

May 6, 1930.

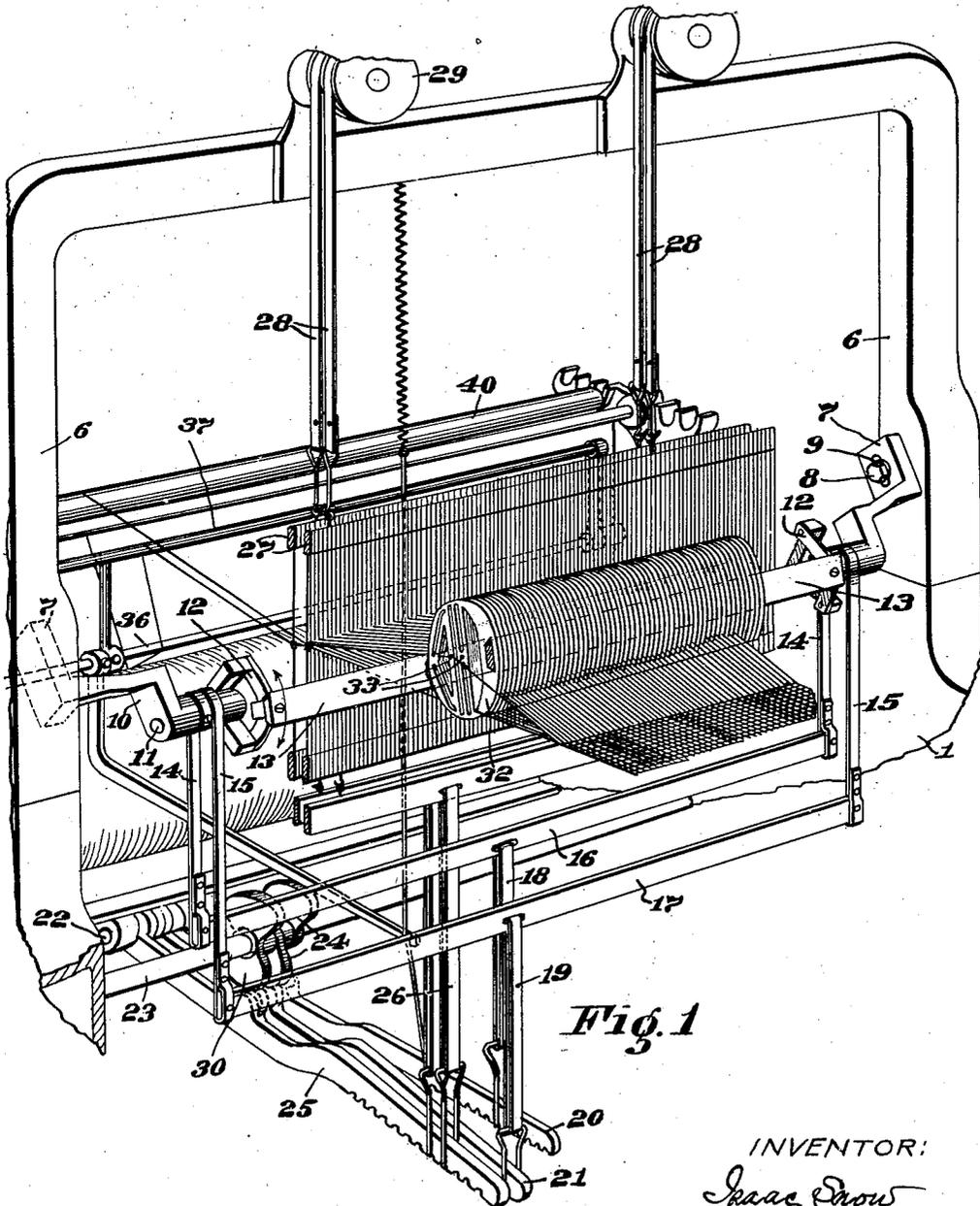
I. SNOW

1,757,947

LENO OR CROSS WEAVING LOOM

Filed April 19, 1929

4 Sheets-Sheet 1



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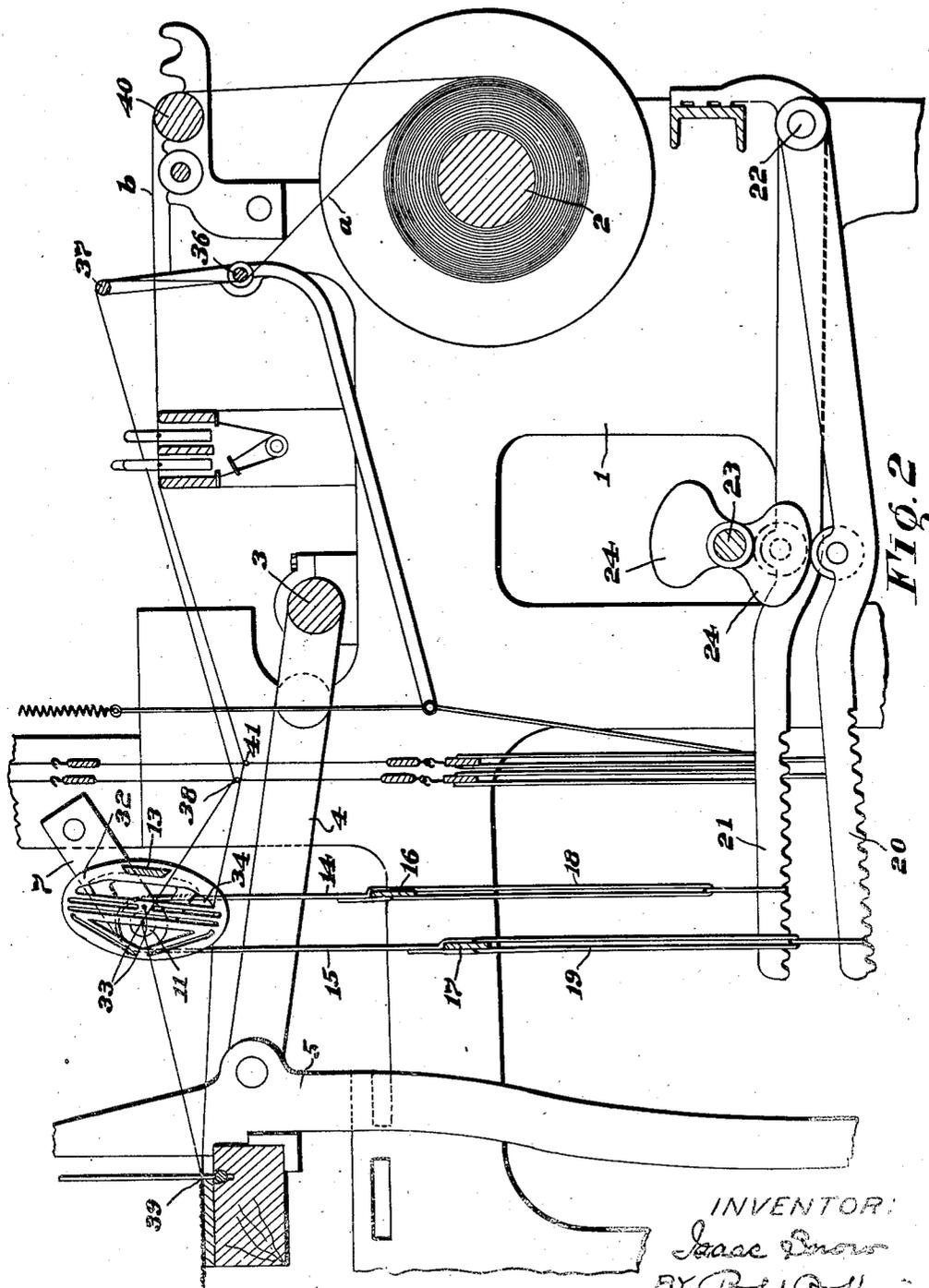


FIG. 2

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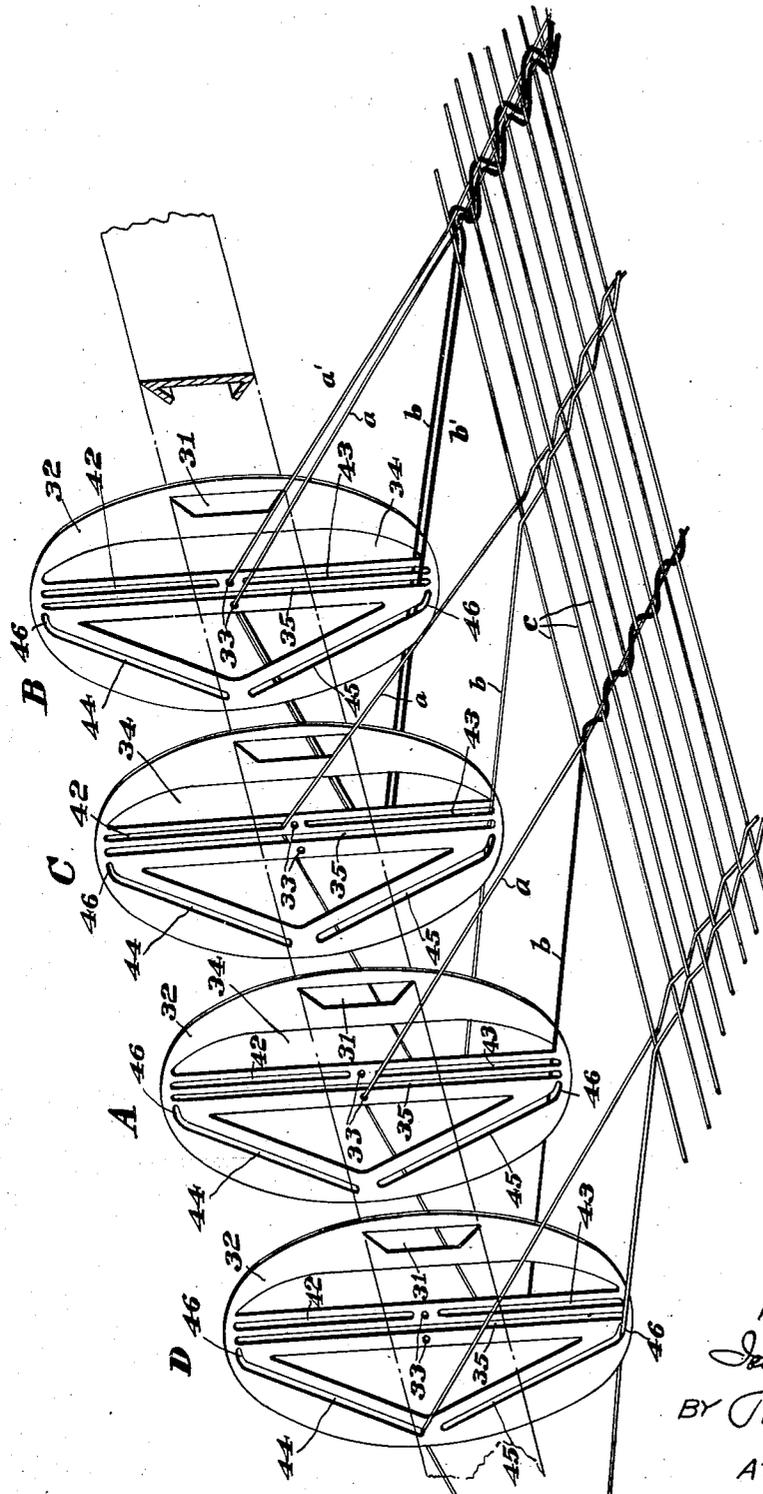


Fig. 3

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4 Sheets-Sheet 4

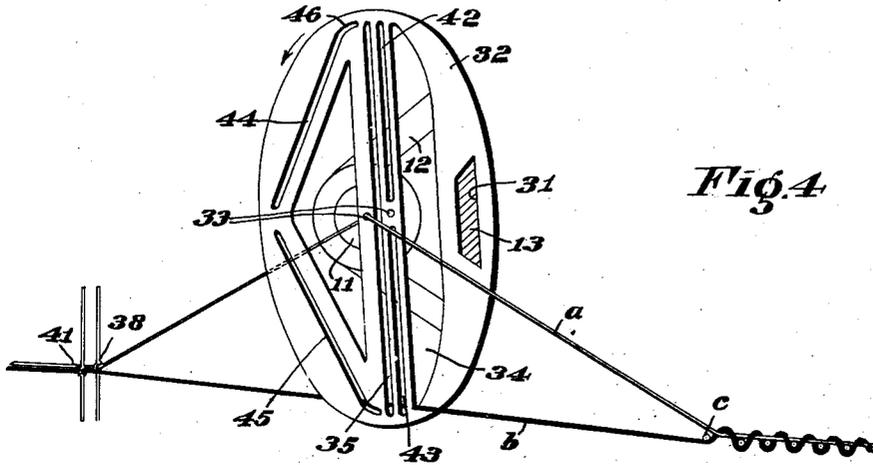


Fig. 4

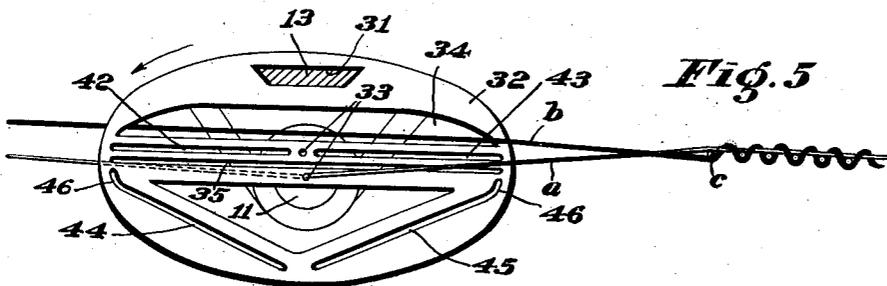


Fig. 5

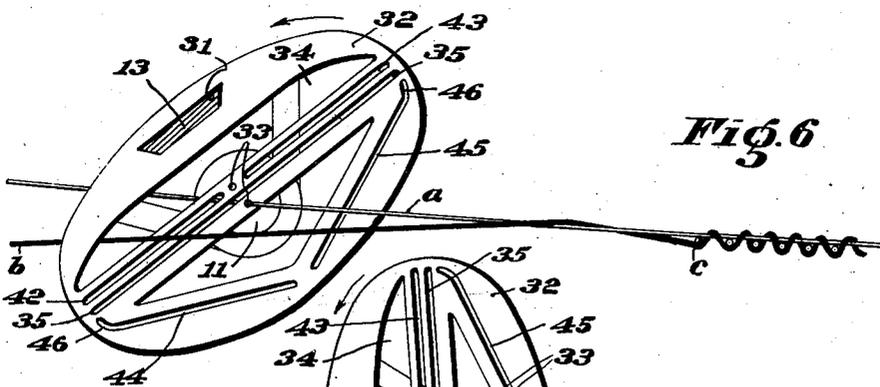


Fig. 6

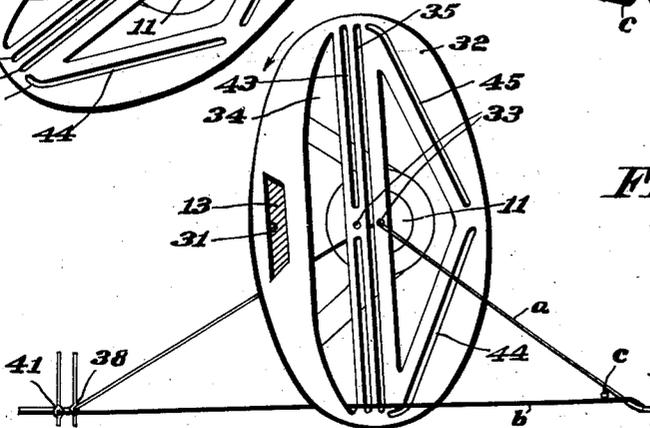


Fig. 7

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## LENO OR CROSS-WEAVING LOOM

Application filed April 19, 1929. Serial No. 356,344.

This invention relates to looms, and more particularly to that class of looms for the production of leno or cross-woven fabrics, wherein some of the warp threads are passed back and forth across other warp threads to produce the well-known cross-woven fabric.

One of the objects of the present invention is to provide a loom of the above general character which shall be capable of producing leno or cross-woven fabrics in great variety of weaving combinations, and in accordance with the present invention fabrics may be woven with stripes of plain woven portions and other stripes of single ground and jumper thread cross-weave, and other stripes of a more fancy character of cross-weave, and such stripes may be alternated in any desired pattern.

An important feature of the present invention consists in plates for controlling the warp threads, and such plates will hereinafter be identified as "crossing plates", which are mounted for rocking movement about their centers through an arc of approximately 90° in either direction from the closed shed plane.

The crossing plates of the present invention have one or more eyes substantially central of the crossing plates and in substantial alinement with the axis of rocking movement, whereby the ground warp threads which are passed through the eyes of the crossing plates may be held in a substantially fixed vertical position during the weaving operation, and at the side of the central eye or eyes the crossing plates are provided with elongated slots for the passage of jumper threads.

In association with the substantially central eye or eyes and the elongated slot or slots, the crossing plates are provided with slotted portions extending from a point adjacent the central eyes outwardly, for the production of plain weave, and since fabrics of the leno or cross-woven type are provided with plain woven selvages, the crossing

plates are provided with selvage forming slots which are adapted during the rocking movement of the crossing plates to shed the warp threads passed through such slots to form the plain selvage weave.

The advantages of the present invention are best illustrated by the following description and the accompanying drawings of one good form of the invention and its novel features.

In the drawings:

Fig. 1 is a perspective view of a loom embodying the present invention, the lay being omitted for clearness of illustration;

Fig. 2 is a fore and aft section through the loom containing the present invention;

Fig. 3 is a perspective view showing the warp threads controlled by the crossing plates for the production of plain weave, single cross weave and fancy cross weave;

Fig. 4 shows a crossing plate in side elevation with a single ground and single jumper thread controlled thereby;

Fig. 5 shows the position of the crossing plate and the associated ground and jumper threads when the shed is closed;

Fig. 6 is a similar view showing the position of parts as the crossing plate is rocked 90° in the direction of the arrow from the closed shed plane; and

Fig. 7 is a side elevation showing the crossing plate as having completed one cycle of its operation in the production of a single cross-weave.

The loom frame 1 may be of usual construction and at the rear portion thereof has the warp beam 2 supported for rotative movement, as usual, and on which the warp threads, both ground and jumper, are wound.

Extending transversely of the loom frame is the crank shaft 3 connected by the pitman 4 to the lay 5, whereby the lay is given its beat-up movements.

Extending upwardly from the loom frame are the risers 6 to which are secured brack-

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ets 7, one at each side of the loom, and for the purposes of adjustment the brackets 7 may be secured to the risers 6 by means of a bolt 8 passing through an elongated slot 9 in the bracket.

Mounted for rocking movement in the arm 10 of the brackets 7 is the rocker 11 having a head portion or arm 12 offset from the axis of the rocker, and extending between the offset heads or arms 12 of the rocker is a support 13 for a series of crossing plates which may be conveniently mounted thereon.

The rocker 11, at each side of the loom, is connected to the actuating straps 14 and 15 which extend downwardly from the hub portion of the rocker and are connected at their lower ends to the cross bars 16 and 17.

Each of the cross bars 16 and 17 is connected by straps 18 and 19 to lever arms 20 and 21 at the lower part of the loom, and such lever arms are conveniently fulcrumed on a cross shaft 22.

Extending transversely of the loom is the cam shaft 23 having the cams 24 for actuating the levers or treadles 20 and 21, the construction being such that upon rotation of the cam shaft the levers or treadles 20 and 21 will be alternately raised and lowered, thereby giving a rocking movement to the rocker about its axis extending transversely of the loom and imparting to the support 13 an arcuate movement at one side of said axis.

Also mounted upon the transverse fulcrumed shaft 22 is a treadle 25 connected by a strap 26 to the harness or heddle frames 27, and such harness or heddle frames are mounted for movement in unison. Connected to the upper portion of the harness or heddle frames are the straps 28 which extend upwardly about guide posts 29 to a suitable head motion, which is not necessary herein to describe because it may be of usual character and tend normally to lift the harness or heddle frames.

Mounted on the cam shaft 23 is the double cam 30 which bears upon the harness operating treadle 25, with the result that on each shed formation the harness frames or heddles may be raised by the usual head motion into the closed shed plane, and then be lowered through the double cam and treadle described.

The support 13, hereinbefore referred to as offset from the axis of the rocker 11, may be variously contrived, but as herein shown consists of a bar of dovetail form which extends through a similar opening 31 formed in the side portion of each of the crossing plates 32.

Each of the crossing plates 32 is provided with one or more eyes 33 substantially central of the plate and approximately in the rocking axis of the rocker, and associated with each of the eyes, the crossing plate is provided with an elongated slot 34 and 35, the

construction being such that upon rocking movement of the rocker the crossing plates will be turned about their centers substantially in the axis of the rocker, while the support 13 travels its path of arcuate movement.

As hereinbefore stated, all of the warp threads are wound upon the warp beam 2 and the ground warp thread *a* passes about the guide 36 and back of a tension bar 37, then frontwardly through the eye 38 of one of the harness or heddle frames, and from this point the ground warp thread passes through one of the substantially central eyes 33 of the crossing plate and frontwardly to the fell of the cloth at 39. The companion jumper thread *b* passes from the warp beam over the whip roll 40, then frontwardly and through an eye 41 in the harness or heddle frame, from which point it passes frontwardly through the elongated slot 34 of the crossing plate and then to the fell of the cloth, with the result that as soon as the crossing plates are rocked about the central axis of the rocker through the arcuate movement of the support 13, the ground thread will remain in substantially the same vertical position with relation to its jumper thread, while the companion jumper thread will be lowered from the closed shed plane by the harness or heddle frame and effect crossing movement with relation to the ground thread, as will further appear.

In the construction thus far described mention has been made of only one pair of ground and jumper threads and their associated relation with the crossing plate, and the operation of effecting the crossing movement as indicated by Figs. 4, 5, 6 and 7.

Referring to Fig. 4 it will be noted that the crossing plate 32 is moving in the direction of the arrow towards the closed shed plane, and the weft or filling thread *c* has been inserted in the shed, which is formed primarily by movement of the jumper thread *b* in a downward direction through the heddle frames or harness, which at this time is in its lowered position.

Fig. 5 indicates the position of parts and the relation of the ground and jumper threads when the crossing plate is in its closed shed position, at which time the harness or heddle frame has been raised, thereby slackening the ground and jumper threads.

Continued movement of the crossing plate from the position of Fig. 5 to that of Fig. 6 through an arc of approximately 90° from the closed shed plane results in crossing the jumper thread *b* over the ground warp thread *a* by the lowering movement of the harness or heddle frames, until the parts take position as indicated in Fig. 7, wherein it will be noted that the crossing plate has been moved through its completed arc of approximately 90° from the closed shed plane and

the jumper thread  $b$  has been crossed over the ground thread  $a$  while the shed is open, due to the lowering movement of the heddle or harness frame. At this time the weft or filling thread  $c$  is inserted in the shed and the reverse movement of the crossing plate is commenced, with a substantial repetition of the crossing action of the threads as hereinbefore described.

The result of the operation so far set forth is a cross-weave formed by a single ground and a jumper thread.

It may be desirable at times, however, to vary the character of the cross-weave or produce a fancy cross-weave, and to this end the crossing plate 32 may have an additional ground and jumper thread passed through the substantially central eyes of the crossing plate and the associated elongated slots 34 and 35, a condition which is represented at section B at the right of Fig. 3.

With the ground and jumper threads associated with the crossing plate 32 as above described, and as shown at section B, the jumper thread  $b$  will be crossed over the two ground threads  $a, a'$  and the jumper thread  $b'$  will be crossed over only one of the ground threads, as  $a$ , with the result that a fancy cross-weave is produced.

Referring to Fig. 3 at section A thereof, it will be noted that a single ground and a single jumper thread have been drawn through their respective parts of the crossing plate 32, with the result that a single or plain cross-weave is formed, as indicated; whereas, at section B, where two jumper threads are associated with the crossing plate, a fancy cross-weave results, as above described.

It may be desirable at times to alternate the cross-weave, whether single or fancy, with a plain weave, as indicated at section C, Fig. 3, and to this end the crossing plate is provided with two slots 42 and 43 which extend from a point adjacent the central eye of the crossing plate in an outward direction, as indicated, with the result that when the crossing plate is moved through its arc of  $90^\circ$  from the closed shed plane, the ground warp thread  $a$  passed through the slot 42 of the crossing plate and the jumper thread  $b$  passed through the slot 43 of the crossing plate, will alternate in raised and lowered positions as the crossing plate is rocked through its arc of movement and the harness or heddle frames are depressed to provide a plain shed through which the weft or filling thread  $c$  will be passed.

By grouping the crossing plates in series transversely of the loom, stripes of plain weave and of single ground and jumper thread cross-weave, and of fancy cross-weave may be produced in the resulting fabric, and such stripes may be of varying widths in accordance with the desired pattern to be produced.

As hereinbefore stated, it is usual in weaving leno or cross-woven fabrics to provide a plain woven selvage, and the crossing plates of the present invention are provided with a selvage forming portion without the use of heddle or harness frame. This condition is represented by section D, Fig. 3.

Each of the crossing plates 32 is provided with a selvage forming elongated slot 44 and 45, which, as indicated, extends diagonally upward and downward from its adjacent end portion opposite the central portion of the crossing plate. Each of the selvage forming slots 44, 45 is provided at its end remote from the center of the crossing plate with an offset warp engaging notch 46 of sufficient angular relation with the main portion of the slot, that when a selvage warp thread is engaged therewith, the notch will carry the engaged warp thread downwardly, while the other or companion warp thread will take position in the closed end of the selvage slot substantially at the side central portion of the crossing plate, during the rocking movement of the plate, as indicated in section D of Fig. 3.

From the construction described as an embodiment of the present invention, it will be apparent that the crossing plates have a central eye portion substantially in alinement with the rocker axis for the passage of a ground warp thread, and an elongated slotted portion at the side of the eye for the passage of a jumper thread, with the result that during the rocking movement of the crossing plate, the ground warp thread will be held in a substantially fixed position vertically with relation to the associated jumper thread.

By drawing the ground warp thread through each of the two eyes of the crossing plate and the jumper thread through the elongated slot associated with each eye, a fancy cross-weave may be produced, and by drawing a warp thread through each of the elongated slots 42, 43 of the crossing plate, a plain weave may be produced, while a plain woven selvage may be formed during the loom operation.

What is claimed is:

1. In a leno or cross-weaving loom, the combination of a crossing plate mounted for rocking movement and provided with an eye substantially in the axis of the rocking movement for the passage of a ground warp thread and an elongated slot at the side of the central eye for the passage of a jumper thread, means for rocking the crossing plate through an angle of  $90^\circ$  in either direction from the closed shed plane, and means for moving the jumper thread from its closed shed position as the crossing plate is moved in either direction from the closed shed plane to cross the jumper and ground warp threads.

2. In a leno or cross-weaving loom, the combination of a crossing plate mounted for

rocking movement and provided with an eye substantially in the axis of the rocking movement for the passage of a ground warp thread that such thread may be held in substantially fixed position and an elongated slot at the side of the eye for the passage of a jumper thread, means for rocking the crossing plate through an angle of  $90^\circ$  in opposite directions from the closed shed plane, and means for lowering the jumper thread from its closed shed position as the crossing plate is rocked in either direction from the closed shed plane to cross the jumper and ground warp threads.

3. In a leno or cross-weaving loom, the combination of a crossing plate mounted for rocking movement and provided with an eye substantially in the axis of the rocking movement for the passage of a ground warp thread that such thread may be held in substantially fixed position and an elongated slot at the side of the eye for the passage of a jumper thread, means for rocking the crossing plate through an angle of  $90^\circ$  in opposite directions from the closed shed plane, and harness mechanism acting to lower the jumper thread from its closed shed position as the crossing plate is rocked in either direction from the closed shed plane to cross the jumper and ground warp threads.

4. In a leno or cross-weaving loom, the combination of a series of crossing plates mounted for rocking movement and having eyes substantially in the axis of the rocking movement for the passage of ground warp threads that such threads may be held in substantially fixed position during weaving and elongated slots at the side of the eyes for the passage of jumper threads, means for rocking the crossing plates through an angle of  $90^\circ$  in opposite directions from the closed shed plane, and means for moving the jumper threads from their closed shed position to form the shed as the crossing plates are rocked in either direction from the closed shed plane in crossing the ground and jumper threads.

5. In a leno or cross-weaving loom, the combination of crossing plates having eyes substantially central thereof for the passage of ground warp threads and elongated slots at the side of the eyes for the passage of jumper threads, a support connected to the crossing plates at one side thereof, means for bodily moving the support about the central axis of the crossing plates through an arc of  $90^\circ$  in opposite directions from the closed shed plane that the ground warp threads will be maintained in substantially fixed position during weaving, and means for moving the jumper threads in the slots of the plates as the plates are rocked in either direction from the closed shed plane.

6. In a leno or cross-weaving loom, the combination of crossing plates having eyes substantially central thereof for ground warp

threads and elongated slots at the side of the eyes for jumper threads, a rocker mounted for rocking movement about an axis substantially central of the crossing plates, a plate support connected to and off-set from the axis of the rocker, means for moving the rocker and plate support to oscillate the crossing plates about the axis of the rocker, and means for moving the jumper threads in a vertical direction relative to the ground threads as the plates are rocked in either direction in crossing the ground and jumper threads.

7. In a leno or cross-weaving loom, the combination of a rocker, an arm extending laterally from the axis of the rocker, a crossing plate support at one side of the rocker axis and connected to the arm of the rocker, crossing plates mounted on the support at one side of the rocker axis and having eyes substantially in the rocker axis for ground warp threads and elongated slots at one side of the eyes for jumper threads, and means for moving the jumper threads in the slots of the crossing plates to cross the ground and jumper threads as the crossing plates are oscillated by the rocker.

8. In a leno or cross-weaving loom, the combination of a rocker, an arm extending laterally from the axis of the rocker, a crossing plate support at one side of the rocker axis and connected to the arm of the rocker, crossing plates mounted on the support at one side of the rocker axis and having eyes substantially in the rocker axis for ground warp threads and elongated slots at one side of the eyes for jumper threads, and means for lowering the jumper threads in the slots of the crossing plates as the latter are oscillated in either direction from the closed shed plane to cross the ground and jumper threads.

9. A crossing plate for leno or cross-weaving looms having an eye substantially central thereof for the passage of a ground warp thread, and an elongated slot formed in the plate at one side of the substantially central eye for the passage of a jumper thread.

10. A crossing plate for leno or cross-weaving looms having eyes substantially central thereof for the passage of ground warp threads and elongated slots at the sides of the eyes for the passage of jumper threads.

11. A crossing plate for leno or cross-weaving looms having an eye substantially central thereof for the passage of a ground warp thread, an elongated slot formed in the plate at one side of the substantially central eye for the passage of a jumper thread, and elongated slots extending in opposite directions from the central eye for the passage of warp threads that the same plate can produce either cross or plain weave.

12. A crossing plate for leno or cross-weaving looms having an eye substantially cen-

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tral thereof for the passage of a ground warp  
thread, an elongated slot formed in the  
plate at one side of the substantially cen-  
tral eye for the passage of a jumper thread,  
5 and two selvage forming slots extending in  
opposite directions from the central portion  
of the plate at one side of the central eye and  
having offset notches in their ends remote  
from the central eye for controlling the sel-  
10 vage threads.

In testimony whereof, I have signed my  
name to this specification.

ISAAC SNOW.

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