May 19, 1964 T. E. ARNOLD ETAL 3,133,560

APPARATUS FOR FORMING SELVAGES IN WIRE SCREEN CLOTH

Filed Oct. 12, 1961 4 Sheets-Sheet 1

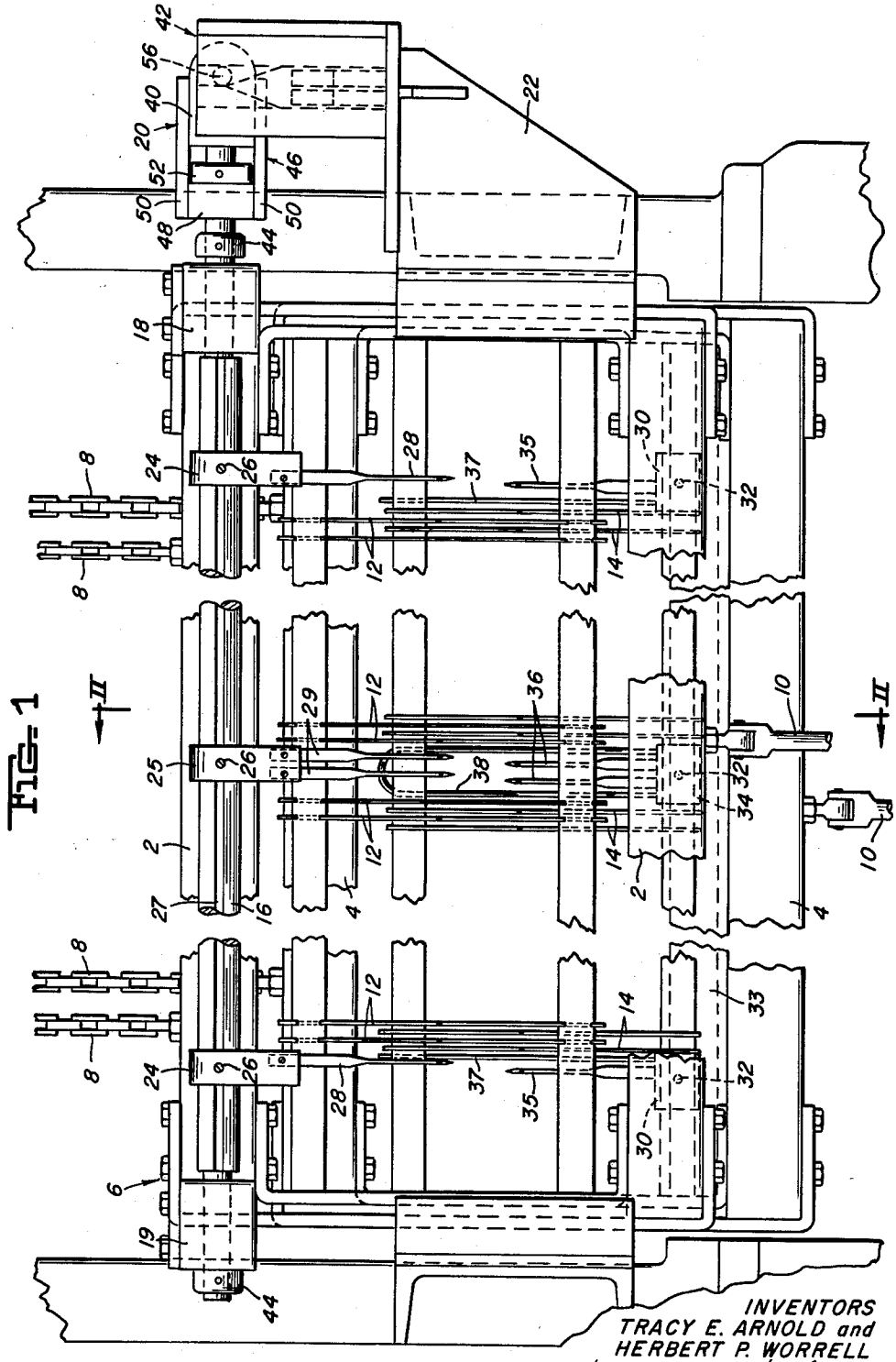


FIG. 1

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4 Sheets-Sheet 2

FIG. 2

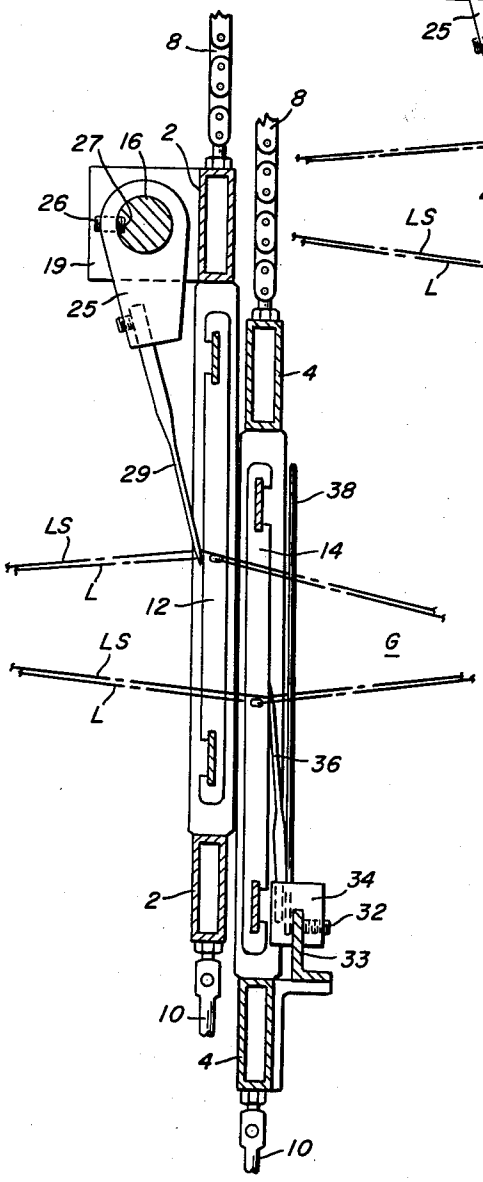
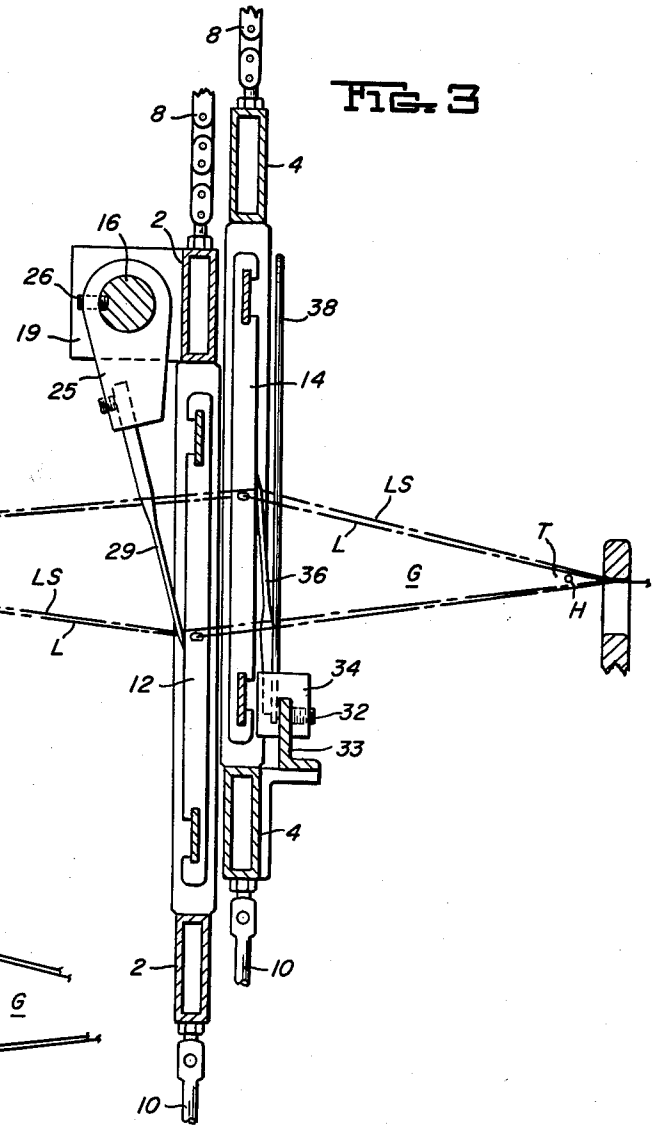


FIG. 3



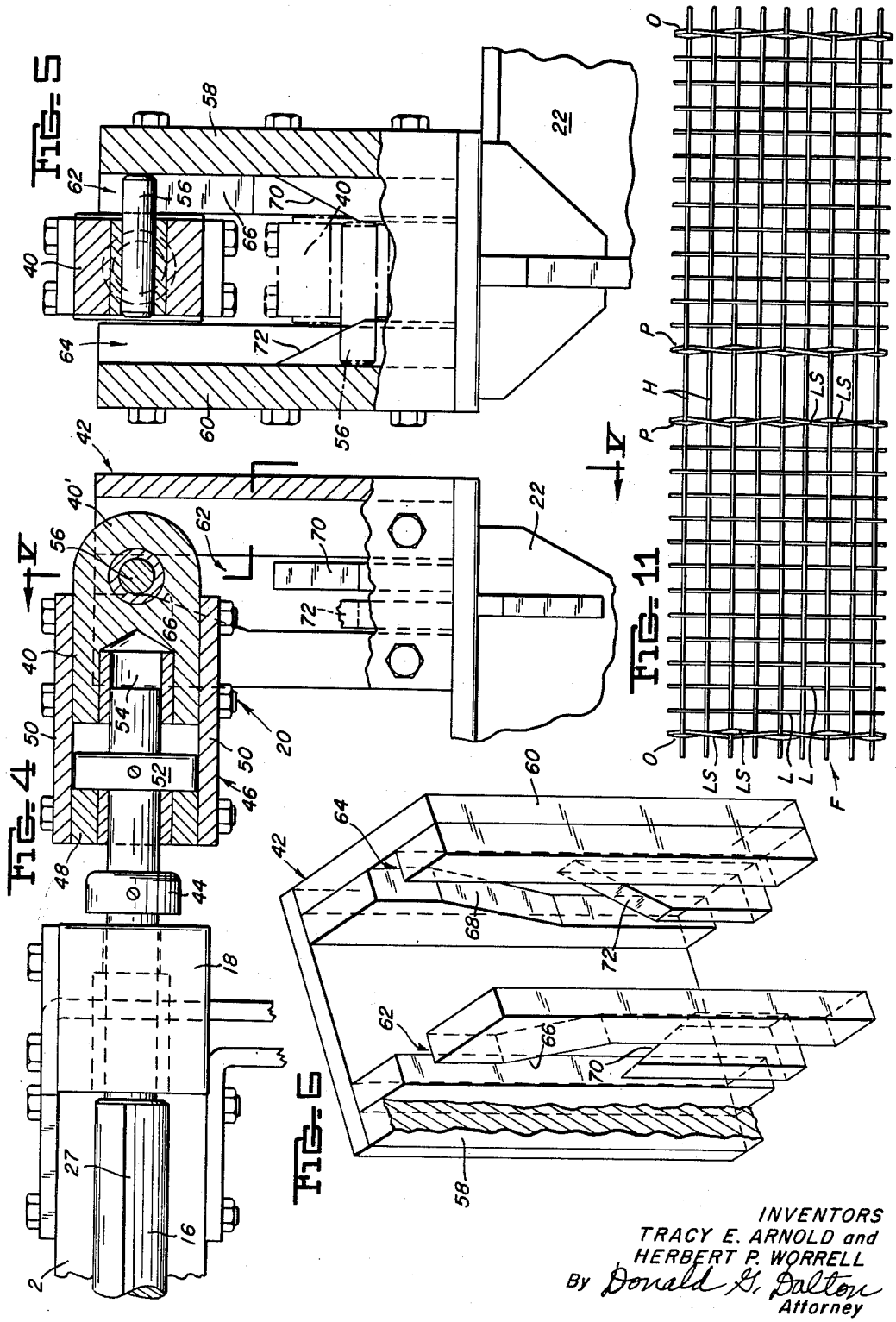
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4 Sheets-Sheet 3



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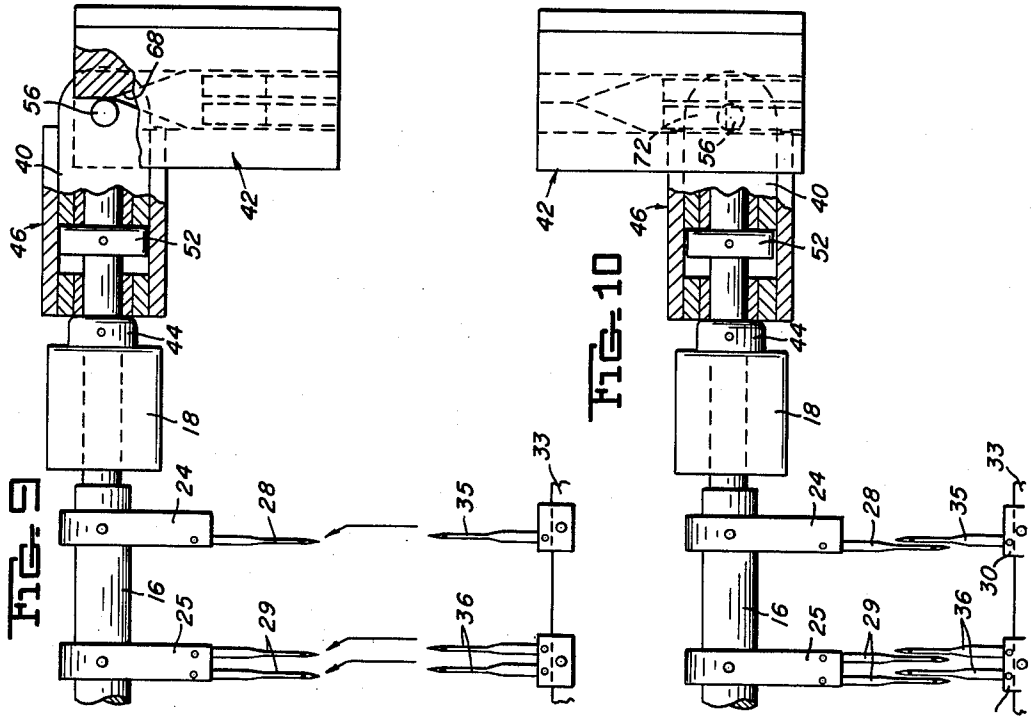


FIG. 9

FIG. 10

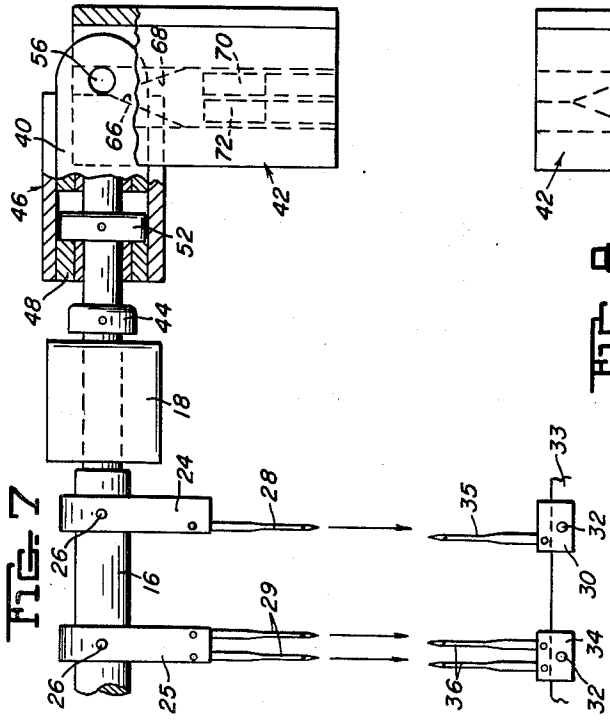


FIG. 7

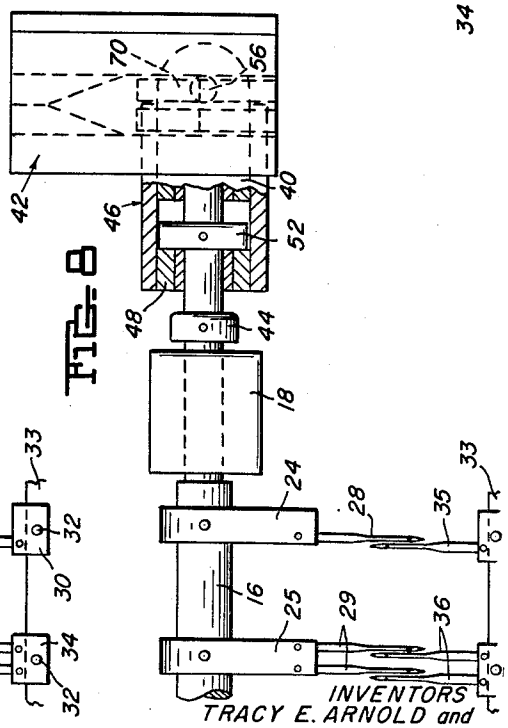


FIG. 8

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APPARATUS FOR FORMING SELVAGES IN WIRE SCREEN CLOTH

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Filed Oct. 12, 1961, Ser. No. 144,591
4 Claims. (Cl. 139—54)

The present invention relates generally to apparatus for weaving wire screen cloth and especially to looms for weaving wire screen cloth having twisted selvages on its edges and intermediate its edges.

More particularly, this invention relates to improvements in wire screen cloth weaving looms of the general type shown in Harter Patent No. 2,421,261. In the operation of this type of loom to produce wire screen cloth, warp or line wires are introduced to the loom in substantial parallelism from a supply source by feed rolls and passed alternately through vertically disposed heddle wires mounted in a pair of vertically reciprocable front and rear heddle frames which effect a warp shed to provide for the admission of weft or picket wires. The weft wires are introduced into the bite of the warp wires by pinch rolls and are guided and positioned in the fabric by a beater frame and reed assembly. Prior to our invention, the cloth thus formed was subsequently processed on the loom after weaving to provide outer selvages thereon.

For economic reasons it is desirable to form the selvages in wire screen cloth during weaving. Also, for many purposes it is desirable to form intermediate as well as outer selvages in the cloth during weaving so that the cloth can later be slit into narrower widths each having finished edges that will not unravel.

Accordingly, we propose and it is the primary object of our invention to provide an improved loom arrangement for forming inner and outer selvages in wire screen cloth as the cloth is being woven by means of laterally shifting heddle needles which cooperate with non-shifting heddle needles to form twisted selvages.

It is another object of our invention to provide apparatus of the character described wherein the laterally shifting needles are mounted on a shaft extending along the upper portion of the front heddle frame of the loom and the non-shifting heddle needles are mounted on the bottom portion of the rear heddle frame.

It is a further object of our invention to provide apparatus of the character described wherein the shaft on which the laterally shifting needles are mounted is axially oscillatable relative to the front heddle frame so as to impart laterally shifting motion to the heddle needles mounted thereon.

It is another object of our invention to provide apparatus of the character described wherein the laterally shifting heddle needles are adjustably mounted on the oscillatable shaft so as to be capable of being adjustably positioned axially of the shaft.

It is yet another object of our invention to provide apparatus of the character described wherein spacing means are provided for spacing adjacent warp wires from the laterally shifting heddle needles.

These and other objects will become more apparent after referring to the following specification and attached drawings in which:

FIGURE 1 is a front elevational view;

FIGURE 2 is a vertical sectional view taken along the line II—II of FIGURE 1 showing the front heddle frame raised and the rear heddle frame lowered;

FIGURE 3 is a view similar to FIGURE 2 but showing the heddle frames in alternate positions;

FIGURE 4 is a partial enlarged elevational view partly in section of the motion translating device;

FIGURE 5 is a vertical sectional view taken along the line V—V of FIGURE 4;

FIGURE 6 is a perspective view showing the camming surfaces of the motion translating device;

FIGURES 7, 8, 9 and 10 are schematic views showing the sequence of operation of the apparatus of the invention; and

FIGURE 11 is an enlarged plan view of the wire screen cloth fabric having inner and outer twisted selvages formed by the apparatus of the invention.

Before proceeding with a detailed description of the apparatus of our invention it will be understood that a typical wire screen cloth weaving loom suitable for installation of the apparatus of our invention thereon is shown and described in detail by the above-mentioned Harter Patent No. 2,421,261 and, therefore, the apparatus of our invention will be hereinafter described in conjunction with such a loom.

Referring more particularly to the drawings reference numerals 2 and 4 designate front and rear heddle frames, respectively, mounted for vertically reciprocating movement in a wire screen cloth weaving loom, designated generally by reference numeral 6, by means of chains 8 and push-rods 10.

Heddle frames 2 and 4 have heddle wires 12 and 14, respectively, mounted thereon in the conventional manner which carry warp wires L. The push rods 10 are attached to suitable power means (not shown) for vertically reciprocating the heddle frames 2 and 4 so that the heddle wires move the warp wires L to form a warp shed in the well known manner.

A shaft 16 is mounted for axially oscillating movement on the upper part of the front heddle frame 2 in bearings 18 and 19. The shaft 16 is connected with and oscillated by a motion translating device 20 which is disposed on a bracket 22 attached to one side of the loom 6. The motion translating device 20 will be described in more detail hereinafter.

Two outer heddle-needle holders 24 are adjustably mounted on the shaft 16, one adjacent each end of the shaft, by means of set screws 26. An intermediate heddle-needle holder 25 is similarly adjustably mounted on the shaft 16 intermediate the holders 24. An axial groove 27 extends along the shaft 16 for receiving the ends of the set screws 26 and thus prevent rotation of the needle holders 24 and 25 relative to the shaft. Needle holders 24 each carry a single heddle needle 28 while needle holder 25 carries a pair of spaced heddle needles 29. Heddle needles 28 and 29 extend downwardly from and normal to the shaft 16 and each carries a warp wire LS.

Two outer heddle-needle holders 30 are adjustably mounted by set screws 32 on longitudinally extending angle bar 33 rigidly affixed to the bottom of the rear heddle frame 4. The needle holders 30 are mounted one adjacent each end of the bottom of the rear heddle frame 4. An intermediate heddle-needle holder 34 is similarly adjustably mounted on the angle bar 33 intermediate the holders 30. Holders 30 each carry a single heddle needle 35 and holder 34 carries a pair of spaced heddle needles 36. Needles 35 and 36 extend upwardly from their respective holders. A vertically disposed spacer rod 37 is anchored in each of the outer needle holders 30 adjacent the inner side thereof. The intermediate needle holder 34 carries a hair pin shape spacer 38. As will become apparent hereinafter, spacers 37 and 38 serve to maintain a clearance between the warp wires L carried by the adjacent heddle wires 12 and 14 and the heddle needles 35 and 36. The heddle needles 35 and 36 each carry a warp wire LS which form selvages in a manner to be more fully explained hereinafter. During operation of

the loom, as the front and rear heddle frames reciprocate vertically, the shaft 16 is oscillated axially by the motion translating device 20 as will be more fully explained.

The motion translating device 20 includes a drive block 40 slidably mounted on the end of the shaft 16 and fitted for generally vertical movement in a box 42 mounted on the bracket 22. A collar 44 is rigidly mounted on each end of the shaft 16 spaced outwardly of the bearings 18 and 19 to limit axial movement of the shaft. A sleeve 46 encloses the major portion of the drive block 40 and the adjacent end portion of the shaft 16. The sleeve 46 includes a forward wall 48 spaced from the collar 44 and top and bottom plates 50 which connect the forward wall 48 in spaced relation with the drive block 40. A rectangular slide block 52 rigidly attached to the shaft 16 is slidably mounted for axial movement in the space between the drive block 40 and the forward wall 48. The end of shaft 16 is slidably received in an opening 54 in the inner end of the drive block 40, as best shown in FIGURE 4. The end 40' of the drive block 40 remote from the shaft 16 projects outwardly from the top and bottom plates 50 and carries a transversely disposed pin 56 slidable therein. The length of the pin 56 is greater than the width of the drive block 40 so that one end thereof always projects from one side or the other of the drive block. The projecting end portion 40' of the drive block 40 and the adjacent end of the sleeve 46 are disposed between opposite side walls 58 and 60 of the box 42.

The inner faces of the side walls 58 and 60 are provided with vertical slots 62 and 64, respectively, which are adapted to be traversed by the ends of the pin 56. The upper portion of slot 62 is inclined to the right, as viewed in FIGURE 4, on one side 66 and is straight on its other side. The upper portion of the slot 64 is inclined to the left, as viewed in FIGURE 9, on one side 68 and is straight on its other side. Slot 62 is provided with an inclined or wedge surface 70 in its bottom portion adjacent to the straight side thereof. Slot 64 is provided with a similar inclined or wedge surface 72 in its bottom portion adjacent its straight side. It will be noted that the wedge surfaces 70 and 72 are narrower than the width of the bottom portions of the slots 62 and 64, respectively. It will also be noted that wedge surface 70 is not directly opposite edge surface 72. Wedge surface 70 is disposed opposite the open bottom portion of slot 64 and wedge surface 72 is disposed opposite the open bottom portion of slot 62, for a purpose which will become apparent.

FIGURES 1, 2 and 7 show the initial position of the heddle frames in the operation of the loom 2. In this initial position, the front heddle frame 2 is up and the rear heddle frame 4 is down thus creating a shed G in the warp wires L and LS so that a weft wire element H can be beat or positioned in the bite T of the warp wires. After the weft wire H is positioned in the bite T, front heddle frame 2 is moved downwardly and rear heddle frame 4 is moved upwardly to close the bite and reverse the shed of the warp wires to form another bite. With the heddle frames in this position another weft wire H is fed into the bite of the warp wires. Weaving of the wire screen cloth is carried on by continuing the vertical reciprocal movement of the front and rear heddle frames and feeding of a weft wire into the shed formed by the warp wires each time the front and rear frames are reciprocated.

The sequence of operation of the apparatus of the invention in forming twisted selvages during the weaving of the wire screen cloth is shown diagrammatically by FIGURES 7, 8, 9 and 10. FIGURE 7 shows the starting position in which heddle needles 28 and 29 are up and heddle needles 35 and 36 are down. FIGURE 8 shows the positions of heddle needles 28 and 29 relative to needles 35 and 36 when the front heddle frame is moved down and the rear heddle frame is moved up to form another shed and bite of warp wires to receive a weft wire.

FIGURE 9 shows the relative positions of the heddle needles after the heddle frames have been reciprocated again. In this position the needles 28 and 29 are again up and the needles 35 and 36 are again down. It will be noted that at this stage of the sequence of operation, the heddle needles 28 and 29 have shifted to the left so that when the heddle frames are next reciprocated the heddle needles 28 and 29 will be adjacent the sides of needles 35 and 36, as shown in FIGURE 10, which is opposite to the relative positions shown in FIGURE 8. When the heddle frames are again reciprocated the heddle needles 28 and 29 will shift to the right to the starting position shown in FIGURE 7, thus completing one cycle of the operation. In the sequence of operation just described, the warp wires LS carried by the shifting heddle needles 28 and 29 are twisted around the warp wires LS carried by the non-shifting heddle needles 35 and 36 to form the outer twisted selvages O and intermediate or inner twisted selvages P in the wire screen cloth F as shown in FIGURE 11. If more selvages are desired in the cloth more needle holders and heddle needles may be mounted on the shaft 16 and the angle bar 33. The needle holders on the shaft 16 and angle bar 33 may also be adjusted along the shaft and angle bar to obtain the desired width of fabric between selvaged edges.

It will be noted that when the front heddle frame 2 is lowered and the rear heddle frame 4 is raised, the spacers 37 and 38 serve to keep the warp wires L carried by the heddle wires 12 and 14 out of the way of the laterally shifting heddle needles 28 and 29 and non-shifting heddle needles 35 and 36.

Lateral shifting of the heddle needles 28 and 29 is achieved by axially oscillating the shaft 16 as the front heddle frame 2 is moved upwardly in the weaving operation of the loom. Although we have shown the use of a motion translating device 20 for oscillating the shaft 16, it will be understood that means other than the motion translating device shown could be used for this purpose if desired. For example, the shaft 16 could be connected with and oscillated by a suitably controlled pneumatic cylinder (not shown) mounted on the front heddle frame.

When the front and rear heddle frames are in the relative positions shown in FIGURE 7, the projecting portion 40' of the driving block 40 and the adjacent end of the sleeve 46 are disposed in the top of the box 42 with the end of pin 56 projecting into the top portion of the slot 62. Then, as the heddle frames are vertically shifted to the relative positions shown in FIGURE 8 during the next step in the sequence of operation, the driving block 40 and sleeve 46 travel downwardly toward the bottom of the box 42. As the block 40 thus travels downwardly, the end of the pin 56 engages the wedge surface 70 and is shifted transversely so that its end is projected into the bottom portion of slot 64. During the next step in the sequence of operation to the position shown by FIGURE 9, the driving block 40 and sleeve 46 travel upwardly in the box 42 with the end of pin 56 traversing the slot 64. As the end of pin 56 travels upwardly in slot 64, it engages the inclined side 68 of the upper portion of slot 64. As the end of pin 56 travels upwardly along the inclined side 68, the driving block 40 and sleeve 46 are shifted to the left causing the slide block 52 to be engaged by the inner end of the drive block 40 to thus cause axial shifting of the shaft 16 and heddle needles 28 and 29 to the left.

During the next stage of operation to the position shown in FIGURE 10, the drive block 40 and sleeve 46 travel downwardly toward the bottom of box 42 with the end of pin 56 transversing the slot 64. As the end of pin 56 travels downwardly in slot 64 it engages the wedge surface 72 and the pin is shifted transversely and its end projected into slot 62.

As the heddle frames are next reciprocated to the position shown in FIGURE 7, the drive block 40 and sleeve 46 travel upwardly in the box 42 with the end of pin 56

transversing slot 62. As the upper portion of slot 62 is approached, the projecting end of pin 56 engages the inclined surface 66 and the drive block 40 and sleeve 46 are shifted to the right. As the sleeve 46 shifts to the right, the slide block 52 is engaged by the forward wall 48 of sleeve 46 and is moved to the right. Movement of slide block 52 to the right causes the shaft 16, to which the block 52 is pinned, to move axially to the right and the heddle needles 28 and 29 carried by shaft 16 to shift laterally to the right.

Thus, the shaft 16 is axially shifted alternately to the right or left by the motion translating device 20 each time the front heddle frame 2 is raised in the cloth weaving operation of the loom. Such shifting of the shaft 16 causes the heddle needles 28 and 29 to shift laterally to the right or left of the non-shifting heddle needles 35 and 36 and achieves twisting of the warp wires LS carried by the heddle needles 28 and 29 about the warp wires LS carried by heddle needles 35 and 36 to form outer and intermediate selvages in the cloth as it is woven.

While one embodiment of our invention has been shown and described it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

We claim:

1. In a loom, front and rear vertically reciprocating heddle frames having shed-forming heddle wires spaced therealong, a shaft extending along the top front side of said front frame having its ends mounted thereon for axial sliding movement, a warp-twisting needle having an eye in the lower end thereof rigidly mounted on said shaft and projecting downwardly therefrom at an angle directed toward the vertical plane containing said heddle wires whereby the eye of said needle is positioned immediately adjacent said heddle wires, a warp needle rigidly mounted on the bottom of said rear heddle frame and projecting upwardly therefrom in a substantially vertical plane adjacent said warp-twisting needle, and means effecting axial reciprocation of said shaft whereby said warp-twisting needle is alternately shifted from one side to the other of said warp needle as said heddle frames reciprocate vertically.

2. In a loom, front and rear vertically reciprocating heddle frames having shed-forming heddle wires spaced therealong, a shaft extending along the top front side of said front frame having its ends mounted thereon for axial sliding movement, a needle holder rigidly mounted on said shaft, a warp-twisting needle having an eye in the lower end thereof secured to said holder and projecting downwardly from said shaft at an angle directed toward the vertical plane containing said heddle wires whereby the eye of said needle is positioned immediately adjacent said heddle wires, a needle holder rigidly mounted on the bottom of said rear heddle frame below said first-mentioned needle holder, a warp needle mounted in said last-mentioned needle holder and projecting upwardly therefrom in a substantially vertical plane adjacent said warp-twisting needle, and means effecting axial reciprocation of said shaft whereby said warp-twisting needle is alternately shifted from one side to the other of said warp needle as said frames reciprocate vertically.

3. Apparatus as defined by claim 2 characterized by said holder on said shaft being releasably secured to said shaft and slidable therealong when released.

4. Apparatus as defined by claim 2 characterized by an elongated spacer element projecting upwardly from said needle holder on the bottom of said rear frame on at least one side of said warp needle.

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