

Jan. 2, 1940.

E. PFARRWALLER

2,185,308

SELVAGE WEAVING

Filed June 28, 1938

2 Sheets-Sheet 1

Fig. 1.

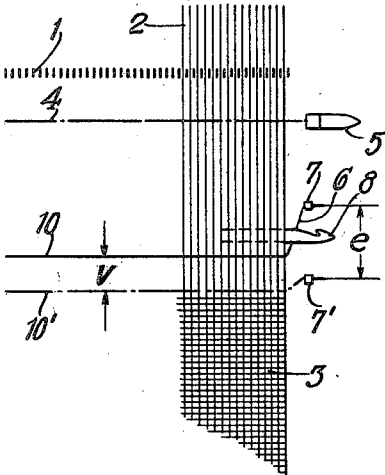
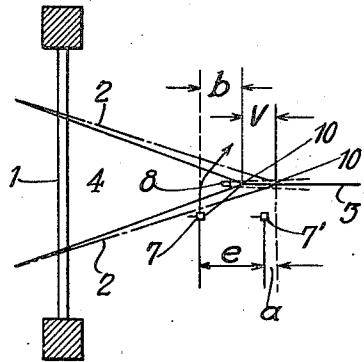


Fig. 2.



Stroke

Fig. 3.

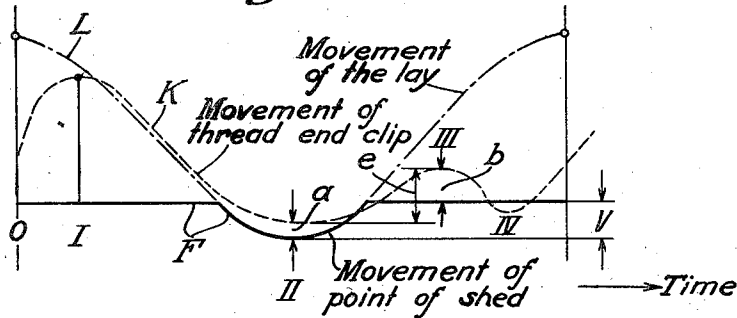
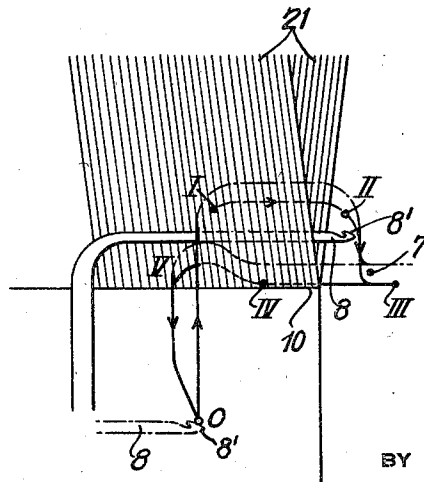


Fig. 4.



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Fig. 5.

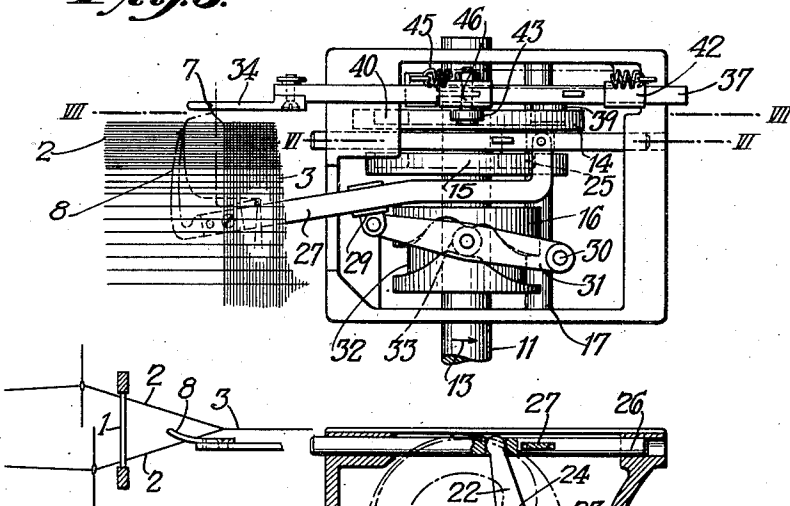


Fig. 6.

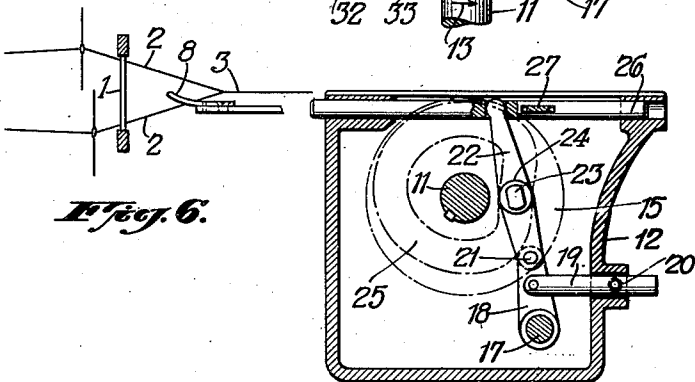


Fig. 7.

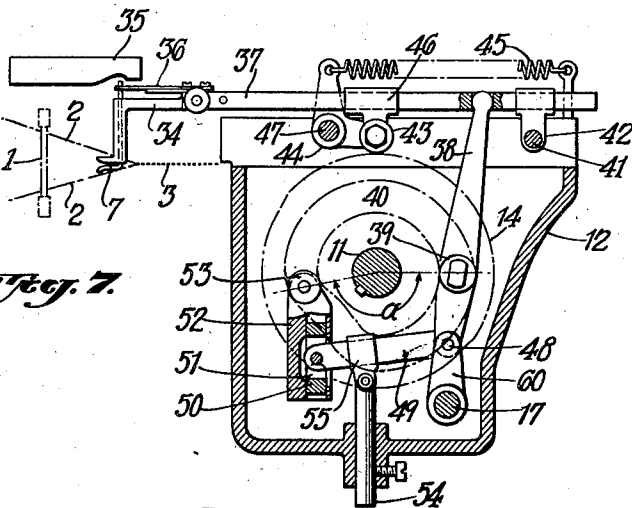
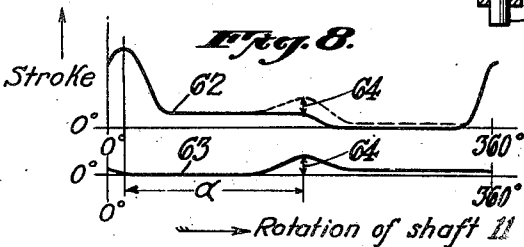


Fig. 8.



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SELVAGE WEAVING

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12 Claims. (Cl. 139—127)

The present invention relates to a method and a mechanism for weaving borders, i. e., producing selvages, particularly to a method and mechanism for the purpose set forth in which the ends of the weft threads which protrude from the shed for forming the border are gripped by means of a gripper before the weft threads are beaten up and in which said gripper carries out a movement in the direction of the returning raddle after the thread is beaten up.

With the customary methods and mechanisms it is not possible to produce a clean selvage by bending the short protruding weft thread ends into the next following shed; this is the greatest difficulty encountered in the development of looms for weaving having gripper shuttles and stationary weft thread spools and in looms for weaving a plurality of breadths of cloth side by side with a selvage at both sides of each breadth. In the conventional mechanisms the backing up of the point of the shed after beating up the extent of which backing movement varies according to type of fabric produced is not taken care of.

The point of the shed is not at all stationary, but moves with the lay in the direction of the cloth when the weft thread is beaten to the cloth. The movement of the point of the shed depends on the density of the cloth produced, the elasticity and tension of the warp threads and this movement may be negligibly small or amount to one-half inch and more.

It is an object of the present invention to provide a selvage forming mechanism in which the variable movement set forth in the paragraph next above is fully taken care of and whereby correct selvages are produced as well at the outside of the cloth as at the inside in case a plurality of breadths are woven side by side on the same loom.

The shorter the protruding ends of the weft threads are the more difficult it is to produce cloths of different density, elasticity, etc., with the same mechanism.

It is an object of the present invention to provide a selvage forming mechanism in which the extent of the backing up movement of the gripper holding the weft end is adjustable. With a mechanism of this type it is possible to operate with very short protruding ends with any type of fabric and assure a reliable transfer of the thread ends from the gripper to the selvage forming needle.

Another object of the present invention resides in the provision of a selvage forming mechanism

having a selvage forming needle the movement of which can be adjusted to conform with the movement of the weft end gripper. One of the advantages connected with the adjustability of the movement of the selvage forming needle is that the point of said needle, when bending over the thread ends into the shed, always moves immediately adjacent to the point of the shed.

Further and other objects of the present invention will be hereinafter set forth in the accompanying specification and claims and shown in the drawings which, by way of illustration show what I now consider to be a preferred embodiment of my invention.

In the drawings:

Figure 1 is a diagrammatic top view of the parts of a loom which are involved in the present invention.

Figure 2 is a diagrammatic transverse sectional view of the parts shown in Fig. 1.

Figure 3 is a diagram showing the relative motions of the lay, the thread end gripper, and the point of the shed.

Figure 4 is an isometric diagrammatic showing of the shed which diagrammatically shows the motions of the selvage forming needle.

Figure 5 is a top view of the mechanism for carrying out the present invention.

Figure 6 is a part sectional view of the mechanism shown in Fig. 5 and taken along line VI—VI of Fig. 5.

Figure 7 is a part sectional view of the mechanism shown in Fig. 5 and is taken along line VII—VII of Fig. 5.

Figure 8 is a diagram showing the movements of the thread end gripper according to the present invention.

Like letters and like numerals designate like parts in all figures of the drawings.

Figs. 1 and 2 diagrammatically show a loom having a raddle 1. 2 designates the warp threads and 3 the finished cloth. The weft thread 4 has just been inserted by means of the shuttle 5. The weft thread 4 is then beaten up against the point of the shed 10 by means of the raddle 1. Due to the elasticity of the warp threads 2 the point of the shed is moved by the raddle 1 by the distance V to the position 10' during the beating up operation and afterwards returns to its initial position 10.

The thread end 6 which projects from the shed is gripped by means of the end clip 7 before the weft thread is beaten up. According to the present invention the end clip 7 moves backwards from position 7' into position 7 in the direction

of the returning lay after the weft thread is beaten up. The magnitude of this movement is indicated by the letter *e* in Figs. 1 to 3; the magnitude of the movement of the point of the shed is designated by means of letter *V* in Figs. 1 to 3.

Preferably the extent of the return motion of the end clip 7 is so adjusted that the distance *b* between the clip and the point of the shed 10 is just great enough to permit passage of the selvage forming needle 8; with such adjustment the projecting thread ends can be made very short and yet a correct seam can be produced. On the other hand it is advisable to adjust the return motion in such manner that the thread end 6 is stretched so that the formation of loops is prevented which would interfere with the transfer of the thread to the needle 8. The extent of the return motion *e* of the end clip is adjusted according to the extent of the return motion *V* of the point 10 of the shed and preferably so that *b* is greater than *a*, *a* being the distance between the point of the shed and the clip 7.

Fig. 3 is a diagram in which the abscissae represent time and the ordinates extent of the strokes of the lay, the end clip and the point of the shed. The movement of the lay is shown by means of the dash and dotted line *L*, that of the end clip by means of the dotted line *K* and that of the point of the shed by means of the solid line *F*. I indicates the moment at which the weft thread is completely inserted and clip 7 has reached its outermost position. Point II indicates the moment when the raddle 1 has reached its extreme position. Between moments I and II the end of the weft thread is gripped by means of the clip 7; between moments II and III the clip, according to the present invention, makes a return motion in the direction of the returning lay; *e* indicates the extent of said return motion. The extent of the movement *e* is greater than the movement *V* of the point 10 of the shed; for this reason the distance *b* between the normal position of the point of the shed and the clip 7 after it is returned with the lay is greater than the distance *a*, i. e., the distance between the clip 7 and the point of the shed at its extreme position during the beating up operation; therefore the thread end 6 is stretched at the moment at which it is transferred to the needle 8. Transfer of the thread end to the needle 8 and bending of the thread end into the shed takes place between the moments designated by numerals III and IV in diagram Fig. 3.

Fig. 4 illustrates the selvage forming needle 8 and diagrammatically shows the movement of the needle point 8' relatively to the shed formed by the warp threads 2 and having a point 10. The needle point 8' is inserted into the shed between the initial position 0 and moment I; between moments I and II the needle point 8' moves between the upper and lower warp threads and towards the clip 7; between moments II and III needle point 8' passes the thread end and clip 7 which at this time travels upwards as seen in Fig. 4. Thereby the thread end 6 slings around needle 8 and is bent into the shed between the moments designated by III and IV. In order to prevent damage of the warp threads when needle 8 is removed from the shed the needle is moved backwards between the position IV and V. The location of point V is so that, at this point, the needle 8 is certainly outside of the shed and can move back to the initial position 0 without engaging warp threads. As is

obvious from Fig. 4 the needle point 8' travels further left when it is removed from the shed than when it is inserted into the shed.

Figs. 5, 6 and 7 illustrate a mechanism for carrying out the present invention. 11 represents a shaft which is driven with the loom and revolved in the direction of arrow 13. Shaft 11 carries the cam-discs 14, 15 and 16. Cams 15 and 16 operate the selvage forming needle 8 whereby cam 15 moves the needle in the direction of the warp threads and cam 16 in the direction of the weft threads. Cam 14 controls the movement of end clip 7.

As is obvious from Fig. 6 a shaft 17 is provided which is rigidly connected with casing 12. Shaft 17 movably carries lever 18. With lever 18 a rod 19 is movably connected which extends through an opening in casing 12 wherein it can be set by means of a screw 20. To the free end 21 of lever 18 a lever 22 is swingably connected which controls the operation of the selvage forming needle 8. Lever 22 carries a roller 24 by means of a bolt 23 which roller cooperates with the groove 25 of cam disc 15. The free end of lever 22 movably engages rod 26 which is adapted to reciprocatingly move in casing 12. To rod 26 a lever 27 is movably connected which carries the selvage forming needle 8. Lever 27 also acts as a guide for the slide member 29 which is movably bolted to the free end of a lever 31. Lever 31 swings about fulcrum 30 which is rigidly connected with the casing 12. Lever 31 carries a roller 33 which cooperates with groove 32 of cam disc 16. The motion of needle 8 is the resultant of the motions produced by cams 15 and 16.

By displacing rod 19 (Fig. 6) the position of the fulcrum about which lever 22 swings is changed and thereby the curve along which the point 8' of needle 8 moves, for example, from the solid curve in Fig. 4 to the dash and dot curve shown in this figure. By means of this adjustment, between points III and IV, movement of point 8' closely to the point of the shed can be assured.

Figures 5 and 7 show the drive of the weft end gripper 7 which causes movement of said gripper in the direction of the warp threads. The gripper 7 is closed by means of the plate spring 36 and opened by means of the movable finger 35. This finger can be adjusted. It can also be operated from the loom. The gripper 7 is connected with rod 37 which reciprocatingly moves in guide members 42 and 46. It is driven by the end of arm 38 with which it is movably connected. Arm 38 swings about fulcrum 48 and is provided with a roller 39 which cooperates with the groove 40 in cam disc 14. The movement imparted to gripper 7 by means of the mechanism described so far is a longitudinal movement, i. e., a movement in the direction of the warp threads. Guide member 42 is swingably mounted on casing 12 by means of bolt 41. Guide member 46 is swingably mounted on roller 43 which rolls on the outer surface of the cam member 14. Roller 43 is carried by one arm of elbow lever 44 which is revolvably connected with casing 12 by means of a bolt 47; the other arm of elbow lever 44 is resiliently connected with casing 12 by means of a spring 45.

The reciprocating movement of rod 37 and gripper 7 can be controlled and adjusted by displacement of fulcrum 48 of lever 38. This fulcrum is positioned at the free end of lever 60 which swings about bolt 17. Fulcrum 48 is connected to lever 60 as well as to connecting mem-

ber 49 which slides in guide member 55; the latter is swingably connected with the end of support rod 54. This rod extends to the outside of casing 12 and its position with respect to said casing is adjustable. By moving rod 54 further in or out of casing 12 the position of guide member 55 can be changed. One end of connecting member 49 is swingably connected with the slide member 50 by means of bolt 51. Slide member 50 is slidably movable in guide member 52 which is swingably connected with casing 12 by means of bolt 51 and has a roller 53 which operates in groove 46.

Fig. 8 diagrammatically shows the movement of rod 37 during one revolution of shaft 11 or cam disc 14. The abscissae of the diagram Fig. 8 represent the rotation of shaft 11 from 0° to 360° and the ordinates the movement of the end of lever 38 which engages rod 37. Curve 62 shows the main movement which is imparted by means of roller 39 to rod 37; curve 63 shows the correcting movement which is imparted to rod 37 by means of roller 53 and fulcrum 48. The movement actually carried out by the gripper 7 is the result of the addition of the aforesaid two movements; the main movement 62 comprises a stroke of constant extent and the supplementary or correcting movement 63 an adjustable stroke 64. The relative phase of movements 62 and 63 depends on angle α which is given by the design and construction of the device. Curve 62 shown in Fig. 8 is obtained when fulcrum 48 is stationary; in that case the correcting influence is zero. Curve 63 is obtained when roller 39 is stationary, i. e. when lever 38 swings about roller 39 instead of fulcrum 48. The size of the amplitude 64 of curve 63 depends on the position of rod 54 and on slide member 55.

The mechanism shown in Fig. 7 produces, after the beat, a movement of the end gripper 7 in the direction of the backing up lay and permits adjustment of said movement.

The change in magnitude of the additional motion of the grippers and of the selvedge producing means can be effected jointly. For example, after removing the rod 19 (Fig. 6), the levers 18 (Fig. 6) and 60 (Fig. 7) pivoted on the common pin 17 can be connected together and operated by the connecting member 49.

The location of the mechanism shown in Figs. 5 and 6 is substantially underneath the finished cloth. It may also be arranged entirely or partly at the side of the fabric as indicated in Figs. 5 and 7.

While it is believed that the above described embodiments of this invention are preferred embodiments, it is to be understood that it is not desired to be limited to the exact details of method, design and construction shown and described, for obvious modifications will occur to a person skilled in the art.

What is claimed is:

1. An apparatus for weaving selvages at the edges of cloth woven by a loom, said apparatus comprising a thread end gripper adapted to grip the ends of the weft threads protruding from the shed, operating means connected with said gripper for operating said gripper, said operating means comprising gripper motion control means which provide for moving said gripper while gripping a weft thread end in the direction of the backward movement of the lay after the beat whereby the end of the thread gripped by the gripper is stretched.

2. An apparatus for weaving selvages at the

edges of cloth woven by a loom, said apparatus comprising a thread gripper adapted to grip the ends of the weft threads protruding from the shed, operating means connected with said gripper for operating said gripper, said operating means comprising gripper motion control means which provide for moving said gripper in the direction of the backward movement of the lay after the beat whereby the end of the thread gripped by the gripper is stretched, and gripper motion correcting means which impart an additional motion to said gripper which supplements the motion produced by said control means.

3. An apparatus for weaving selvages at the edges of cloth woven by a loom, said apparatus comprising a thread gripper adapted to grip the ends of the weft threads protruding from the shed, operating means connected with said gripper for operating said gripper, said operating means comprising gripper motion control means which provide for moving said gripper in the direction of the backward movement of the lay after the beat whereby the end of the thread gripped by the gripper is stretched, gripper motion correcting means which impart an additional motion to said gripper which supplements the motion produced by said control means and adjusting means connected with said correcting means for adjusting the influence of said correcting means on the movements of said gripper.

4. An apparatus for weaving selvages at the edges of cloth woven by a loom, said apparatus comprising a thread gripper adapted to grip the ends of the weft threads protruding from the shed, operating means connected with said gripper for operating said gripper, said operating means comprising gripper motion control means which provide for moving said gripper in the direction of the backward movement of the lay after the beat whereby the end of the thread gripped by the gripper is stretched, gripper motion correcting means which impart an additional motion to said gripper which supplements the motion produced by said control means and adjusting means connected with said motion control means and said correcting means for adapting the movements of said gripper to various operating conditions.

5. An apparatus for weaving selvages at the edges of cloth woven by a loom, said apparatus comprising a thread gripper adapted to grip the ends of the weft threads protruding from the shed, operating means connected with said gripper for operating said gripper, said operating means comprising a cam member and gripper motion control means operatively connected and operated by said cam member for moving said gripper in the direction of the backward movement of the lay after the beat whereby the end of the thread gripped by the gripper is stretched, and gripper motion correcting means operatively connected with said cam member for imparting an additional motion to said gripper which supplements the motion produced by said control means.

6. An apparatus for weaving selvages at the edges of cloth woven by a loom, said apparatus comprising a thread gripper adapted to grip the ends of the weft threads protruding from the shed, operating means connected with said gripper for operating said gripper, said operating means comprising gripper motion control means which provide for moving said gripper in the direction of the backward movement of the lay after the beat whereby the end of the thread

gripped by the gripper is stretched, gripper motion correcting means, and connecting means interconnecting said control means and said correcting means, whereby the movements of said gripper are made the result of the combined actions of said control and correcting means.

7. An apparatus for weaving selvages at the edges of cloth woven by a loom, said apparatus comprising a thread gripper adapted to grip the ends of the weft threads protruding from the shed, operating means connected with said gripper for operating said gripper, said operating means comprising gripper motion control means which provides for moving said gripper in the direction of the backward movement of the lay after the beat whereby the end of the thread gripped by the gripper is stretched, gripper motion correcting means, connecting means interconnecting said control means and said correcting means, whereby the movements of said gripper are made the result of the combined actions of said control and correcting means, and adjusting means connected with said connecting means for adjusting the movements of said gripper.

8. An apparatus for weaving selvages at the edges of cloth woven by a loom, said apparatus comprising a selvage producing means adapted to engage the ends of the weft threads protruding from the shed, operating means connected with said selvage producing means for operating said selvage producing means, said operating means comprising motion control means which move said selvage producing means engaging the weft thread end in the direction of the backward movement of the lay after the beat.

9. An apparatus for weaving selvages at the edges of cloth woven by a loom, said apparatus comprising a selvage producing means engaging the ends of the weft threads, operating means connected with said selvage producing means and comprising a cam means, a drive member operatively connected with said cam means and said selvage producing means and operating said sel-

vage producing means, and adjusting means connected with said drive member for changing the action of said drive member on said selvage producing means and thereby adjusting the movements of said selvage producing means.

10. An apparatus for weaving selvages at the edges of cloth woven by a loom, said apparatus comprising a selvage producing means engaging the ends of the weft threads, operating means connected with said selvage producing means and comprising a cam means, a drive member operatively connected with said cam means and said selvage producing means and operating said selvage producing means, adjusting means connected with said drive member for changing the action of said drive member on said selvage producing means and thereby adjusting the movements of said selvage producing means, and another cam means operatively connected with said selvage producing means for imparting an additional motion to said selvage producing means.

11. An apparatus as claimed in claim 8 in which said operating means are located substantially below the woven cloth.

12. An apparatus for weaving selvages at the edges of cloth woven by a loom, said apparatus comprising a thread gripper adapted to grip the ends of the weft threads protruding from the shed, a selvage producing means which takes the weft thread from the gripper and bends it back into the shed, operating means connected with said gripper and said selvage producing means and jointly operating said gripper and selvage producing means, said operating means comprising gripper motion control means operatively connected with and moving said gripper with the weft end gripped, in the direction of the backward movement of the lay after the beat whereby the end of the thread gripped by the gripper is stretched.

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