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ART OF FORMING LEASES

Filed Sept. 24, 1935

3 Sheets-Sheet 1

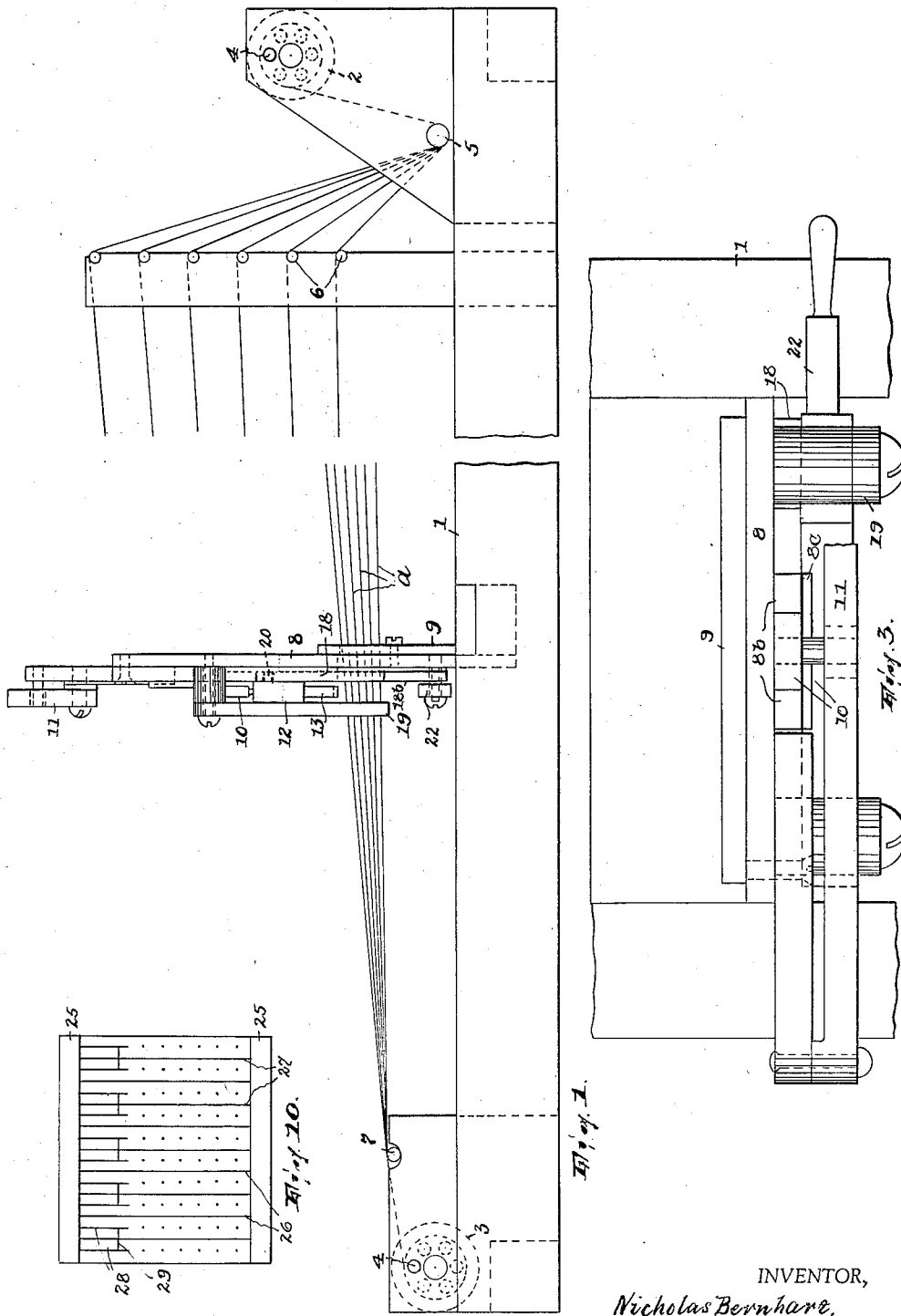


Fig. 1.

Fig. 2.

Fig. 3.

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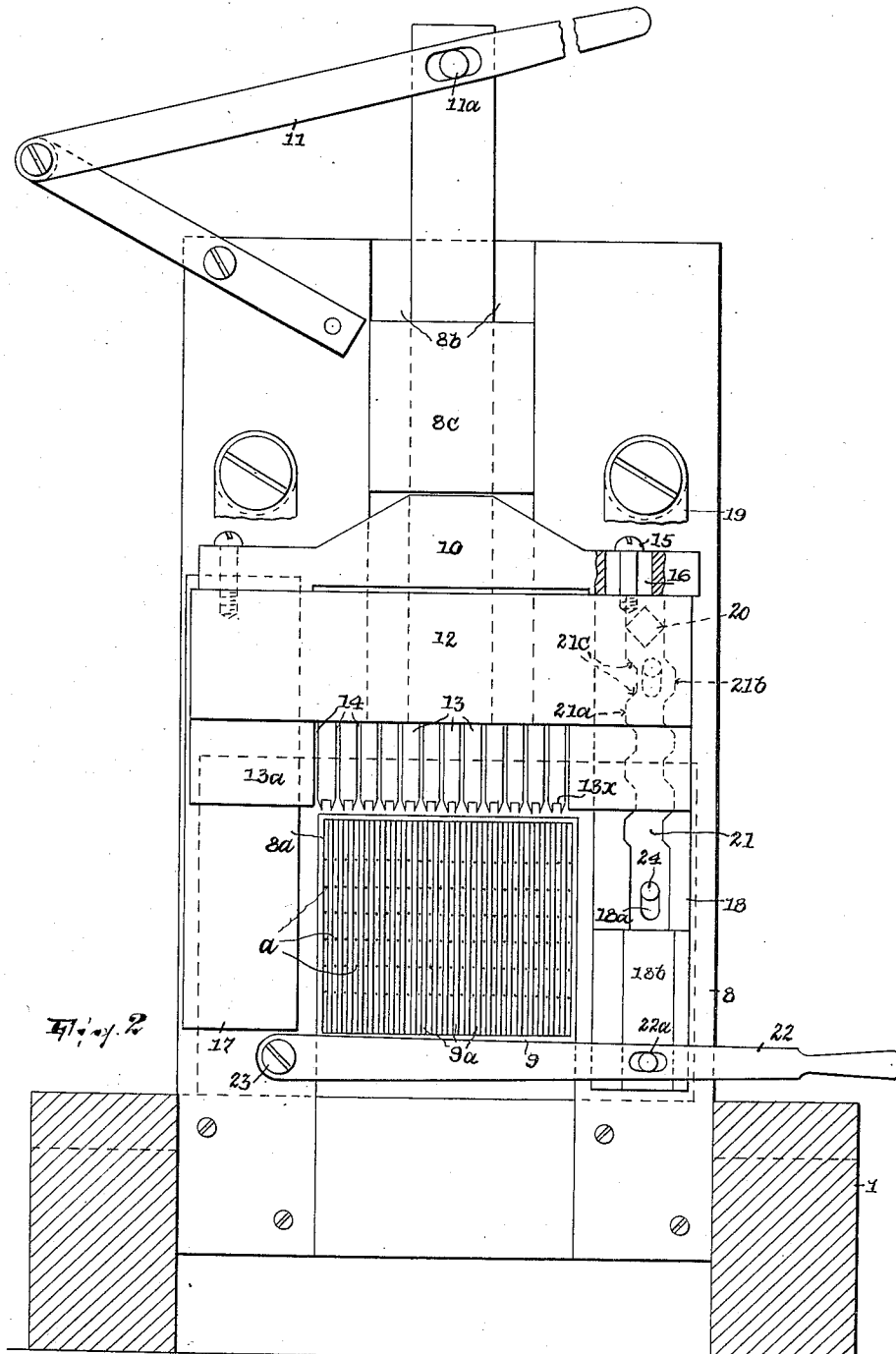
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3 Sheets-Sheet 2



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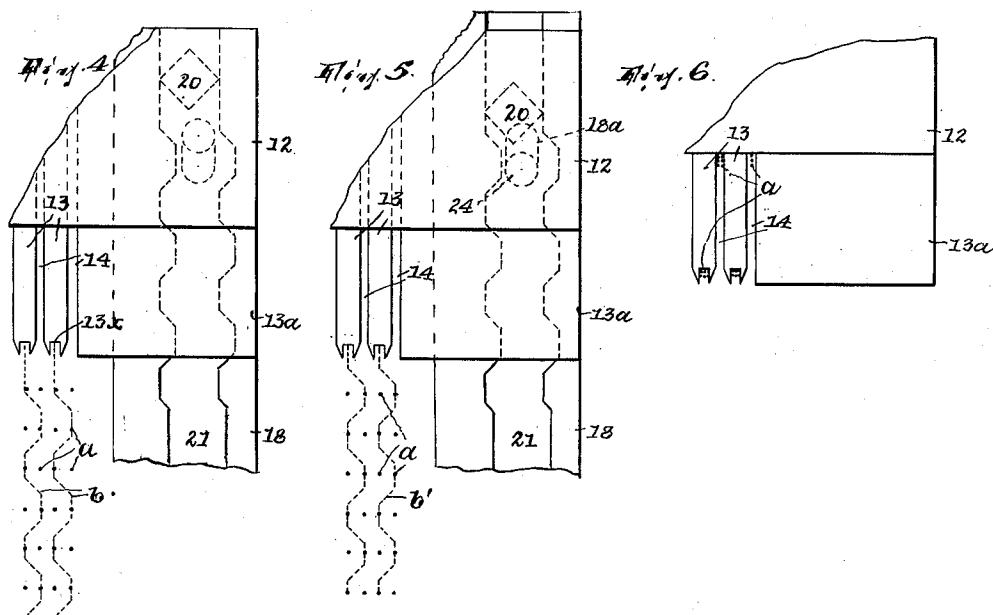
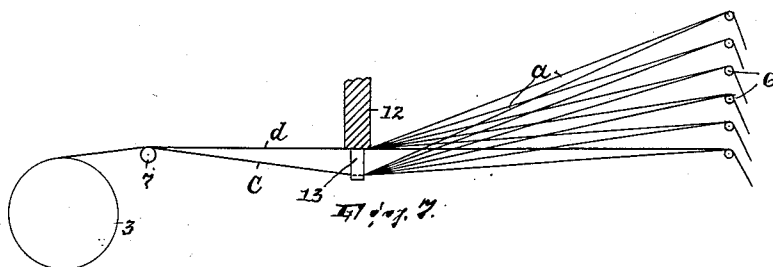
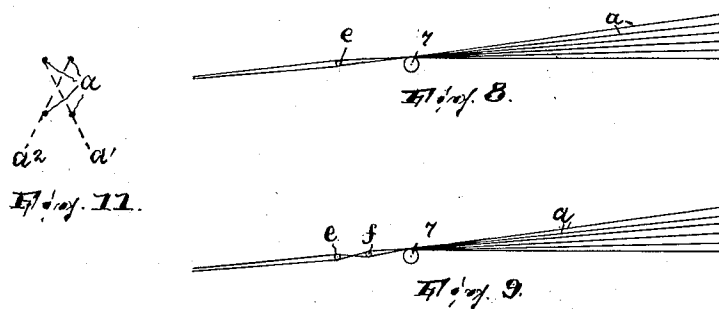
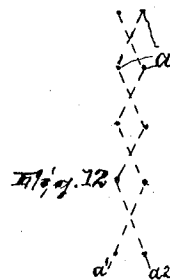
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ART OF FORMING LEASES

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3 Sheets-Sheet 3



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ART OF FORMING LEASES

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Application September 24, 1935, Serial No. 41,853

6 Claims. (Cl. 28—40)

This invention relates to the art of forming warp-leases and particularly to the forming of leases in the case where the final or completed warp is composed of a number of warps or warp sections which when the leasing is done stand in superposed relation to each other, all converging from superposed supports to form, by merging together in a single plane, the completed warp.

Heretofore to form the lease a hook-reed has been used of the kind whose dents have hooks all projecting in one direction from them short of the neighboring dents. The spaces between the hooks and the neighboring dents are of course present to permit the reed, after drawing down the selected threads to form a shed to be maintained by a lease-cord or the like, to clear as it rises the remaining threads preparatory to the next downward movement of the reed to draw down the latter threads in the forming of the second shed followed by entry of a lease-cord thereto. Of course the capacity of the reed is reduced by just so much as the sum of these spaces. Again, a reed of this type may be used to form a true lease (i. e., in which the threads are equally divided) only where there is an even number of the component warps or warp sections superposed; if there is an odd number one of the warp sheets at the lease will contain more threads than the other—for instance, where there are three banks of component warps or sections one sheet would be formed with twice the number of threads of the other.

The principal objects of this invention are to overcome these faults characterizing the hook reed.

In the drawings,

Fig. 1 is a side elevation of apparatus which may be used in the performance of the invention;

Fig. 2 is a sectional view in a vertical plane say immediately to the left of the mechanism carried by the upright 8;

Fig. 3 is a plan of said mechanism;

Fig. 4 is an elevation, viewed from the left in Fig. 1, of fragments of the segregator and its controlling slide, the slide being down and the segregator in its upper position and the view showing the threads in section and by dotted lines the paths which the segregator teeth follow when the segregator descends with the slide in said position;

Fig. 5 is a similar elevation, the slide being up and the segregator in its upper position and the view showing the threads in section and by dotted lines the paths which the segregator teeth follow when the segregator descends with the slide in this position;

Fig. 6 is a similar elevation showing the positions of the threads relatively to the segregator when it has descended;

Fig. 7 shows partly in section and partly dia-

grammatically the beam 3, bar 7, the segregator and the threads in the depressed position of the segregator, a shed being formed to receive the first lease-cord;

Fig. 8 shows in side elevation, diagrammatically, the bar 7 and the threads with said lease-cord in position and upon the ensuing rise of the segregator;

Fig. 9 is a similar view but showing the lease completed, i. e., with the second lease-cord also in position;

Fig. 10 is a front elevation of a modified form of the segregator; and

Figs. 11 and 12 are diagrammatic views illustrating the invention essentially and with respect to the method involved.

Suppose, for example, there are two banks or tiers of threads of equal number and in some way substantially equally spaced. There is a segregator which is movable through the planes of the banks and has spaced teeth projecting toward them and of a number one-half that of the threads in each bank, the teeth, considered successively, being respectively active on the pairs (also considered successively) of threads. To form the first shed the segregator is moved through the planes of the banks in such manner that each tooth displaces with itself one (as left or right) of the threads of the pair to which it is devoted in the upper bank and then the relatively opposite thread of the pair to which it is devoted in the lower bank, the resulting shed formed as between the threads thus displaced and the remaining ones (of equal number to those displaced) being maintained by a lease-cord or equivalent separating device. The segregator is then returned and the operation repeated but on the now ensuing movement of the segregator through the planes of the banks each tooth thereof is made to displace in the two banks the threads it missed before, the resulting shed formed as between the sheet of threads last displaced and those first displaced being maintained by a lease-cord, completing the lease. If there are more than two banks the operation continues in the same way, the segregator moving zig-zag through the planes of the banks; and, whether the number of the banks is even or odd, a true lease will be formed. Referring now to the apparatus shown:

It will be convenient, though not necessarily indispensable, to arrange the threads *a* of the warp in converging banks, those in each bank being as nearly as possible all in the same plane, which arrangement may be maintained thus: Supporting structure, as 1, carries two beams 2 and 3 on which the threads may be wound and which maintain them normally taut, the beams being held against rotation in any way, as by pins 4. From beam 2 the whole complement of 60

threads is shown extending under a bar 5, then bank for bank over respective bars 6 and finally over a bar 7 which coacts with bars 6 to maintain the banks in the state of convergence—Fig.

1. The banks are as nearly as possible equally spaced, as are the threads in each bank or transversely; all the banks here have exactly the same number of threads and they are arranged squarely one above another or so that a thread of any given number across a bank will be in the same vertical plane as threads of the same number in the other banks. It will be understood that usually in practice there will be several beams 2, one for each bank, where the complete warp (wound on beam 3) is composed of several component warps respectively forming the banks; also that the convergence, as stated not indispensable to the performance of the invention, is merely an incident of the bringing together as usual on a single beam 3 of such component warps or banks.

Between the two beams the supporting structure includes an arch-like upright 8 through whose opening 8a the threads extend, and their mentioned lateral spacing is maintained by a reed 9 secured to one face of this upright and having its dents standing vertically.

In a vertical guideway afforded by the upright (as between two ribs 8b thereof spanned by a bridge-plate 8c) is movable the stem of a plunger in the form of a cross-head 10, 11 being a lever for moving it down and back which is pivoted to the upright and suitably connected, at 11a, with the plunger stem. The plunger carries a comb-like thread segregator or comb formed and controlled as follows:

From a horizontally elongated "back" or block 12 depend a series of equal-width teeth 13, the series being flanked at both sides by depending webs 13a and the teeth and webs being all separated by equal-width slots 14. The number of teeth should be such that there will be at least one for every two threads in each bank, for the successive teeth are to operate, as will appear, on the respective successive pairs of threads in each bank, each acting on one descent of the segregator on only one of the threads of the corresponding pair in each bank and on the next descent on the other thread. In the example every reed space is occupied by a thread of each bank and, there being 24 such spaces, there are twelve teeth. Each tooth has its lower end desirably tapered and it has a notch 13x. The segregator is suspended from the cross-head by screws 15 penetrating slots 16 in the cross-head, permitting the segregator to reciprocate transversely relatively to the cross-head.

On opposite sides of opening 8a of the upright are a pad 17 and a controller in the form of a slide 18, and between them and depending arms 19 affixed to the upright the plunger and segregator are movable. When the segregator is depressed the slide, as will appear, causes its transverse reciprocation; the pad is present simply to space the segregator from the upright the same as does the slide. The segregator has a rear stud 20 formed here square with a diagonal thereof vertical. This is engaged with a zig-zag way (here a groove) 21 of a thickened-up portion of the slide which in the example is formed as follows: it comprises a series of equal-length sections or portions which from center to center in the vertical direction are spaced the same as the thread-banks, the alternates 21a being offset transversely with respect to the remainder 21b the same as the reed spaces (or the threads in

each bank transversely) are spaced and the sections of one set being joined with those of the other by oblique sections 21c. The arrangement is in short such that when the segregator is depressed the engagement of the stud 20 with the groove produces the transverse reciprocation of the segregator, its movement in each direction being equal to the spacing of the threads and such movement occurring at intervals equal to the spacing of the thread-banks in substantially the plane of the segregator.

However, the slide is itself capable of movement up and down a distance equal to the spacing of the thread-banks, as by a lever 22 pivoted to the upright at 23 and connected at 22a with a suitable thickening rib 18b of the slide, whose movement is limited by vertical slots 18a therein receiving studs 24 on the upright and having a length equal to the spacing of the thread-banks.

If the segregator be moved down while the slide (as by lever 22) is held down (position of Fig. 2 or 4) the teeth 13 will follow the zig-zag paths b in Fig. 4, receiving in their notches and depressing one-half of the threads, i. e., the odd-numbered threads in the odd-numbered banks and the even-numbered threads in the even-numbered banks, the remaining half of the threads being permitted to enter the slots 14—see Fig. 6. If the segregator be moved down while the slide is held up (Fig. 5) the teeth 14 will now follow the paths b', receiving in their notches and depressing one-half of the threads, i. e., the even-numbered threads in the odd-numbered banks and the odd-numbered threads in the even-numbered banks, the remaining half of the threads being permitted to enter said slots. On completion of either such operation (Fig. 6) there will be as many threads in each tooth-notch as there are thread-banks and in each slot likewise as many as there are thread-banks (except for the extreme right-hand slot, in which there will be one-half the number of threads as there are thread-banks).

Further, on either such operation the threads depressed by the teeth will, between the segregator and bar 7, assume a plane, as at c; and if, as is preferred, the segregator is depressed sufficiently so that the block 12 engages all the threads which enter the slots 14, these threads will assume the plane d between the segregator and bar 7. Thus a shed (Fig. 7) will exist through which a lease-cord may be passed to maintain it.

The operation of forming a lease is as follows: The slide being held at one of its limits the segregator is depressed to form a shed (one-half of the threads assuming the plane c and the other half being preferably made to assume the plane d), a lease-cord e is entered through the shed and shifted forward of bar 7, whereupon the segregator is elevated, permitting all the threads to re-assume substantially the state shown by Figs. 1 and 2 and see Fig. 8. The slide being shifted to and held at its other limit the segregator is again depressed to form a shed (the two halves of the entire thread complement being now in reversed positions with respect to the planes c and d), another lease-cord f is entered into this shed, which may be shifted past the bar 7, and the lease results. Upon elevating the segregator the leased warp may be withdrawn from the reed.

The invention may be thus analyzed:

Suppose there are only two banks of threads. Each two pairs of threads to which any tooth

13 appartains (one pair in the upper and the other in the lower bank) undergoes this treatment (Fig. 11): A thread of the one hand or class (left or right) in one pair and a thread of the opposite hand or class in the other pair (as the threads joined by the dotted line *a'* or *a2*) are first bent to form with the remaining threads a shed (Fig. 7) and a shed-preserving device, as *e*, is introduced into this shed, and then, while the shed is so preserved, the two of the threads forming one side of the shed (as its top side) are bent past the other pair of threads to form another shed and a shed-preserving device, as *f*, is introduced into this shed, completing the lease.

Again, suppose there are three banks, or it may be more. Each two vertical rows of threads to which any tooth appartains undergoes this treatment (Fig. 12): The odd-numbered threads of one row and the even-numbered threads of the other row are first bent past the remaining threads to form a shed and a shed-preserving device introduced, and then, while the shed is so preserved, the remaining threads are bent past the first-named threads and a shed-preserving device introduced.

I claim the method thus involved, not limiting myself to the particular apparatus so far described. For instance, it would be possible to perform such method with the use of the segregator shown by Fig. 10, having which, even in a manual operation and also without the use of a reed as 9, one might in fact form a true lease.

This segregator has top and bottom bars 25, dents 26 and 27, alternating with each other and connecting the bars, and short dents 28 depending from the top bar one each side of a dent 27 and connected by cross-pieces 29 short of the lower ends of the dents 28. With this segregator a reed (as 9) as an independent element is unnecessary since the dents 26 and 27 isolate the vertical rows of threads from each other. Each pair of dents 27 taken with the cross-bar positioned as stated presents in effect a tooth with a notched lower end, or in effect like each tooth 13. The warp being threaded through this segregator in the manner shown, it may be first made to descend as per one of the dotted zig-zag lines in Fig. 12, for instance, thus depressing certain threads as in that figure to form a shed, and with this shed now preserved and upon the return of the segregator, it may next be made to descend as per the other of said dotted zig-zag lines, thus depressing the remaining threads in the completing of the lease.

While my principal object has been concerned with the forming of a lease in a banked warp it incidentally includes the forming of a shed in such a warp, as will be apparent. And in that regard I believe it is new in this art, having a pluri-banked warp, to bend past the remaining threads the threads of one class in one bank and then the threads of the other class in the other bank. Further, having a warp including more than two banks, to bend past the remaining threads those threads which exist as alternately odd-numbered and even-numbered in the series of banks successively thereof.

Having thus fully described my invention what I claim is:

1. The method of forming a lease in a group of four threads stretched in the same general direction and arranged in superposed pairs which consists in successively engaging and bending a thread of the one class in one pair and a thread of the other class in the other pair to form with the remaining threads a shed and introducing a shed-preserving device into said shed, and then, while said device preserves said shed, bending the two of the threads forming one side of the shed past the other two threads to form another shed and introducing a shed-preserving device into the latter shed.

2. The method of forming a lease in a group of more than four threads stretched in the same general direction and arranged so as in the cross-section of the group to present two side-by-side rows which consists in successively engaging and bending the threads of one class in one row and the threads of the other class in the other row past the remaining threads to form a shed and introducing a shed-preserving device into said shed, and then, while said device preserves said shed, bending the remaining threads past the first-named threads to form another shed and introducing a shed-preserving device into the latter shed.

3. The method of forming a shed in a warp comprising two superposed banks each of more than two threads stretched in the same general direction which consists in bending the threads of one class in one bank and then the threads of the other class in the other bank to form a shed with the remaining threads.

4. The method of forming a lease in a group of four threads stretched in the same general direction and arranged in superposed pairs which consists in successively engaging and bending a thread of the one class in one pair and a thread of the other class in the other pair to form with the remaining threads a shed and introducing a shed-preserving device into said shed, and then, while said device preserves said shed, bending the remaining threads past the first-named threads to form another shed and introducing a shed-preserving device into the latter shed.

5. The method of forming a lease in a group of more than four threads stretched in the same general direction and arranged so as in the cross-section of the group to present two side-by-side rows which consists in successively engaging and bending the threads of one class in one row and the threads of the other class in the other row past the remaining threads to form a shed and introducing a shed-preserving device into said shed, and then, while said device preserves said shed, bending the threads forming one side of the shed past the other threads to form another shed and introducing a shed-preserving device into the latter shed.

6. The method of forming a shed in a warp including more than two superposed banks each of more than two threads stretched in the same general direction which consists in bending those threads in each odd-numbered bank which exist as threads of the one class and those threads in each even-numbered bank which exist as threads of the other class to form a shed with the remaining threads.

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