July 26, 1960 C. E. WEBBER ET AL 2,946,354

WIRE CLOTH SELVAGE FORMING MECHANISM

Filed May 26, 1958 2 Sheets-Sheet 1

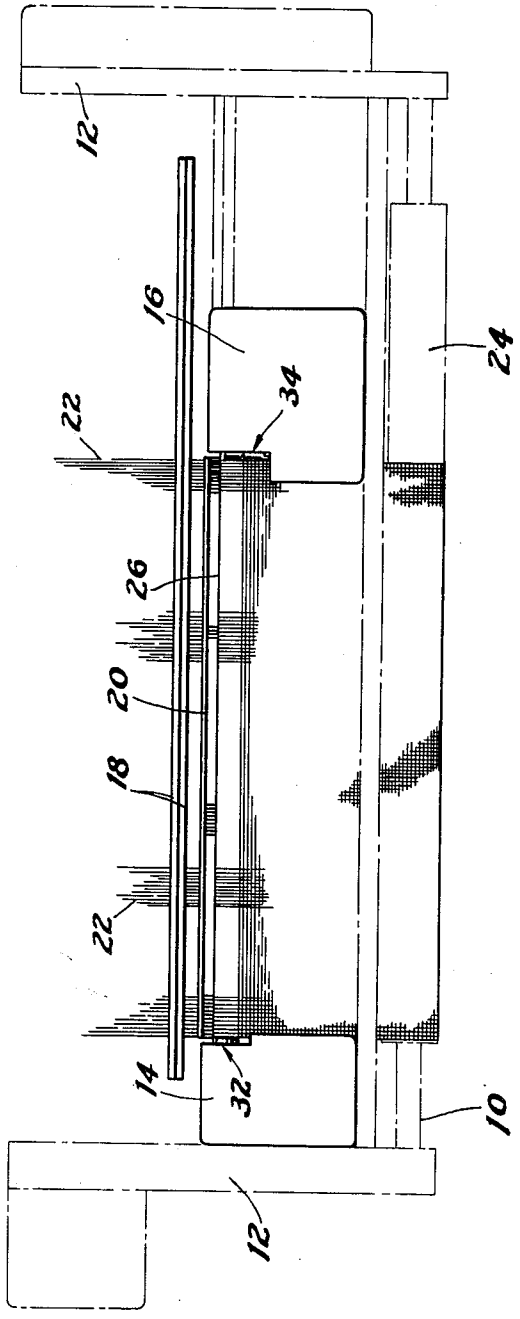


Fig. 1.

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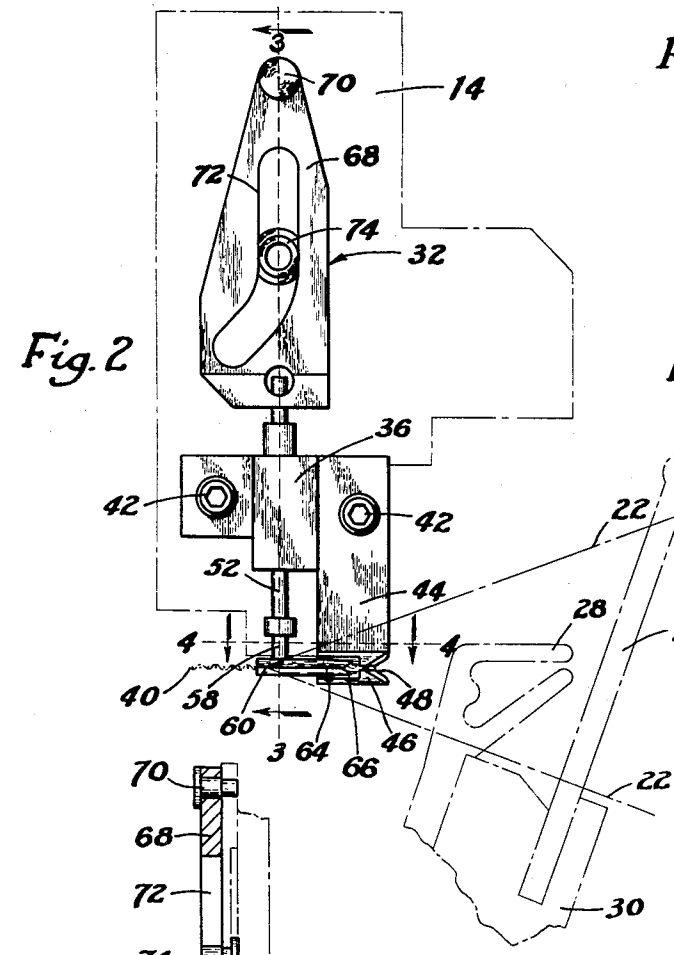


Fig. 2

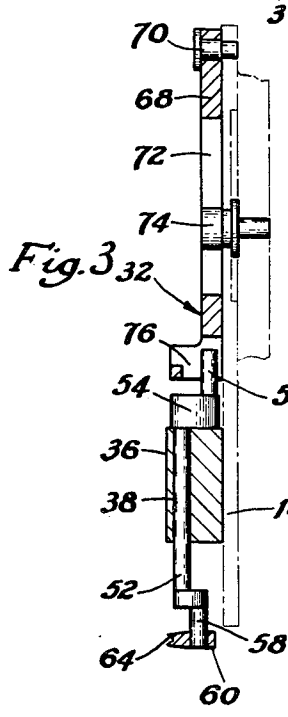


Fig. 3

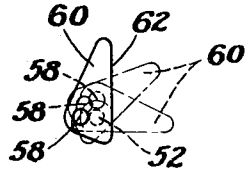


Fig. 8

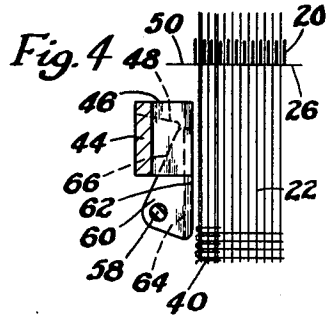


Fig. 4

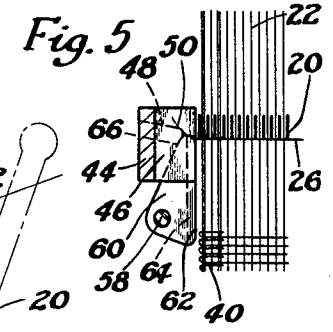


Fig. 5

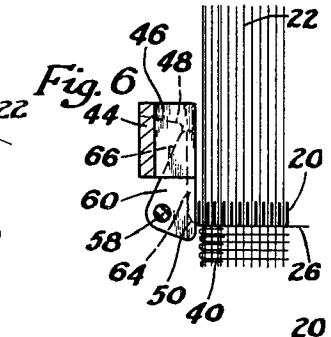


Fig. 6

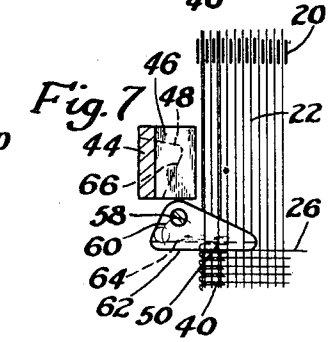


Fig. 7

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Patented July 26, 1960

2,946,354

WIRE CLOTH SELVAGE FORMING MECHANISM

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Filed May 26, 1958, Ser. No. 737,568

8 Claims. (Cl. 139—130)

This invention relates to a wire cloth selvage forming mechanism and, more particularly, to mechanism included within a loom for weaving wire cloth wherein the loom is of the type which feeds weft wires from a substantial supply thereof such as a drum upon which thousands of feet of weft wire may be wound and, after a suitable length of said wire is inserted into the shed of the weave, said wire is cut from the wire in the feeding mechanism in such manner that the opposite ends thereof project beyond the edges of the weave of the cloth. These projecting ends of the weft wire which is last inserted, after said wire is beat-up by the reed bar into the shed and the shed is reversed to lock the wire in the weave, are bent and tucked into the shed of the weave so as to form a highly desirable selvage at opposite edges of the weave which closely resembles the selvage produced by conventional wire weaving looms using a shuttle and, in weaving the cloth, the weft wires are connected at the opposite edges of the weave.

By using a loom in which weft wires are fed from a substantial supply and successively are cut from the supply after being inserted in the shed of the weave are far more desirable than shuttle-type looms in that, not only is the loom more simple, but the cost of operating the same is substantially less and hence the cost of producing the woven wire cloth is less than when produced upon a shuttle-type loom.

One type of loom for weaving wire cloth of a type having cut weft ends which are tucked into the weave of the cloth is described in co-pending application Serial No. 579,915 filed April 23, 1956, now U.S. Patent No. 2,849,029, in the names of C. E. Webber and L. K. Watson, Jr. The loom described and claimed in said co-pending application embodies relatively complex tucking mechanism for disposing the cut ends of the weft wires into the weave.

It is the principal purpose of the present invention to provide a loom of this type with more simple tucking mechanism than embodied in said co-pending application, the greater simplicity somewhat being made possible due to the loom being of a somewhat different type than that with which the tucking mechanism of said co-pending application is employed.

Another object of the present invention is to provide tucking mechanism designed in such manner that when the cut weft wires are beat-up into the shed, such movement of the cut weft wire by the reed bar effects a partial bending of the projecting ends of the wire in a direction to facilitate the complete bending or tucking thereof into the shed of the weave by tucking blades comprising part of the present invention.

A further object of the invention is to provide not only a simple mechanism for tucking the projecting ends of the weft wires into the shed of the weave but also to provide a compact tucking mechanism which consumes very little space adjacent opposite edges of the weave.

A still further object of the invention is to provide within the tucking mechanisms offset portions on the shafts

which support the tucking blades, whereby when said blades are moved to effect substantially complete bending or tucking of the ends of the weft wire into the shed, an arcuate wiping movement is afforded said blades to facilitate such bending of the ends of the weft wire in addition to the movement of the blades about the axis of rotation of the shafts which support said blades.

Details of the foregoing objects and of the invention are set forth in the following specification and illustrated in the accompanying drawings comprising a part thereof.

In the drawings:

Fig. 1 is an exemplary, somewhat diagrammatic, top plan view of a loom for weaving wire cloth which embodies the tucking mechanism to form selvage edges on the woven cloth in accordance with the principles of the present invention.

Fig. 2 is a side elevation of a tucking unit mounted at one side of the loom shown in Fig. 1 and illustrated on a substantially larger scale than used in Fig. 1, a portion of the loom to which the tucking unit is connected being illustrated in phantom by broken lines.

Fig. 3 is a vertical sectional view taken on the line 3—3 of Fig. 2.

Figs. 4 through 7 are sectional plan views, taken on the line 4—4 of Fig. 2, and respectively representing progressive steps in the operation of the tucking units from the commencement of the beat-up movement of the reed bar to the final tucking of the ends of the weft wire into the shed of the weave.

Fig. 8 is a diagrammatic plan view of the tucking blade of the tucking unit shown in Figs. 2 through 7 illustrated in full lines to represent the fully retracted position of the tucking blade as shown in Figs. 4 through 6 and, by a series of two additional broken line illustrations showing progressive movement of said tucking blade from the fully retracted to the fully extended position thereof within the shed of the weave to illustrate the wiping movement effected by the tucking blade in addition to the rotary movement thereof about the axis of the shaft supporting the blade.

Referring to Fig. 1, an exemplary loom **10** is shown therein, in phantom, for purposes of simplifying the illustration. Said loom comprises side frame members **12** and housings **14** and **16** which, for purposes of the present invention, are considered part of the stationary frame of the loom. Said housings contain mechanism not comprising part of the present invention and, if desired, the housing **16** may be adjustable relative to the frame of the loom so as to render the loom capable of weaving wire cloth fabric of different widths. Nevertheless, the housing **16** also is considered a part of the stationary frame of the loom as far as the present invention is concerned.

The loom also includes a pair of harness frames **18** of customary construction, said harness frames being supported for relative vertical movement in opposite directions to each other in accordance with the conventional operation of looms. No specific supporting mechanism for the harness frames is shown inasmuch as such mechanism is of conventional type. Further, it will be understood that the harness frames are the means which form the shed of the weave of the wire cloth to be woven by the loom. The loom also includes a reed bar **20** which is reciprocated longitudinally of the warp wires **22** in customary manner by conventional mechanism not illustrated. Further, the loom also comprises a conventional take-up roll **24**, the opposite ends of which are supported by the side frame members **12** of the loom, and said take-up roll is operated by conventional mechanism in accordance with customary practice.

In the top plan view of the loom shown in Fig. 1, a weft wire **26** is shown inserted within the shed of the

weave and has not yet been beaten-up into said shed by the reed bar **20**. This weft wire may be inserted by any suitable mechanism but, in the exemplary loom illustrated herein, said wire is inserted by a shuttle which is shot longitudinally of a shuttle guide **28** which is carried by the reed bar support **30** as shown in Fig. 2. The mechanism for shooting the shuttle through the guide **28** is not illustrated since it does not comprise part of the present invention. Briefly described however, said shuttle is arranged to engage the outer end of a continuous weft wire supply wound upon a large spool for example and positioned adjacent one side of the loom and from which spool the weft wire readily is paid off. The shuttle automatically engages the outer end of this weft wire supply and propelling mechanism hits the shuttle and shoots it, with the weft wire connected thereto, through the shed of the loom to the opposite side thereof where the shuttle automatically disengages the forward end of the weft wire and is returned to the opposite side of the loom by mechanism not illustrated. By such arrangement, the weft wires, as inserted in the shed of the weave, are cut from the supply of weft wire adjacent the left-hand side of the loom as viewed in Fig. 1 by automatically operated mechanism which is not illustrated since it too does not comprise part of the present invention. Nevertheless, by this arrangement, cut weft wires successively are inserted within the shed of the weave and the length thereof is such that a short portion of the opposite ends of the weft wire initially projects beyond opposite edges of the weave of the cloth when said wire first is inserted into the shed.

The present invention primarily is concerned with mechanism for tucking said projecting ends of the cut weft wires into the weave of the cloth so as to comprise part of the selvages thereof at opposite edges of the cloth and, for all practical purposes, such selvage edges resemble corresponding selvage edges of wire cloth woven conventionally by looms employing shuttles which carry a supply of the weft wire. However, in such conventional shuttles, when the supply of weft wire is exhausted in the shuttle, it is necessary to stop the loom, place a new filled bobbin of weft wire within the shuttle, perform such threading operations as may be required, and then start the loom operating again. This is time consuming and somewhat tedious. Looms of the type to which the present invention pertains do not require such replenishing of the bobbins inasmuch as the bobbins referred to above in the loom illustrated in Fig. 1 do not carry a supply of bobbin wire but, rather, merely engage the leading end of a very substantial supply of bobbin wire and shoot said leading end through the shed of the weave. The weft wire thus inserted in the shed is cut from said supply automatically and the reed bar **20** beats-up said inserted weft wire into the shed, following which the shed shifting mechanism, comprising the harness frames **18**, operates to shift the shed and locks said weft wire into the weave.

The tucking mechanism comprising the present invention operates upon the projecting opposite ends of the weft wires as they successively are inserted into the shed and are locked into the weave. Such tucking mechanism in accordance with the present invention, comprises units **32** and **34** and the unit **32** is disposed at the left-hand side of the loom as shown in Fig. 1, while the unit **34** is disposed at the right-hand side of the loom. The left-hand unit **32** is illustrated in enlarged detail in Figs. 2 and 3 and it will be understood that the right-hand unit **34** is similar except that it comprises a mirror image of the left-hand unit **32**. These units are respectively supported by the housings **14** and **16** which are stationary relative to the frame of the loom and hence it is considered that the units **32** and **34** are supported stationarily relative to the frame of the loom in the following description and the claims appended thereto.

Referring to Figs. 2 and 3, the tucking unit **32** specifically illustrated therein comprises a bearing member **36** having a bearing opening **38** therein which is substantially vertical to the plane of the weave **40** as shown in Fig. 2. The bearing member **36** may be secured to the housing or frame member **14** by suitable bolts **42** and the member **36** has an extension **44** depending therefrom to support a guide block **46** at the lower end thereof. The forward end of guide block **46** has a guide notch **48** therein which is positioned within the plane of the weave **40** so as to receive the projecting end **50** of the last inserted weft wire **26** as is best shown in Figs. 4 and 5.

The bearing member **36** rotatably supports a shaft **52** which is received within the bearing opening **38** as clearly shown in Fig. 3. The upper end of shaft **52** has a crank block **54** and a crank pin **56** fixed thereto. The lower end of shaft **52** has a laterally offset portion **58** integral therewith. A tucking blade **60** is fixedly connected at one end to the lower end of the offset portion **58** of shaft **52**, the offset portion **58** being for purposes to be described, and blade **60** projects radially therefrom to comprise a cantilever-type blade.

In the so-called retracted position of the blade **60**, the same is disposed as shown in Figs. 4 through 6, wherein the side **62** of the blade preferably is straight and substantially parallel to the adjacent edge of the weave. Said side **62** is quite close to the adjacent edge of the weave to lend compactness to the tucking mechanism, whereby it consumes very little space between the frame portions **14** and **16** and the respective edges of the weave **40** of the cloth. Said side **62** of the tucking blade **60** also has a longitudinal groove **64** therein which is disposed within the plane of the weave **40** as best shown in Fig. 2.

To further contribute to the compactness of the tucking units and also to facilitate the tucking operation, the guide blocks **46** have recesses **66** therein for receiving the forward ends of the blades **60** when the blades are in the retracted position as illustrated in Figs. 4 through 6. Hence, inasmuch as the grooves **64** in the blades are in longitudinal alignment with the guide notches **48** of the guide blocks **46**, when the reed bar **20** engages the last inserted weft wire **26** as shown in Fig. 4, and moves the same forwardly toward the weave **40**, the projecting ends **50** of the weft wire **26** first are moved into the guide notches **48** and continued movement thereof, as shown in Fig. 5, causes the projecting ends **50** to engage the grooves **66** of tucking blades **60**, whereby when the reed bar **20** reaches its forwardmost position as shown in Fig. 6, the projecting ends **50** of weft wire **26** are disposed within the grooves **64** and, more importantly, are partially bent into their tucked position since they are disposed somewhat parallel to and adjacent the outermost warp wire **22** as shown in Fig. 6.

Before the tucking blades **60** are rotated from the retracted position thereof shown in Figs. 4 through 6, the reed bar **20** must first retreat sufficiently toward its position in Fig. 4 to permit the blades **60** to clear the reed bar **20**. Such retreating movement of the reed bar is accomplished by conventional mechanism actuating the same and, after said bar has retreated slightly past the position shown in Fig. 5, the mechanism for rotating the shafts **52** is operated. Such actuating mechanism comprises a lever **68** which is pivotally connected at its upper end by a headed pin **70** to the frame member **14**. The lever has a cam slot **72** therein which receives a cam follower **74** which is reciprocable in opposite directions substantially along a line parallel to the axis of shaft **52**. Such cam followers **74**, at opposite sides of the machine, are reciprocated by mechanism, not shown, within the housings or frame members **14** and **16**, such operation being performed automatically in accordance with the normal operation of the loom **10**.

The lower end of lever **68** is enlarged and contains a slot **76** which is perpendicular to the plane of the lever **68** and receives the crank pin **56**. Such slot permits sliding movement of the crank pin therein in a direction transverse to the plane of lever **68**. Hence, oscillatory movement of the lower end of lever **68** effects actuation of the crank pin **56** in opposite directions so as to rotate

the shaft 52 and the tucking blade 60 on the lower end thereof.

The above described rotation of the tucking blades 60 take place simultaneously at opposite sides of the loom and respectively adjacent the opposite edges of the weave 40 after the reed bar 20 has retreated sufficiently as described above. The rotation of shafts 52 by the crank pins 56 not only rotates the tucking blades 60 into projected, tucking position shown in Fig. 7, for purposes of substantially completing the bending of the projecting ends 50 of weft wire 26 into the shed of the weave as shown in said figure but due to the blades 60 being mounted on offset portions 58 upon the shafts 52, an arcuate wiping action is afforded the blades 60 to facilitate the bending of such ends 50 into the shed of the weave. This wiping action is more graphically illustrated in Fig. 8 wherein a series of progressive positions of the tucking blade 60 at the left-hand side of the loom are illustrated. In this figure, it will be seen that the offset portions 58 of the shaft move through an arc about the axis of shaft 52 which results in a certain amount of longitudinal sliding action of the groove 64 in the blade 60 relative to the end 50 of the weft wire. Such movements of the blade 60 takes place while the reed bar 20 is completing its retreating movement.

After the reed bar 20 has retreated to its full extent, another weft wire is inserted into the shed and is cut from the supply thereof, and at this time, or even while the reed bar 20 next advances toward the shed for purposes of beating-up the next weft wire into the shed, the cam follower 74 moves in its reverse direction to oscillate the lever 68 in a direction reverse to that described above so as to retract the outer end of the blade 60 from the shed of the weave and restore the same to the retracted position shown in Figs. 4 through 6. All of this takes place before the next inserted weft wire is beat-up sufficiently by the reed bar so that the projecting ends 50 thereof may engage the guide notches 48 and be moved along the grooves 64 in the blades 60. It will be understood that such disposition of the projecting ends 50 of the weft wire 26 takes place simultaneously relative to the tucking units at opposite sides of the loom.

When the next inserted weft wire 26 is fully beat-up into the weave, said wire will engage the substantially completely tucked ends 50 of the last inserted weft wire and thereby finally position the tucked weft ends into the weave of the cloth. The inherent resilience of the weft wire material, after the completing of the tucking and the bending thereof by blades 60 to dispose the tucked ends 50 within the weave as shown in Fig. 7, will cause the tucked ends 50 to flex reversely backward a slight distance when the tucked end 50 are disengaged by the blades 60. However, when the next inserted weft wire is fully beaten-up, the tucked ends of the previously inserted wire will be disposed substantially parallel to the weft wires of the weave as clearly shown in the illustrations of the weave in Figs. 4 through 7.

From the foregoing, it will be seen that the present invention provides tucking units within a loom for weaving wire cloth which are simple in construction and operate automatically to tuck the projecting ends of a cut weft wire into the shed and weave of the cloth, whereby the cloth closely resembles in appearance conventional wire cloth having a substantially continuous weft wire arrangement. Structurally, the woven wire cloth having cut tucked ends woven into the selvage edges of the cloth is fully equal to any conventional wire cloth having a continuous weft wire arrangement. The weaving of cloth with tucked cut weft ends however is substantially less expensive than conventionally woven, continuous weft wire cloth and the tucking units comprising the present invention tuck the cut weft ends into the weave in a highly satisfactory manner. In addition, the tucking units are compact, rugged and durable, and of simple construction. Also, the detailed mechanism of the tucking units which actually performs the bending of the initially projecting ends of the cut weft wire employs the normal movement of the reed bar to partially effect the bending of such projecting ends of the weft wire and also to position said projecting ends conveniently upon the tucking blades of the units.

While the invention has been described and illustrated in its preferred embodiment, and has included certain details, it should be understood that the invention is not to be limited to the precise details herein illustrated and described since the same may be carried out in other ways falling within the scope of the invention as claimed.

We claim:

1. Wire cloth selvage forming mechanism comprising a wire cloth weaving loom of the type arranged to position cut weft wires between the warp wires in the shed of said loom, said loom including a stationary frame, a reed bar operable to beat-up each weft wire after insertion thereof in said shed, and means to shift said shed after each weft wire is beat-up within the shed to lock said wire within the weave, the opposite ends of each weft wire initially projecting respectively axially outward beyond the opposite edges of the weave of the cloth when said weft wire is locked into said weave; in combination with shafts supported by said stationary frame adjacent the opposite outer edges of the weave and substantially vertical to the plane of the weave, substantially straight cantilever-type tucking blades respectively supported for rotation at one end about the axes said shafts and extending radially therefrom substantially within the plane of the weave for oscillatory movements of the blades in opposite directions successively into and out of the shed of the weave, one edge of each blade being grooved, and actuating means interengaging said blades and operable to rotate the same simultaneously in one direction while said reed bar is retreating from beat-up position to move said other ends and grooved edges of said blades respectively in directions to bend the projecting ends of said locked weft wire into the shed and to rotate said blades subsequently in the opposite direction simultaneously to remove said blades from the shed before the next inserted weft wire is beat-up into the shed.

2. Wire cloth selvage forming mechanism comprising a wire cloth weaving loom of the type arranged to position cut weft wires between the warp wires in the shed of said loom, said loom including a stationary frame, a reed bar operable to beat-up each weft wire after insertion thereof in said shed, and means to shift said shed after each weft wire is beat-up within the shed to lock said wire within the weave, the opposite ends of each weft wire projecting respectively axially outward beyond the opposite edges of the weave of the cloth when said weft wire is locked into said weave; in combination with bearing members fixedly supported by said frame adjacent opposite edges of the weave and having bearing openings substantially vertical to said plane, shafts respectively supported by said bearing members for rotation about the axes of said fixed bearing members adjacent the outer opposite edges of the weave, substantially straight cantilever-type tucking blades respectively connected at one end to said shafts and extending radially therefrom substantially within the plane of the weave for oscillatory movements of the blades in opposite directions within the plane of the weave to move the other ends thereof successively into and out of the shed of the weave, one edge of each blade being grooved, and actuating means interengaging said shafts and operable to rotate said shafts simultaneously in one direction while said reed bar is retreating from beat-up position to move said other ends of said blades and grooved edges respectively in directions to bend the projecting ends of said locked weft wire into the shed and to rotate said shafts subsequently in the opposite direction simultaneously to remove said blades from the shed before the next inserted weft wire is beat-up into the shed.

3. Wire cloth selvage forming mechanism comprising a wire cloth weaving loom of the type arranged to position cut weft wires between the warp wires in the shed of said loom, said loom including a stationary frame, a reed bar operable to beat-up each weft wire after insertion thereof in said shed, and means to shift said shed after each weft wire is beat-up within the shed to lock said wire within the weave, the opposite ends of each weft wire projecting respectively axially outward beyond the opposite edges of the weave of the cloth when said weft wire is locked into said weave; in combination with guide blocks supported stationarily relative to said frame adjacent opposite outer edges of said weave, said blocks having guide means within the plane of the weave and operable to receive and position the projecting ends of the weft wires incident to being beat-up, shafts supported by said stationary frame adjacent the opposite edges of the weave and substantially vertical to the plane of the weave, substantially straight cantilever-type tucking blades respectively supported for rotation at one end about the axes of said shafts and extending radially therefrom within the plane of the weave for oscillatory movements of the blades in opposite directions successively into and out of the shed of the weave, one edge of each blade being grooved, and actuating means interengaging said blades simultaneously to rotate the same in one direction while said reed bar is retreating from beat-up position to move said other ends of said blades respectively in directions to bend the projecting ends of said locked weft wire as positioned by said guide blocks into the shed and to rotate said blades subsequently in the opposite direction simultaneously to remove said blades from the shed before the next inserted weft wire is beat-up into the shed against the bent ends of the previously inserted weft wire and thereby finally positioning said bent ends within the selvages of the woven wire cloth.

4. The wire cloth selvage forming mechanism set forth in claim 3 further characterized by said guide blocks each having a recess therein opening outwardly toward the adjacent outer edge of the weave of the cloth and said recesses being arranged respectively to receive at least portions of said blades when removed from said shed, and the path of movement of said reed bar when moving in beat-up direction being positioned to permit the reed bar to move the projecting ends of the weft wire being beaten-up thereby into the guide means of said guide blocks and also into engagement with said tucking blades to partially bend said ends rearwardly.

5. The wire cloth selvage forming mechanism set forth in claim 2 further including crank means connected respectively to said shafts, and crank actuating means reciprocable during the movement of said reed bar and operable in opposite directions respectively to rotate said shafts in opposite directions to move said blades thereon as aforesaid.

6. The wire cloth selvage forming mechanism set forth in claim 2 further characterized by said shafts having laterally offset portions thereon to which said blades are connected, whereby as said shafts are rotated in a direction to project said blades into the shed of the weave each blade will effect a compound movement including an arcuate wiping movement relative to the projection end of the last beat-up weft wire engaged thereby in addition to the rotary movement of each blade about the axis of the shaft to which it is connected.

7. The wire cloth selvage forming mechanism set forth in claim 4 further characterized by the grooves of said tucking blades extending longitudinally of the faces thereof engageable with the projecting ends of the weft wires when the blades are removed from the shed of the weave, said grooves being substantially within the plane of the weave and operable to be engaged by the projecting ends of the weft wires and cause bending thereof rearwardly when said reed bar is moving in beat-up direction.

8. The wire cloth selvage forming mechanism set forth in claim 3 further characterized by said guide means of said guide blocks comprising notches opening forwardly toward said shed shifting means, and said tucking blades each having a side face respectively substantially parallel to and adjacent the outer edges of the weave of the cloth and the grooves therein being in longitudinal alignment with the notches of said guide means when the blades are removed from the shed of the weave, whereby the reed bar when beating-up a weft wire into said shed will cause the projecting ends of said weft wire to engage the notches of said guide blocks and grooves of said blades to partially bend said projecting ends and place the same within the grooves of said blades.

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