread **33** travels through
e eye of the heald **31** arranged behind the heald **32**
d also through the slot portions **38**, **38'** and from the
tter, behind the plates **43**, **43'** to the fabric **40**.

The plates **43**, **43'** are secured, by means of screws,
ith the loom. Arranged between the plates **43**, **43'** is
second yarn guide or guide means **46**. Both the yarn
ide **36** and also the yarn guide **46** are movable parallel
the direction of movement of the shafts of the loom,
e. parallel to the rectilinear portion **38** of the slot in
ate **43**. The second yarn guide **46** is designed as a rod
r tape and is formed with entrainment means i.e., in-
ntations **47** and **48** extending in its longitudinal direc-
on. The indentations serve to entrain the leno thread **37**.
etween the indentations is an intermediate space ex-
nding between the limiting portions or projections **49**
nd **50**. As can readily be seen in FIGURE 2, the inter-
ediate space is open towards the righthand side and
wards the warp threads **33** and **34**.

A thread disposed in the curved end **44**, such as for ex-
mple the thread **37** is, as the yarn guide **46** moves down-
wardly, entrained by the indentation or by the entrain-
ent means **47**. Similarly, if the yarn guide **46** is in its
wer position, coinciding with the curved end **45**, a thread
isposed in the end **45** is entrained by the indentation or
y the entrainment means **48**. If, on the other hand, a
hread is disposed in the rectilinear portion **38** of the slot
1 plate **43**, then it will not be engaged by the said entrain-
ent means **47** or **48**. The slot arrangement or means **38**,

44, **45** in plate **43** thus serves as a guide arrangement for the leno thread **37**, in as much as, with the aid thereof, the threads are guided into the indentations **47**, **48** and out thereof.

The yarn guides **36** and **46** are individually driven. Their movement development depends on the nature of the leno interlacing to be manufactured. FIGURES 1 and 2 also show the weft threads **51**, **52**, **53**, **54**, **55**, **56** and **57** of the fabric **40**.

In explanation of the mode of operation of the arrangement or apparatus during the manufacture of a leno interlacing, FIGURES 3 to 8 show various, successive positions of the healds **31** and **32**, the yarn guides **36**, **46**, the warp threads **33**, **34** and the leno thread **37**. In FIGURES 3 to 8, no plan view, corresponding to FIGURE 2, has been shown. However, the elevation of the fabric **40** or **40'** has been included in each of the FIGURES 3*a*–11*a* as a fragmentary plan view.

For the further development of the leno interlacing extending in FIGURE 1 over the weft threads **51** to **56**, the closure of the open-shed position of the warp threads **33**, **34** (as shown in FIGURE 1) is commenced. While these threads travel in the rectilinear portion **38** of the slot in plate **43**, the yarn guide **46** is displaced downwardly. As this takes place, the indentation or the entrainment means **47** engages the crossing thread **37** whereby the thread is drawn, from its position above the warp threads **33**, **34**, behind them and downwardly. This movement can be most clearly seen from FIGURE 2.

The warp threads **33**, **34** extend to the right of the yarn guide **46** (see also FIGURE 3) and are not engaged by guide **46**, but the leno thread **37** is retained thereby with the indentation **47**. Therefore, the thread **37** must, if it is drawn downwardly, along the inner, left-hand edge of the slot portion **38** against which it bears, slip through between the latter and the warp threads **33**, **34**. It should be noted that, as this takes place, the yarn guide **36** (and with it the eyelet **35** thereof) remains stationary. Similarly, thread **37** must slide, at the inner, right-hand edge of the slot **38'** about which it bends round, downwardly over the threads **33**, **34**. An intermediate position of this movement is shown in FIGURE 3. Before the warp threads **33**, **34** have passed through their closed shed position, the weft thread **57** has been beaten up. The plan view of the fabric **40** shows how, from the above discussed procedure, the leno thread **37** has been laid over the two warp threads **33**, **34**.

After the downward movement of the yarn guide **46** and the shed-change in respect of the warp threads **33**, **34** has been effected, a new weft thread **58** is picked-in. This condition is shown in FIGURE 4. As the next-following movement, the shed formed by the warp threads **33**, **34** begins to close once more and the weft thread **58** is beaten up. When the warp threads **33**, **34** are again in the rectilinear portion **38** of the slot, the yarn guide **46** again commences its upward movement.

The end position of the movement of guide **46** is shown in FIGURE 5. In this working phase, a weft thread (i.e., the weft thread **59**) is again picked. Thereupon, the shed formed by the warp threads **33**, **34** is changed and the weft thread **59** is beaten up. Simultaneously with the shed-change, the forward yarn guide **36** moves downwardly. Since the yarn guide **46** remains stationary at the commencement of this movement, the leno thread **37** is, due to the downward movement of the yarn guide **36**, displaced along the curved end **44** and, as it "turns into" the rectilinear portion **38** of the slot in plate **43**, leaves the intermediate space between the projections **49** and **50**. In this way, the leno thread **37** (as will be more readily comprehended from FIGURE 2) is first of all drawn at the forward, left-hand, inner edge of the slot in plate **43** forwardly over the warp threads **33**, **34**. At the same time, it slides along these warp threads **33**, **34**, down over them at the forward side. Correspondingly, it slips at the inner, right-hand edge of the slot portion **38'** between the

right-hand edge and the warp threads **33, 34**. After the yarn guide **36** has commenced its downward movement, and in particular after the leno thread **37** has taken up its position in the rectilinear portion **38** of the slot, the yarn guide **46** is displaced downwardly in an idle movement. The weft yarn **60** is also inserted.

The end position resulting therefrom is shown in FIGURE 6. The corresponding plan view of the fabric **40**, illustrated in FIGURE 6*a*, also shows how the leno thread **37** is wound round the weft thread **58**, forming a U-shaped loop lying over the warp threads **33, 34**. At the next movement during the further production of the leno interlacing **40**, the shed formed by the warp threads **33, 34** (shown in FIGURE 6) begins to close. Then the yarn guide **46** is moved upwardly. During this movement, the indentation or the entrainment means **48** engages the leno thread **37** and displaces it upwardly. Consequently, the leno thread **37** on the rear side of the warp threads **33, 34**, and first at the position of the slot **38'** (see FIGURE 2) behind the warp threads **33, 34** is drawn over the threads, upwardly: this movement being propagated upwardly and rearwardly over the warp threads from the slot **38'**, towards the right and towards the fabric. Correspondingly, the leno thread **37** is, at the inner, left-hand edge of the slot **38** against which it bears, drawn through between the edge and the warp threads **33, 34**.

The new condition resulting therefrom is shown in FIGURE 7. In this figure, the new weft thread **61** which has been picked is also shown. As can be seen from the plan view of the fabric in FIGURE 7*a* (and as a result of the condition just described) the leno thread **37** has been drawn through under the warp threads **33, 34** and the weft thread **60**. With the beating-up of the weft thread **61**, there again takes place the closing of the shed and, with an appropriate delay, a movement of the yarn guide **46** in the downward direction. The weft thread **62** is then picked.

This movement results in the condition shown in FIGURE 8. As the next step for the further formation of the leno interlacing, the shed change in respect of warp threads **33, 34** recommences. Simultaneously, the forward yarn guide **36** travels upwardly. During this movement, the leno thread **37** travels out of the intermediate space located between the projections **49** and **50** and along the curved end **45** towards the rectilinear portion **38** of the slot. During a further part of this movement, the leno thread **37** is displaced by the yarn guide **36**, at the inner edge of the slot **38** against which it bears, forwardly over the warp threads **33, 34**. Then, the thread **37** is drawn upwardly also at the inner edge of the slot **38'**, against which it bears, between the edge and the warp threads **33, 34**. Additionally, the yarn guide **46** also travels upwardly in an idle stroke and with a corresponding delay. In the end position resulting from this movement, both the yarn guide **36** and also the yarn guide **46** are again in their upper end positions. The warp thread **33** is again in its lower shed position and the warp thread **34** in its upper shed position. These end positions correspond exactly to the positions of the elements shown in FIGURE 1. Naturally, as compared with FIGURE 1, a complete repeat (or cycle of leno interlacing) has been further added.

From the plan view of the fabric shown in FIGURE 8*a* it will be apparent that, as a result of the procedure described with reference to FIGURES 6 to 8, the leno thread **37** is wrapped about the weft thread **61** and forms a U-shaped loop extending under the warp threads **33, 34**.

FIGURE 9 shows a form of embodiment which has been varied relative to the embodiment heretofore described. The difference between the embodiments is that the second yarn guide means comprises a guide **46***a* with an intermediate zone between the entrainment elements **47** and **48** or between the projections **49** and **5** designed to be somewhat longer than the length of th slot made up of portions **38, 44, 45**. The advantage of thi embodiment will be appreciated if the mode of operatio described with reference to the embodiment illustrated b FIGURES 1 to 8 is recalled. In that case, after the down ward movement of the yarn guide **36**, a downward idlin movement of the yarn guide **46** took place, thus pro ducing the condition shown in FIGURE 6. In an anal ogous manner, after the condition shown in FIGURI 8, an upward movement of the yarn guide **36** takes plac and this is followed by an idling movement of the yarı guide **46** in the upward direction: consequently, the con dition shown in FIGURE 1 is again attained. In the ar rangement shown in FIGURE 9, the two idling move ments just described are no longer necessary.

Also the embodiment shown in FIGURE 10 serves, a compared with the form of embodiment first described to simplify the upward and downward movement of the second guide means. The description in the foregoing tex pointed out that the yarn guide **46** is intended to carry out its movement, after the commencement of the shed movement, effected by the healds **31, 32**. The reason for this step resides in the fact that undesirable entrainment of threads disposed in the slot ends **44, 45** is to be avoided, since threads disposed in the curved slot ends **44** and **45** are entrained by the entrainment elements or means **47** or **48**. The embodiment shown in FIGURE 10 has the advantage that the shed movement in respect of the threads **33, 34** is able to commence simultaneously with the movement of the yarn guide **46**, because of the increased length of slot **38, 44, 45**. The yarn guide **36** must, also in this case, move in every instance before the yarn guide **46**, in order that the guide **46** may not be able to engage the leno thread **37** during its idling movement.

In yet a further embodiment which, however, is not shown, the end position of one of the entrainment means **47** is above the curved slot end **44** and the end position of the further entrainment means **48** is below the curved end **45**, in the case of a design of the slot **38, 44, 45** as shown in FIGURE 10. This embodiment is thus a combination of the examples shown in FIGURES 9 and 10. It has the advantages mentioned in connection with those figures. In this case, wherein the idle movement of the yarn guide **46** is again dispensed with, also the forward-shifting of the movement of the yarn guide **36** is no longer necessary.

FIGURE 11 shows a further embodiment of the invention. According to this embodiment, the shed-formation in respect of the warp threads **33, 34** is effected once again by healds **31, 32** and the leno thread **37** is again displaced by an eyelet **35'** in the first yarn guide means comprising a yarn guide **36'**. The FIGURES 11 and 11*a* show additionally the leno interlacing or pattern **40'** formed from the warp threads **33, 34**, the weft threads **61, 62, 63** and the crossing thread **37**. In this embodiment, the leno interlacing comprises two warp threads **34** and, associated therewith, two healds **32**.

The second yarn guide means includes a yarn guide **46'**, having a shape deviating from that described in the preceding embodiments. This can be seen most clearly from FIGURE 12, which illustrates the arrangement of FIGURE 11 in section, as seen from the left-hand side of FIGURE 11. The yarn guide **46'** is provided with two entrainment means or indentations **67** and **68** for the entrainment of the leno thread **37** downwardly or upwardly respectively. According to this embodiment, the ends **44, 45** of the slot having portion **38** are not necessary for displacing the crossing thread **37** in the zone of the entrainment means **47, 48**, since the eyelet **35'** is so shaped that it retains the thread **37** permanently in the zone thereof. The thread **37** travels from a supply bobbin (not shown) through the eyelet **35'** and downwardly,

n over the indentation 67 and then to the leno intering 40', i.e., towards the right in FIGURE 11 and, in GURE 12, away from the viewer.

FIGURES 12, 13*a*, 13*b*, 14*a*, 14*b*, 15*a*, 15*b* and 16 ow various phases of the movement of the yarn guides ' and 46'. In order to make the arrangement clearer, GURES 13*a* to 15*a* show the end elevations and FIGRES 13*b* to 15*b* show the corresponding plan views (as wed from the left hand side of FIGURE 11). As can seen from the figures, there has been provided for guiding of the warp threads 33 and 34 associated with leno interlacing 40', a yarn guiding means 65 which s the form of an elongated rod. The function thereof nsists substantially in pressing the warp threads 33, 34 t of the travel path of the yarn guide 46'.

In explanation of the mode of operation of this angement, it will be assumed that it is in the condition work phase shown in FIGURE 11. This corresponds that shown in FIGURE 12. During the further formaon of the leno interlacing the weft thread 64 is first aten up and the shed formed by the warp threads , 34 is closed, as shown in FIGURE 13*a*. Simultaneisly, the yarn guide 36' travels downwardly and the rn guide 46' travels upwardly towards its center posion. In this way, the thread 37 passes into a position herein it is free from the two entrainment means 67, 68 the yarn guide 46' and travels therein from the inner le of the leno interlacing (the side of points A, C shown the fragmentary plan view of FIGURE 11) to the aperre in the eyelet 35' located at the side of the yarn guide 5'. Since this aperture extends more towards the side the yarn guide 46' than the warp threads 33, 34, the no thread 37 does not cross the warp threads and avels obliquely upwardly to the position of the leno terlacing as shown in FIGURE 13*a*.

In the case of the movement development shown in IGURES 13*a*, 14*a* and 15*a* the eyelet 35' is then dislaced on the right of or outwardly past the warp threads 3, 34. These warp threads are pressed somewhat towards ie left, during the travel-through of the guide 36' carryig the eyelet 35' due to the wedge-shape or tapered shape f the eyelet. During this procedure, the leno thread 37 naturally entrained by the eyelet 35, i.e., it is laid over nd around the warp threads 33, 34. This step terminates the phase shown in FIGURES 14*a* and 15*b*.

After the eyelet 35' has travelled past the warp threads 3, 34, the threads are again displaced out of the entrainent zone of the indentations 67 and 68. As already stated, is the purpose of the guide strip or rod 65 to press the arp threads 33, 34 out of the entrainment zone of the ndentations 67 and 68. Due to the procedure hitherto decribed, the crossing thread 37 now extends from a point n the inner edge of the leno interlacing over the warp hreads 33, 34 and then, extending downwardly somehat, to the eyelet 35'.

In the next working phase, the leno thread 37 is before he yarn guide 36' has travelled completely downwardly, ngaged by the entrainment means 68 and drawn upvardly, as shown in FIGURE 16. In this way it is still urther tiwsted or wound about the warp threads 33, 34. n order to be able to follow the entire procedure with eference to the plan view of the leno pattern 60 shown n FIGURE 11*a*, it should be pointed out that, during he formation of the leno pattern, the same procedure is epeated after each two successive weft threads. Thus, it nay be assumed that, previously, instead of the weft hread 64, the weft thread 62 was picked. Consequently, luring the step shown in FIGURES 13*a* to 15*b*, the crossng thread 37 has been laid from point A over the warp hreads 33, 34, to point B. Due to the entrainment of the hread 37 by the indentation 68, in the manner shown in FIGURE 16, it travels from the right-hand side of the leno pattern through, under the warp threads 33 and 34 and is drawn upwardly on the left-hand side of the warp threads. In this way, thread 37 passes into the position C.

Simultaneously, opening of the shed takes place and a new weft thread is inserted. With the assumption made hereinabove, this will be considered to be the weft thread 63. If attention is given to the leno pattern 40' shown in FIGURE 11, it will now quite readily be appreciated that, as the next movement step, the yarn guide 46' will move downwardly into its middle position and the shed of the warp threads 33, 34 will close again, accompanied by the beating up of the weft thread 63. Thereby, the leno thread 37 extends obliquely downwardly from the interior of the leno pattern (position C). Simultaneously, the yarn guide 36' is displaced upwardly. As this takes place, and after the leno thread 37 has been freed from the indentation 68, the thread 37 first of all extends from point C obliquely downwardly to the eyelet 35'. Since the eyelet 35' has the wedge shape which projects towards the yarn guide 46' in this working phase, the leno thread 37 does not yet cross the warp threads 33, 34. Thereupon, the yarn guide 36' moves further upwardly and displaces the eyelet 35' on the right past the warp threads 33, 34 which are in the "shed-closed" position. During this procedure, the leno thread 37 is laid-through under the warp threads 33, 34 and extends through the position D from which it now extends obliquely upwardly to the eyelet 35'.

During the further development of the movement of the yarn guides 36', 46' the yarn guide 46' travels further downwardly. The warp threads 33, 34 are, during this step, again located externally of the entrainment zone of the entrainment means 67, 68. The leno thread 37 which, however, is positioned within this entrainment zone is engaged by the entrainment means 67 and drawn downwardly. Thread 37 thereby takes up its position obliquely over the warp threads 33, 34 and extends at the end of this movement phase from the outer edge of the leno interlacing (position D) over the warp threads 33, 34 and obliquely downwardly to the entrainment means 67 of the yarn guide 46' which is now in its lower end position. The yarn guide 36' has meanwhile reached its upper end position and a new weft thread 64 may be picked-in. This terminates a complete period of the leno interlacing and the mode of operation again commences from the beginning of the work cycle.

Both the fabric interlacing manufactured with the arrangement of FIGURES 1 through 8 and also that manufactured with the arrangement of FIGURES 11 through 16 are distinguished for their stability. It is characteristic of both fabric interlacings that they "travel-through" alternatingly above and below the warp and weft threads. This symmetry results in good cohesion of the interlacing, i.e., in a high degree of durability. When the interlacing is used as a selvedge, it is especially advantageous that the looped-around portions of the leno thread wrapped about the weft threads are all on the same side. In order to form an edge of maximum firmness, these wrapped-around portions are provided on the inner side of the selvedge, i.e., at that side of the selvedge adjacent the fabric. If the wrapped-around portions were to be disposed on the outer side of the selvedge, then they might slip off from the weft yarn ends, when these ends sag.

The edge of interlacing produced by the embodiment of the apparatus first described is less dense than the edge of that produced in the last described embodiment. However, it will be quite clear to the person skilled in the art that this does not result from the arrangements or apparatus disclosed per se but from the mode of actuating the same. If, in the embodiment first described, during a full cycle of movement of the leno thread, only a part of the weft threads were to be picked, as in the case in the description, i.e. if, for example, the weft threads 51, 53, 54, 56, 57, etc. were not to be inserted, then the fabric interlacing according to the embodiment last described would be obtained. It will thus be clear

that, with the arrangements illustrated, not only may the two leno patterns illustrated with the embodiments be produced but also a large number of varying leno patterns.

In FIGURE 17, there is shown in diagrammatic form an embodiment of a device or means for producing the movement of the predetermined number of warp threads 33, 34 and of the yarn guides 36, 46 for actuating the leno thread 37. The warp threads 33, 34 are, as already described, displaced by means of the healds 31, 32. The leno thread 37 again travels through the eyelet 35 and the slot 38, 44, 45 formed in the plate 43. The plate 43 is, through the agency of the carrier or support 99 secured to the loom frame 98.

The healds 31, 32 and the yarn guides 36, 46 are continuously subjected, by the tension springs 70, 71, 72, 73, to an upwardly directed traction force. At their lower ends, they are, as shown in FIGURE 17, secured to the levers 74, 75, 76 and 77 respectively. The levers are pivotal about the fixed pivot 96. Each of the levers 74, 75, 76, 77 carries a roller (of these only rollers 78, 79 and 80 are visible). Due to the pull of the springs 70 to 73, the levers 74 to 77 also are subjected to a continuous upward pull. In this way, each roller is pressed against a guide cam pivotal about the pivot 81. With this arrangement, the following elements are operatively associated with each other:

The roller 78 of the lever 74 and the guide cam 82;
The roller 79 of the lever 75 and the guide cam 83;
The roller 80 of the lever 77 and the guide cam 85.

The roller of the lever 76 (connected to yarn guide 36) is disposed behind the roller 79 and is moved by the guide cam 84. In order to show clearly the path followed by the guide cams, the reference numerals designating the cams are, in part, shown at various positions of the cams.

The regulating roll 86, over which the warp threads 33, 34 are guided, is movable perpendicularly to the longitudinal direction thereof, in order that the warp threads may, during the shed movement, be subjected to practically constant tension. In order to achieve a permanently tensioned condition also for the leno thread 37, the two-armed lever 88 and the tension spring 89 are provided. The lever 88 is pivotal about the pivot 90 and carries on one arm an eyelet 91 through which the yarn 37 is guided. From the eylet 91, the thread travels to the pivotally mounted yarn bobbin 92. The yarn brake 97 is carried by the carrier 93 and serves to brake the yarn bobbin 92. The pivot 90 is secured, by means of the carrier 93, with the loom frame 98. The pivoting of the lever 88 is limited in one direction by the stop 94.

The drive mechanism or means shown in FIGURE 17 drives the arrangement shown in FIGURES 1 to 8. In operation, due to rotation of the pivot 81, the guide cams 82 to 85 are rotated in the direction of the arrow 95. Due to the rollers 78, 79 and 80 travelling along the guide cams, the levers 74 to 78 are caused to carry out pivoting movements about the pivot 96 and thereby to displace the healds 31, 32 and the yarn guides 36 and 46. It is quite clear for example from the shape of the guide cams that the shed-forming means comprised of elements 31, 32 and 46 associated with the guide cams 82, 83 and 85 carry out the same number of reciprocating movements and that yarn guide 46 always lags behind relatively to the movements of the yarn guide 36. In this way, there is no danger of the threads 33, 34 being engaged by the entrainment means of the yarn guide 46.

In order to make clear the path or configuration of the guide cam 84, which coincides in part with other cams, this cam has been given the reference numeral 84 at four different points.

Due to the movement of the leno thread 37, it would be alternatingly tensioned and again loosened, if the pivotal lever 88 were not provided. With each upward and downward movement of the eyelet 35 and with each entrainment movement of the thread 37 by the yarn guide 46, the variation in the required length of thread 37 is compensated by pivoting of the lever 88 which is subjected to the pull of the spring 89. The spring 89 is weaker than the yarn brake 97. As yarn is used up for the leno pattern, a replenishing supply of yarn thread is drawn in past the brake 97, as the lever 88 bears on the stop 94.

While the novel features of the invention have been shown and described and are pointed out in the claims, it is to be understood that various omissions, substitutions and changes in construction and arrangement of the the features shown and described may be made by those skilled in the art without department from the spirit and scope of the invention.

What is claimed is:

1. A method for the manufacture of a leno interlacing during a weaving operation, wherein a leno thread is wrapped around a predetermined number of warp threads, which comprises selectively guiding a leno thread in a reciprocatory movement in a direction parallel to the direction of movement of the healds of a loom, both on one side of the predetermined number of warp threads and also on the other side of the predetermined number of warp threads; continuously retaining the leno thread on said one side; selectively retaining the leno thread on said other side in both end positions of the reciprocatory movement of the leno thread, and selectively inserting a weft thread through an open shed formed by the warp threads during the weaving operation when said leno thread is in an end position of said reciprocatory movements.

2. The method of claim 1, in which alternatingly, during one end position of the leno thread on said one side, the leno thread is reciprocated once on said other side and, during a second end position of the leno thread on said one side, the leno thread is reciprocated once on said other side, and between the two movements of each reciprocating movement, a weft thread is inserted on said other side.

3. The method of claim 1, in which the leno thread is reciprocated in phase opposition on both sides and is freed in a central zone of its movement on the said other side, said leno thread being, due to its movement on said one side guided about the warp thread and then reengaged on said other side and entrained into its end position, and during each end position of the crossing thread a weft thread is inserted.

4. The method of claim 2 in which before each movement of the leno thread into each of the end positions on said one side and after each movement of the leno thread into said end positions, a weft thread is inserted.

5. An arrangement for the manufacture of a leno interlacing having a leno thread wrapped about a predetermined number of warp threads, comprising a first and a second thread guide means, each reciprocable in the direction of movement of the healds on a loom, for actuating a leno thread, the first thread guide means disposed on one side of the predetermined number of warp threads and the second thread guide means disposed on the other side of the said predetermined number of warp threads; two entrainment means so arranged on said second thread guide means that during its reciprocating movement, one entrainment means entrains the leno thread in the one direction of movement and the other entrains the leno thread in the other direction of movement and an intermediate space between the two entrainment means in which the leno thread is freed from said entrainment means and which is open towards the predetermined number of warp threads.

6. The arrangement of claim 5 in which the first thread guide means is arranged externally of the shed and the second thread guide means is arranged within the shed for the formation of a selvedge; said second thread guide means being shifted into the interior of the shed by the

iount of threads equal to that of said predetermined mber of warp threads.

7. The arrangement of claim 5 further comprising a ead guiding means, the leno thread extending from a io thread supply through the first thread guide means, i said thread guiding means and the second thread guide ans to the leno interlacing, and the leno thread being ided by the thread guiding means at the end positions the first thread guide means into the path of movement the entrainment means of the second thread guide ans.

8. The arrangement of claim 7, in which the thread iding means is formed with at least one slot comprising rectilinear portion extending parallel to the direction of ovement of the healds whereby the leno thread extend- g through the rectilinear portion is kept outside the path movement of the entrainment means and also compris- g end portions so shaped and arranged relatively to the ith of movement of the entrainment means that a thread tending through either of said end portions is disposed the path of movement of the entrainment means.

9. The arrangement of claim 8, in which both the leno iread and also the predetermined number of warp threads e guided through the slot; the shed movement of the arp threads by said healds moving the warp threads only ver the rectilinear portion of the slot or the commence- ient of the shed movement of the said warp threads by iid healds being before the commencement of the move- ient of the second thread guide means.

10. The arrangement of claim 8, in which the two en- ainment means provided by the second thread guide ieans includes an elongated member formed at one longi- idinal side with a recess from which extend indentations iat are directed and are spaced apart in the longitudinal irection of said member, said indentations operating to ntrain the leno thread upon reciprocal movement in one r the other direction of said member.

11. The arrangement of claim 10, in which two identical lots are provided by said thread guiding means, said slots eing in registry and the second thread guide means being iovable between the two slots parallel to the rectilinear ortions of the slots, the two entrainment means coin-

ciding in the end positions, of their movements at least approximately with the ends of said slots.

12. The arrangement of claim 10, in which the spacing between the two indentations in the longitudinal direction of said member is at least equal to the spacing of the ends of the slot in the thread guiding means.

13. The arrangement of claim 5, in which the mutual arrangement of the two thread guide means is such that the leno thread extends from the leno thread supply through the first thread guide means, emerges therefrom at a point which projects to the side towards the second thread guide means, travels from that point over the path of movement of the second thread guide means to the leno interlacing, and the first thread guide means has a wedge-shaped portion extending in its longitudinal direction for deflecting the predetermined number of warp threads during its travel past said warp threads.

14. The arrangement of claim 5, further comprising a thread guiding means shaped as a rod which is arranged adjacent to the second thread guide means and parallel to the path of movement thereof, and which is so offset relatively thereto that the predetermined number of warp threads is guided out of the path of the second thread guide means.

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