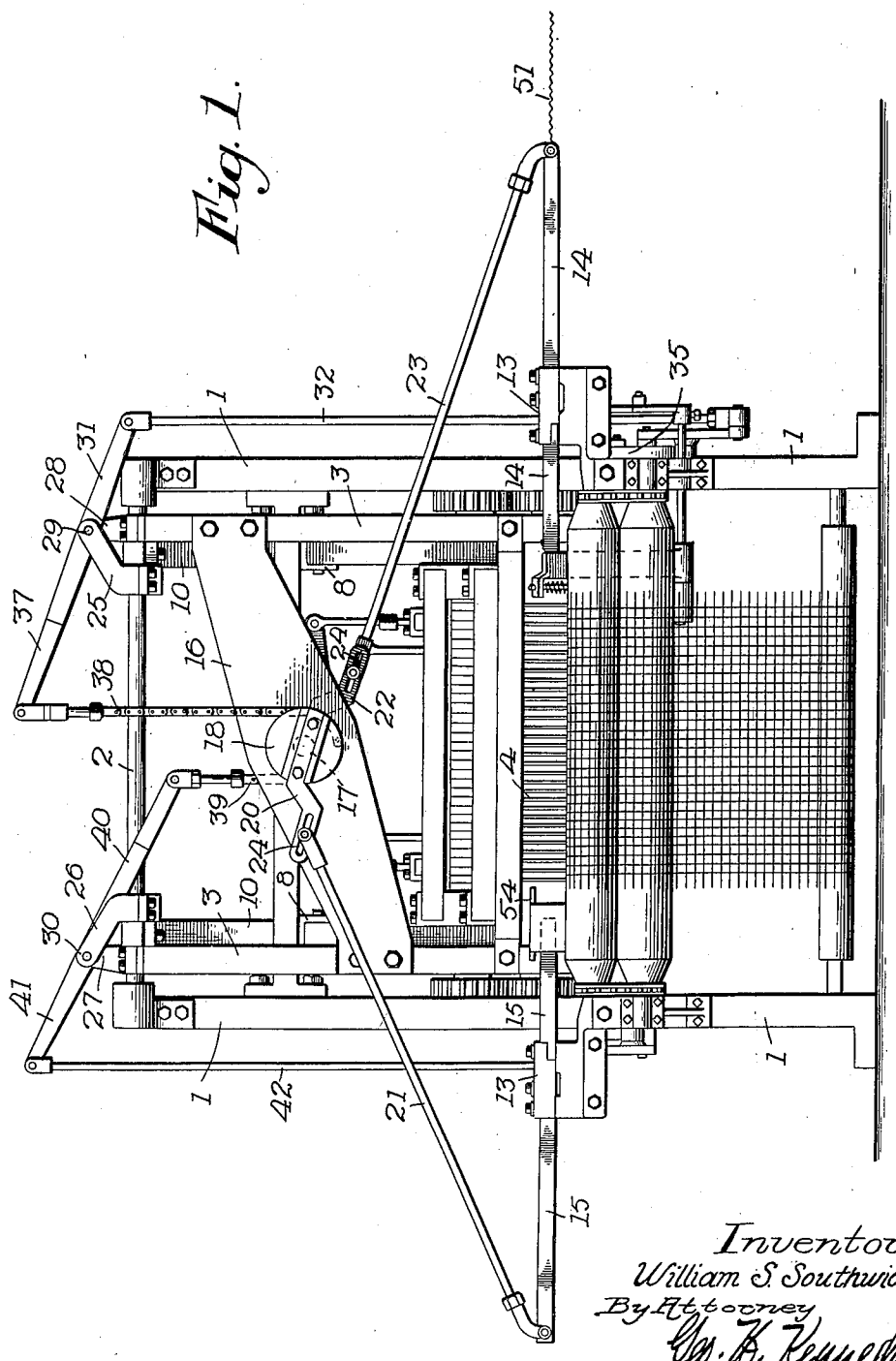
March 31, 1925. 1,531,762

W. S. SOUTHWICK

LOOM FOR WEAVING WIRE

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Fig. 1.



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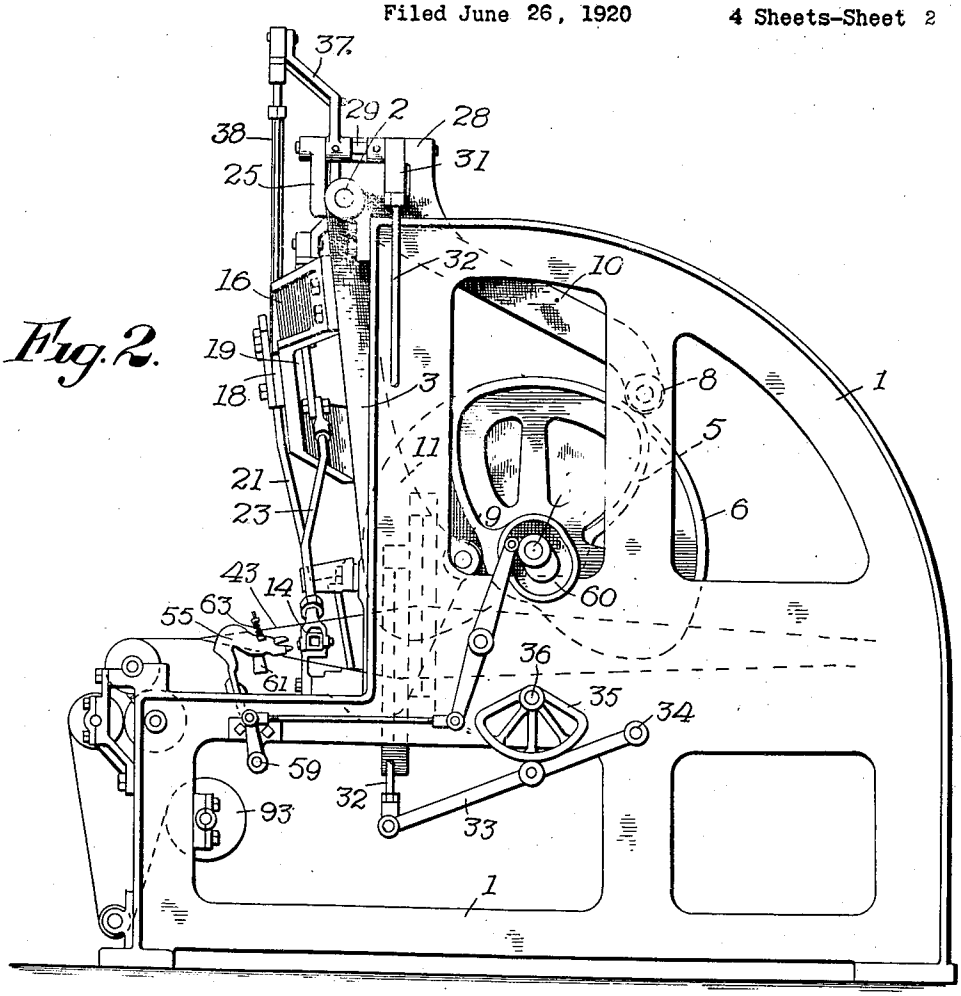
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Fig. 2.



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LOOM FOR WEAVING WIRE

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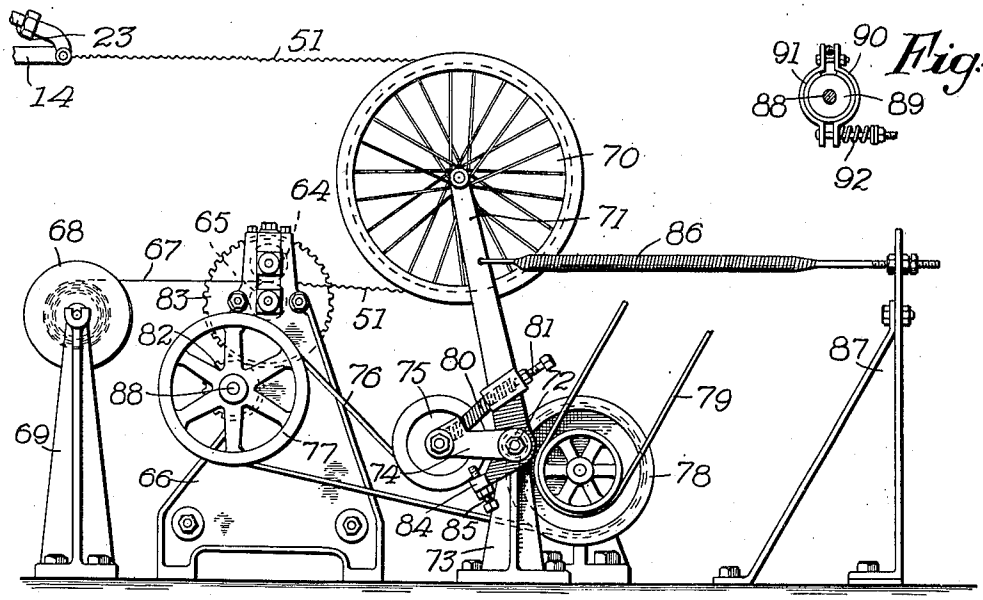


Fig. 3.

Fig. 4.

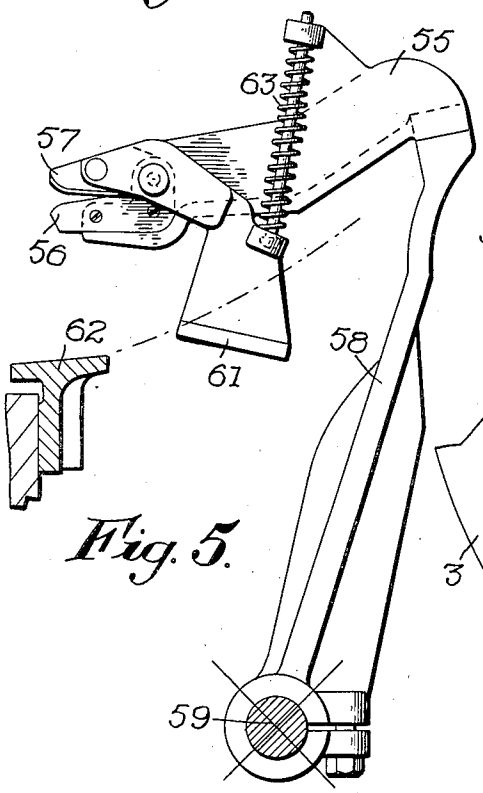


Fig. 5.

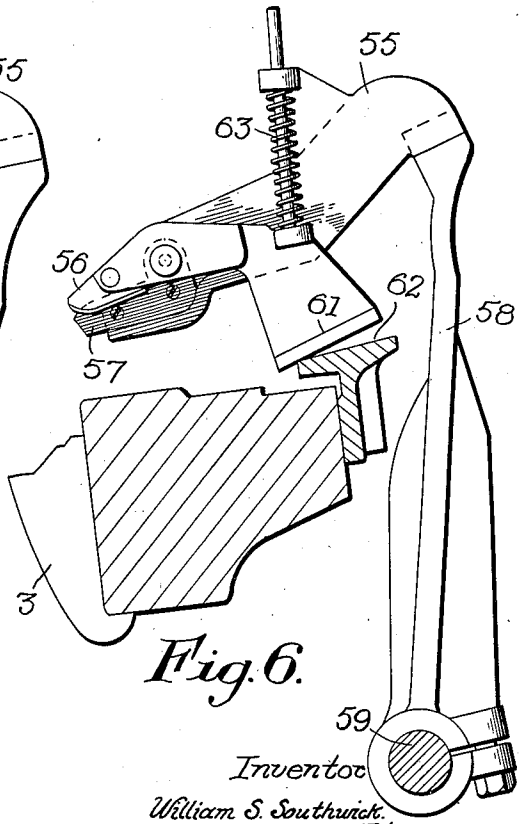


Fig. 6.

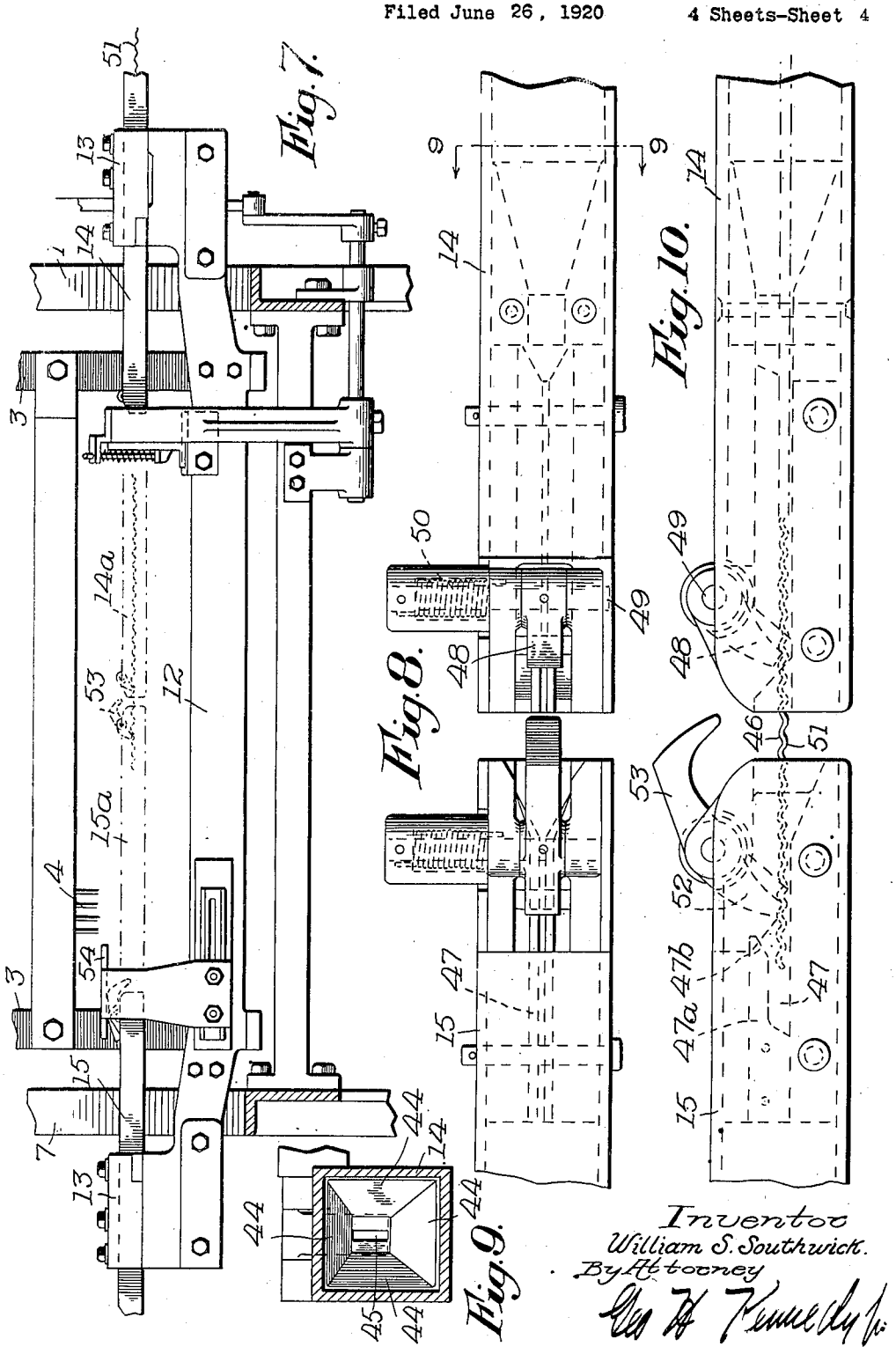
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Filed June 26, 1920 4 Sheets-Sheet 4



Patented Mar. 31, 1925. 1,531,762

UNITED STATES PATENT OFFICE.

WILLIAM S. SOUTHWICK, OF CLINTON, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WICKWIRE SPENCER STEEL COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

LOOM FOR WEAVING WIRE.

Application filed June 26, 1920. Serial No. 391,857.

To all whom it may concern:

Be it known that I, WILLIAM S. SOUTHWICK, a citizen of the United States, residing at Clinton, in the county of Worcester and Commonwealth of Massachusetts, have invented a new and useful Improvement in a Loom for Weaving Wire, of which the following, together with the accompanying drawings, is a specification.

The invention relates to a wire weaving loom for producing a crimped wire cloth or fabric by the introduction of a crimped weft wire into an open warp shed, the warp wires being crimped by the action of beating up the crimped weft wire, and my present invention relates particularly to the means employed for crimping and feeding a crimped weft wire through the open shed of the loom and for controlling the operation of the crimping rolls as hereinafter described, the features of novelty being pointed out in the appended claims.

In the accompanying drawings,

Fig. 1 is a front view of a wire weaving loom embodying my present invention.

Fig. 2 is a side view of the same.

Fig. 3 is a side elevation of the mechanism for controlling the operation of the weft wire crimping mechanism.

Fig. 4 is a detached view of a brake mechanism embodied in the apparatus shown in Fig. 3.

Fig. 5 is a side view of the shearing mechanism for severing the weft wire, shown in its open position.

Fig. 6 is a side view of the same, shown in its closed position.

Fig. 7 is a front view of the lower portion of the swinging lay and illustrating the means employed for introducing a crimped weft wire into the open warp shed.

Fig. 8 is a top view of the inner ends of the reciprocating weft bars.

Fig. 9 is a sectional view of one of the reciprocating weft bars on the plane of the broken line 9—9, Fig. 8, and

Fig. 10 is a side view of the inner ends of the reciprocating weft bars.

Similar reference characters refer to similar parts in the different figures.

The wire weaving loom embodying my present invention is provided with means for forming a shed in the warp wires, consisting of a harness mechanism, not shown, but which may be of any known type suitable for forming a shed in the warp wires; means for taking up the woven fabric; means for delivering the warp wires and regulating the tension thereon; and means for beating up the weft wire after it has been inserted in the open shed. These mechanisms, while they are indicated in part in the accompanying drawings and described in the following specification, form no part of my present invention and may be of any known and suitable type. My present invention is concerned with the means for rendering the action of the crimping rolls intermittent and for inserting the crimped weft wire in the open warp shed.

In the accompanying drawings, 1, 1 denote the loom sides supporting the operative portions of the loom, in the upper portion of which is journalled an oscillating rod 2 to which is attached the framework 3, 3 of a swinging lay carrying a reed 4 for beating up the weft wire against the fell. A swinging movement is imparted to the lay by any suitable means, in the present instance by the cams 5 and 6 carried upon a rotating shaft 7 connected in any suitable manner with the driving power of the loom. The cams 5 and 6 act against cam rolls 8 and 9 carried, the former upon an arm 10 attached to the oscillating shaft 2 and the latter upon a bracket 11 attached to the framework 3 of the lay. Attached to the lower end of the framework 3 of the lay is a bar 12 extending transversely across the loom and projecting beyond the sides 1, 1 of the loom, and carrying at its ends guideways 13, 13 for the reciprocating weft bars 14 and 15. Attached to the swinging framework of the lay is a plate 16, in which is journalled a short shaft 17 indicated by the broken line in Fig. 1. Attached to the shaft 17 is a disk 18 upon the front side of the the plate 16, and a similar disk 19, Fig. 2, upon the rear side of the plate 16. Bolted upon the front disk 18 is an arm 20 connected by a link 21 with the outer end of the weft bar 15. Bolted upon the rear disk 19 is a similar arm 22 connected by a link 23 with the outer end of the weft bar 14. The arms 20 and 22 are slotted at 24 to permit an adjustment in the movement of the weft bars 14 and 15. Each of the links 21 and 23 are pivoted on studs which are

rigidly held in their adjusted positions in the slots 24 of the arms 21 and 22.

Attached to the oscillating rod 2 are arms 25 and 26, Fig. 1. Journalled in the arms 25 and 26 and in supporting brackets 27 and 28, Fig. 2, attached to the arms 10 of the swinging bars 3, are rocking shafts 29 and 30. The shaft 29 carries an arm 31 having a pivotal connection, by means of a link 32, with a lever 33, Fig. 2, pivoted to the loom side at 34 and actuated by a cam 35 carried upon a shaft 36 by which an oscillating movement, in one direction, is given to the rocking shaft 29. Attached to the shaft 29 is an arm 37, and pivotally attached to the arm 37 is a chain 38, Fig. 1, having its end attached to the disk 18. The depression of the lever 33, Fig. 2, by the cam 35, will rock the shaft 29 to raise the arm 37 and oscillate the disk 18. This movement of the disk 18 will rock the shaft 17 and impart a similar movement to the disk 19, which will wind up a chain 39, Fig. 1, attached to the disk 19 and pivotally connected to an arm 40 carried upon the rocking shaft 30. The winding of the chain 39 upon the disk 19 will elevate an arm 41 attached to the rock shaft 30 which, in turn, will again be depressed through a link 42 by means of a lever and cam upon the opposite side of the loom, which are duplicates of the lever 33 and cam 35, shown in Fig. 2. By the rocking of the shafts 29 and 30, the chains 38 and 39 will be alternately wound and unwound on the disks 18 and 19, producing a reciprocating movement of the short shaft 17, Fig. 1, and a corresponding movement of the disks 18 and 19, which, through the arms 20 and 22 and links 21 and 23, will produce a sliding movement of the weft bars 14 and 15 from the positions shown by solid lines in Fig. 7 to the positions shown by broken lines 14^a and 15^a.

The warp wires are periodically separated, by any suitable harness mechanism forming no part of my present invention and therefore not shown, to produce a shed in the usual and well known manner, as indicated at 43, Fig. 2. The oscillation of the disks 18 and 19 are so timed with the opening of the shed 43 as to cause the weft bars 14 and 15 to be moved from their normal positions, shown in Fig. 1 and by solid lines in Fig. 7, into the positions shown by broken lines 14^a and 15^a, Fig. 7, and back again to their normal positions, while the warp wires are separated to form the open shed 43, Fig. 2, and while the swinging lay is in its rearmost position, as indicated at 3, Fig. 2.

The weft bar 14 is provided with a passage therethrough for the insertion of a crimped weft wire. At the entrance end of the weft bar 14, the top, bottom and sides of the passage are bevelled as shown at 44, Fig. 9, to facilitate the entrance of the weft wire. The bevelled sides 44 lead to an interior passage 45, Fig. 9, said passage having straight sides separated slightly more than the thickness of the wire and of sufficient height to provide for the crimps in the weft wire, said crimps being shown at 46, Fig. 10. The weft bar 15 is provided with a similar passage for a short distance from its inner end, as represented at 47, Figs. 8 and 10. The inner end of the weft bar 14 carries a pawl 48 attached to a spindle 49 to which a torsional spring 50 is applied to carry the free end of the pawl into engagement with the crimps of the weft wire, as shown in Fig. 10.

The weft wire 51, having crimps 46, is first inserted through the weft bar 14 and for a short distance beyond its inner end, the weft wire slipping under the free end of the pawl 48. As the weft bar 14 is reciprocated into the position 14^a, Fig. 7, the crimps 46 of the weft wire will be engaged by the pawl 48, causing the projecting end of the weft wire to be inserted in the end of the weft bar 15 as it approaches the position shown at 15^a, Fig. 7. In this position the crimps 46 will be engaged by a pawl 52 carried by the inner end of the weft bar 15. As the weft bars are reciprocated to remove them from the open shed from the positions 14^a and 15^a to the positions 14 and 15, Fig. 7, the engagement of the weft wire by the pawl 52 will cause the weft wire to be drawn entirely through the open shed, the pawl 48, during this movement, slipping over the crimps 46 of the weft wire. When the weft bars have been reversed and have drawn the weft wire through the open shed by means of the pawl 52, the pawl 52 is released by the final movement of the weft bar 15, carrying a tailpiece 53 of the pawl 52 beneath a plate 54, which will cause the pawl 52 to be raised out of engagement with the weft wire, allowing the final movement of the weft bar 15 to withdraw itself from the end of the weft wire. The entrance of the weft wire into the bar 15 is facilitated by a plate 47^a inserted in the wire channel 47 and having a bevelled end 47^b. The weft bar 14, having been withdrawn from the open shed, the weft wire is severed at sufficient distance from the end of the weft bar to leave a suitable projecting end beyond the weft bar 14 to again be reentered in the weft bar 15 as the weft bars approach each other in the position shown by broken lines 14^a and 15^a, Fig. 7.

Any suitable means may be employed for severing the weft wire. In the present instance, the means employed consist of a shear 55 shown in Fig. 2 and in detail on a larger scale in Figs. 5 and 6. This shear

consists of stationary and movable jaws 56 and 57 carried in a framework 58 attached to a rocking shaft 59, which is rocked at the proper interval by a cam 60, Fig. 2. The rocking of the shaft 59 moves the shear rearwardly and carries a projection 61 on the movable jaw against a plate 62 on the swinging lay 3 to rock the movable jaw on its axis into a closed position, as shown in Fig. 6, thereby severing the weft wire. As the frame 58 is again moved by the cam 60 into its forward position, the jaws are opened by a spring 63.

The weft wire is crimped by passing it between a pair of toothed rolls 64 and 65 supported in stands 66, as shown in Fig. 3 of the drawings. This method of crimping the weft wire is that now generally employed and forms no part of my present invention. In the crimping mechanism employed by me, the plain uncrimped wire, represented at 67, is taken from a reel 68 supported upon a stand 69. As the rotation of the toothed rolls 64 and 65 project the weft wire forward, I provide means for interrupting the action of the crimping rolls 64, 65, except at such times as it is necessary to supply a weft wire to the reciprocating weft bars 14 and 15, and in Fig. 3 I have illustrated the means employed for this purpose. The crimped weft wire as it leaves the crimping rolls 64 and 65 is carried around a grooved wheel 70, mounted upon a lever 71 pivoted at 72 upon a stand 73. Pivoted at 72 is an arm 74 carrying a tightening pulley 75 arranged to bear against a driving belt 76 forming a driving connection between the belt pulleys 77 and 78, the latter being driven by a belt connection 79 with any convenient source of power. Between the lever 71 and the arm 74 I interpose an open spiral spring 80 with its pressure capable of being adjusted by a screw 81. When the crimped weft wire is taken up by the reciprocating movement of the weft bars 14 and 15, the lever 71 will be rocked on its pivot 72 to carry the tightening pulley 75 against the belt 76, causing a rotation of the pulley 77 and, by means of the pinion 82 and gear 83, rotating the roll 65 which is connected with the roll 64 by gearing, not shown. The lever 71 is provided with an arm 84 at its lower end, carrying an adjusting screw 85 directly beneath the arm 74. As the draft upon the weft wire 51, caused by the reciprocating movement of the weft bars 14 and 15, is relieved, the lever 71 is carried to the right by the pull of a spiral spring 86, connecting the lever 71 with a stationary stand 87. The pulley 77 is attached to a shaft 88 journalled in the stand 66 and provided with a friction brake, shown in Fig. 4, said brake comprising a disk 89 carried by the shaft 88 and surrounded by curved brake arms 90, 91, which are drawn against the disk 89 by means of a spiral spring 92 in order to prevent the shaft 88 from over-running when the tightening pulley 75 is raised off the belt 76 by contact of the screw 85 with the arm 74 as the lever 71 swings to the left.

In the operation of the mechanism above described, by the action of the cam 35, Fig. 2, and that of a similar cam on the shaft 36 at the opposite side of the loom, the disks 18 and 19 are reciprocated by the alternate winding and unwinding of the chains 38 and 39, thereby imparting, through the arms 20 and 22 and the links 21 and 23 a reciprocating movement to the weft bars 14 and 15 in the guides 13, 13, accomplished during the opening of the warp shed 43. As the mechanisms for reciprocating the weft bars 14 and 15 as well as the guides 13, 13 are carried upon the swinging lay 3, an overlapping movement is permitted between the reciprocating movement of the weft bars 14 and 15 and the warp shedding or harness mechanism, thereby allowing an increase in the speed of the loom. During the movement of the weft bar 14 toward the center of the warp shed, the weft wire is engaged by the pawl 48 until the projecting end of the weft wire enters the end of the approaching weft bar 15 and is engaged by the pawl 52. The movement of the weft bars 14 and 15 is then reversed and, during this reversal, the weft wire is drawn into the shed by the pawl 52, causing the pawl 48 to slide over the crimps 46 of the weft wire. When the tail 53 of the pawl 52 passes beneath the plate 54, the pawl 52 is raised and the weft bar 15 continues its movement until the end of the weft wire has become removed from the weft bar 15. The cutting mechanism is then brought into action by the cam 60, Fig. 2, severing the weft wire some distance from the end of the weft bar 14 to provide a projecting end to enter the weft bar 15 as the weft bars are again brought together. The woven fabric, at each successive beat of the lay, is taken up by an intermittent rotation of the takeup roll 93, Fig. 2, in the usual and well known manner in weaving looms, and, as it forms no part of my present invention, is not shown.

The lever 71 and grooved wheel 70 around which the weft wire is carried by the spring 86, constitutes a take-up mechanism which equalizes the tensile strain upon the weft wire as the latter is acted upon by the reciprocating weft inserting mechanism and, at the same time, it controls the operation of the toothed rolls which serve to crimp the weft wire and also to project the same from a source of weft supply, comprising the reel 68, to the weft inserting mechanism.

I claim,

1. In a loom of the class described, a pair of reciprocating weft bars having interior

channels with side walls adapted to maintain a crimped weft wire with its crimps in a vertical plane, and provided with means for engaging the crimps of the weft wire.

2. In a loom of the class described, a pair of reciprocating weft bars provided with interior channels having side walls adapted to maintain a crimped weft wire with its crimps in a vertical plane, and pivoted pawls carried by said weft bars with their free ends entering said channels to engage a crimped weft wire.

3. In a loom of the class described, a pair of reciprocating weft bars having interior channels adapted to receive a crimped weft wire and maintain its crimps in a vertical plane, of a pawl carried by each weft bar, and a torsional spring applied to each of said pawls to hold it in engagement with a crimped weft wire and cause the weft wire to move with said weft bars in one direction.

4. In a loom of the class described, a weft bar having an interior channel throughout its length to receive a crimped weft wire and maintain its crimps in a vertical plane, means for imparting a reciprocating longitudinal movement to said weft bar to carry it into and out of an open warp shed, a pawl carried by said weft bar to engage a crimped weft wire, and a spring applied to said pawl to hold it in engagement with the weft wire during the movement of the weft bar into the warp shed but allow the pawl to slide over the weft wire during the reverse movement of the weft bar.

5. In a loom of the class described, a weft bar, means for imparting a reciprocating longitudinal motion to said bar to carry it into and out of an open warp shed, means for imparting a corresponding movement to a weft wire held in said weft bar with a portion projecting beyond the advancing end of said weft bar, a second weft bar adapted to receive the projecting end of the weft wire, means for imparting a reciprocating longitudinal motion to said second weft bar into and out of an open warp shed, and means carried by said second weft bar as it is withdrawn from the warp shed to impart a corresponding movement to the weft wire.

6. In a loom of the class described, a pair of weft bars in alinement with each other adapted to carry a crimped weft wire into an open warp shed, means for moving said weft bars into and out of said warp shed, means carried by one of said weft bars for engaging the crimps of the crimped weft wire during the movement of the weft bar toward the center of the warp shed, means carried by the second of said weft bars for engaging the crimps of the weft wire during the movement of the weft bar away from the center of the warp shed, and means for relieving the weft wire from movement during the final movement of said weft bar.

7. In a loom of the class described, the combination with a reciprocating mechanism for laying a weft wire and a source of weft supply, of means for crimping the weft wire, a yielding mechanism for maintaining a uniform tension of the weft wire, and means controlled by said yielding mechanism for operating said crimping means.

8. In a loom of the class described, the combination with means for laying a weft wire and rotatable means for crimping the weft wire, yielding mechanism between the laying means and said crimping mechanism, and means controlled by said yielding mechanism for rotating said crimping mechanism.

9. In a loom of the class described, the combination with reciprocating means for laying a weft wire and rotatable means for crimping the weft wire, of a driving mechanism for actuating said crimping means, comprising a belt connection between the crimping mechanism and a source of power, a tightening pulley for said belt, and means for relieving the pressure of said tightening pulley on said belt connection controlled by the tensile strain on the weft wire exerted by said reciprocating means.

Dated this 19th day of June, 1920.

WILLIAM S. SOUTHWICK.

Witnesses:

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NELLIE WHALEN.