May 4, 1926. 1,583,321

G. B. SMITH

CHAIN AND CROSSTIE LINK ASSEMBLING MACHINE

Filed May 9, 1923 3 Sheets-Sheet 1

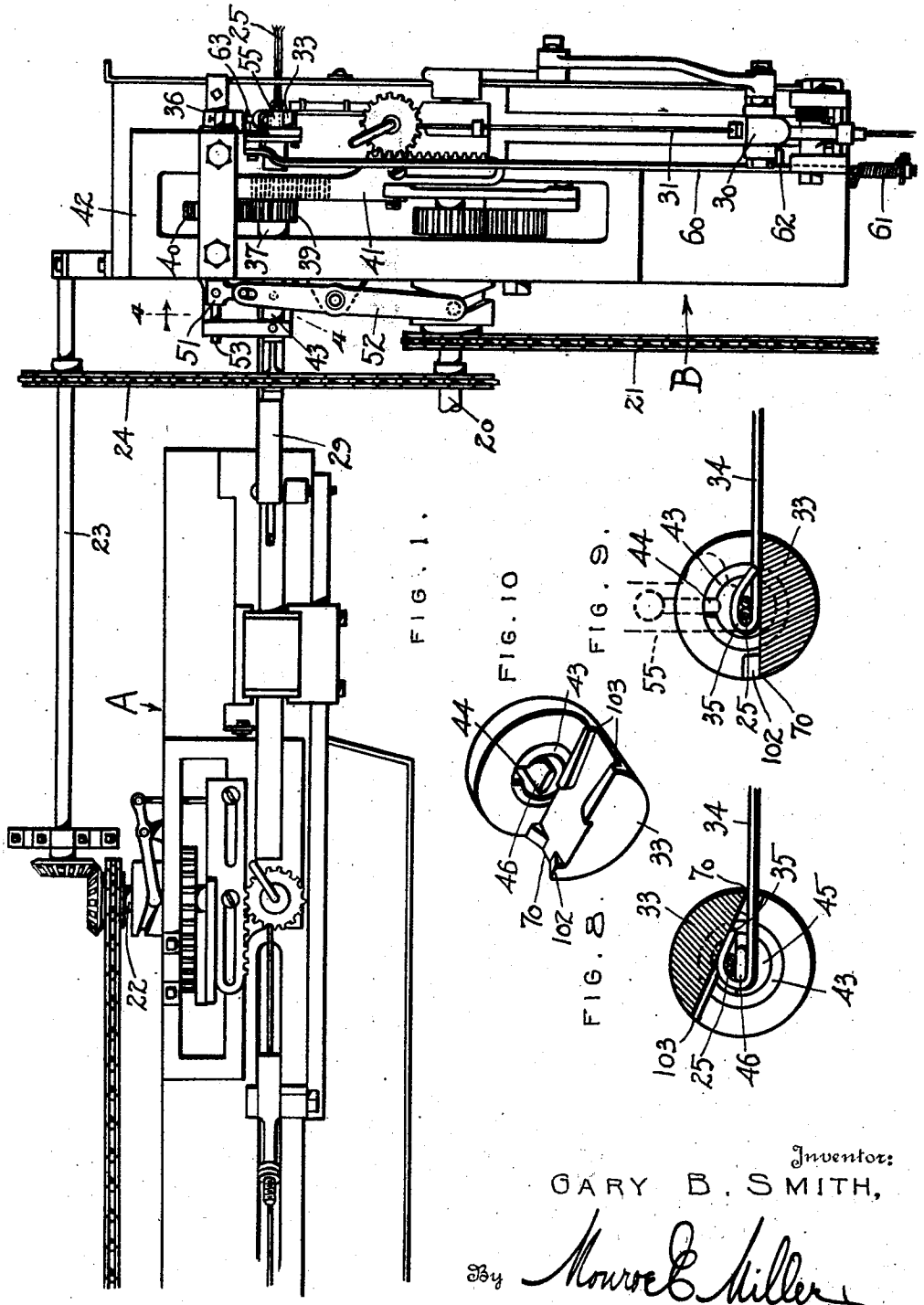


FIG. 1.

FIG. 9.

FIG. 10

FIG. 8.

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CHAIN AND CROSSTIE LINK ASSEMBLING MACHINE

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FIG. 2.

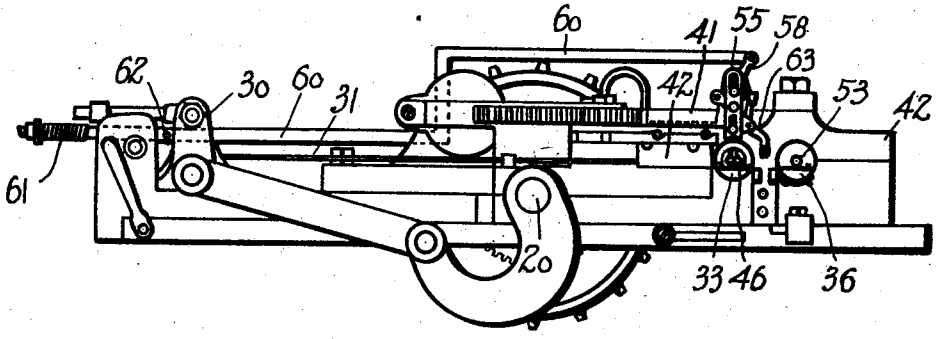


FIG. 3.

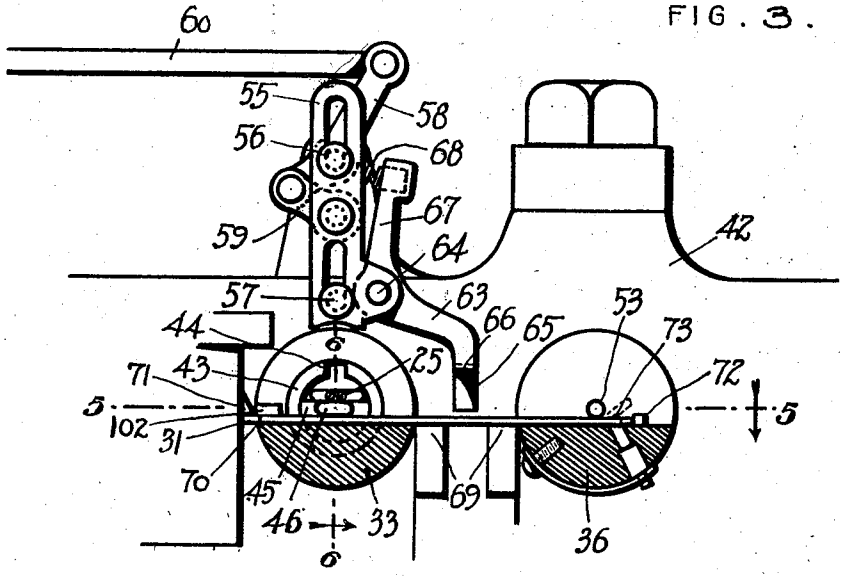
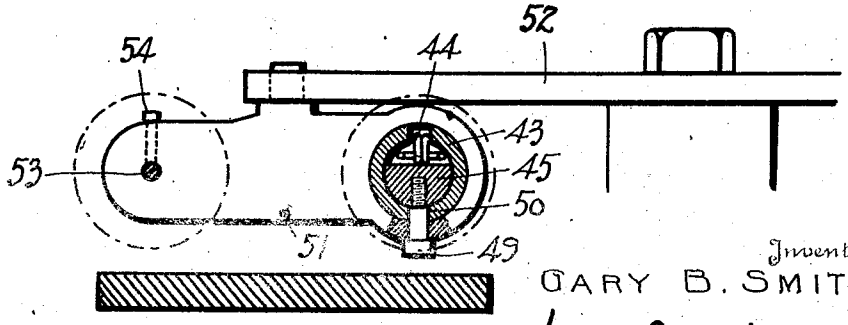


FIG. 4.



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Filed May 9, 1923 3 Sheets-Sheet 3

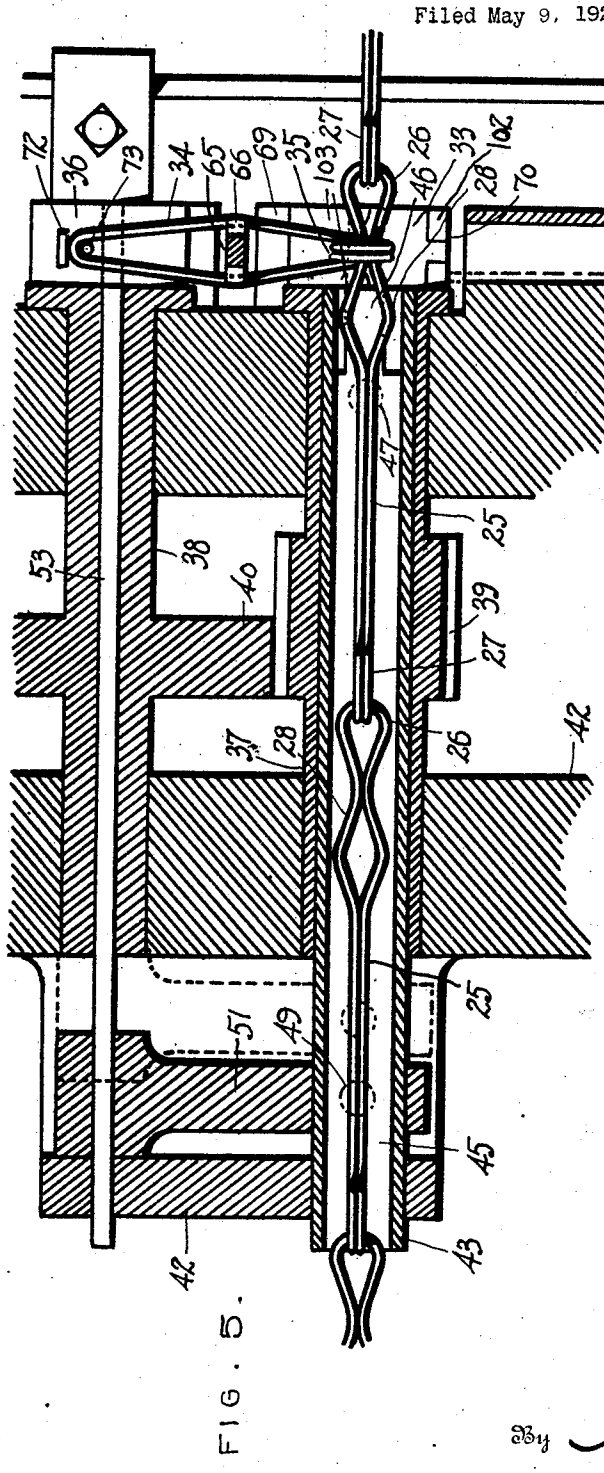


FIG. 5.

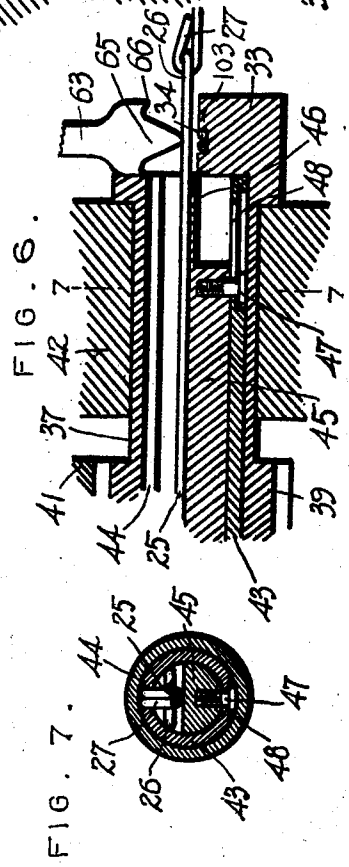


FIG. 6.

FIG. 7.

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UNITED STATES PATENT OFFICE.

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CHAIN AND CROSSTIE LINK ASSEMBLING MACHINE.

Application filed May 9, 1923. Serial No. 637,784.

To all whom it may concern:

Be it known that I, GARY B. SMITH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Chain and Crosstie Link Assembling Machines, of which the following is a specification, reference being had therein to the accompanying drawing.

The present invention is a machine for applying cross tie links to a chain or other member from which bed fabrics and the like are made, and it is the primary object of the invention to provide a novel and improved machine of that kind, which will operate in a practical and efficient manner.

As a further object, the invention aims to provide such a machine which is improved generally in its construction and details to enhance the utility and efficiency thereof.

Another object is the provision of means for bending portions of the cross tie links into hooks embracing the chain or other articulated member and for closing said hooks on such member to securely fasten the cross tie links thereto one at a time in succession at longitudinally spaced points of said chain or member.

The machine is also designed to bend the terminals of doubled looped cross tie links on the chain or articulated member, and for spreading or separating the intermediate portions of the cross tie links.

A still further object is the provision of novel means for guiding and supporting the links of the chain for the application of the cross tie links thereto.

With the foregoing and other objects in view, which will be apparent as the description proceeds, the invention resides in the construction and arrangement of parts, as hereinafter described and claimed, it being understood that changes can be made within the scope of what is claimed, without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a plan view of the machine.

Fig. 2 is an elevation thereof.

Fig. 3 is an enlarged detail elevation of the cross tie link applying and forming devices.

Fig. 4 is an enlarged sectional detail on the line 4—4 of Fig. 1.

Fig. 5 is a horizontal section on the line 5—5 of Fig. 3.

Fig. 6 is a vertical section on the line 6—6 of Fig. 3.

Fig. 7 is a cross section on the line 7—7 of Fig. 6.

Fig. 8 is a sectional view of the hook bending member in the position to form the hooks on the cross tie link around the chain.

Fig. 9 is a similar view showing the hook bending member in normal position and showing, in dotted lines, the die in position to close the hooks on the chain.

Fig. 10 is a perspective view of the hook bending and anvil member.

The present machine employs in combination the chain-making mechanism or sub-machine A, substantially the same as disclosed in my Patent No. 1,153,266, granted September 14, 1915, and the cross tie link making mechanism or sub-machine B, which is substantially the same, in general respects, as disclosed in my Patent No. 1,116,506, granted November 10, 1914, such mechanisms being co-related and an organization effected for applying the cross tie links to the links of the chain. Such mechanisms are substantially the same as disclosed in said patents, with the changes and improvements as hereinafter described. The mechanism B has the drive shaft 20 driven by the sprocket chain 21 or other means for operating the cross tie link making mechanism, and the chain making mechanism A has the drive shaft 22 which is driven from the drive shaft 20 of the cross tie link mechanism by means of the shaft 23 geared to the shaft 22 and connected by the sprocket chain 24 with the shaft 20, although other gearing can be used for driving the chain making mechanism from the cross tie link mechanism.

The chain making mechanism A produces and feeds out a chain, substantially the same as disclosed in Patent No. 1,153,266, composed of the doubled wire links 25, each having the loop 26 at its forward end and the hooks 27 at its rear end formed by doubling the terminals of the wire back, the loops and hooks of the links being interengaged, and the links having the separated or offset portions 28 adjacent to the loops for the application of the cross tie links to the chain links 25 between the loops 26 and offset portions 28. The mechanism A includes a re-

ciprocatory dog or pawl 29 for feeding or delivering the chain from the mechanism A intermittently as the chain links are formed, substantially the same as in said Patent No. 1,153,266.

The cross tie link mechanism B has a reciprocatory feeder or advancer 30 for intermittently feeding or advancing the wire 31 from which the cross tie links are fashioned, and said mechanism has the bending device 32, as seen in Fig. 5, for bending the forward terminal portion of the wire 32 back, substantially the same as disclosed in Patent No. 1,116,506, and after the wire is thus bent it is fed or advanced forward by the feeder or advancer 30 over a hook bending member and anvil 33 and a loop bending member 36. The cross tie link 34 of doubled wire is of loop form, and the terminals of the wire are bent back into hooks 35 at the end of the cross tie link opposite to the bend or loop, and with the present machine, the hooks 35 of the cross tie links are made to embrace the chain links 25 between the loops 26 and offsets 28, thereby producing a chain having looped cross tie links attached thereto. The production of the cross tie links, generally considered, by the mechanism B is substantially the same as disclosed in Patent No. 1,116,506, but in using the patented mechanisms in combination for applying the cross tie links to the chain, provisions are made to accomplish the desired results.

The cross tie link mechanism includes a tubular rock shaft 37 journaled in the frame 42 and carrying the hook bending member and anvil 33 at that end opposite to the mechanism A, and the loop bending member 36 is carried by the corresponding end of a tubular shaft 38 journaled in the frame parallel with the shaft 37. The shafts 37 and 38 have the gear wheels 39 and 40 thereon, respectively, meshing with one another so that said shafts turn simultaneously in opposite directions, the gear wheel 40 being of larger diameter than the gear wheel 39 so as to turn the shaft 38 and member 36 through a smaller angle than the shaft 37 and member 33 accordingly. The mechanism B has a rack 41 reciprocated from the drive shaft 20 and meshing with the gear wheel 39 for oscillating the shafts 37 and 38 in proper timed relation, and the wire feeder or advancer 30 is also reciprocated from the shaft 20.

In using the mechanisms A and B in combination for applying the cross tie links to the chain, a guide tube 43 is fitted within the tubular rock shaft 37 and extends from the member 33 beyond the opposite end of the shaft 37 to be secured rigidly to the frame 42, so that the guide 43 remains stationary, while the shaft 37 rotates around said tubular guide. The guide 43 serves to guide the chain therethrough to pass through the shaft 37 and over the member 33, and the guide 43 has a longitudinal slot 44 in the top thereof in which the hooks 27 of the chain links 25 move, whereby to guide the chain links and hold said links against turning motion. A bar 45 of substantially semi-circular cross section is fitted in the tubular guide 43 at the bottom thereof, with its flat surface uppermost, so that the chain links slide over the bar in moving through the tubular guide 43. That end of the bar 45 adjacent to the member 33 has a reduced extension or tongue 46 to project out over the member 33 and to provide a substantial element around which the hooks 35 of the cross tie links can be bent, as will hereinafter more fully appear. A screw 47 is secured in the bar 45 near the extension 46 and works in a longitudinal slot 48 in the bottom of the guide 43 to prevent angular or transverse displacement of the bar 45 and its extension 46 and a second screw 49 is engaged in the bar 45 near the opposite end thereof and depends through a longitudinal slot 50 in the guide 43. The screw or member 49 engages a reciprocatory cross head 51 which is slidable on the guide 43, and the cross head 51 is reciprocated in proper timed relation by a lever 52 of the mechanism B which is oscillated from the drive shaft 20.

A rod 53 is slidable through the shaft 38 to project out over the member 36, and projects from the opposite end of the shaft 38 through the cross head 51, and said rod is secured to the cross head by means of a set screw 54. The rod 53 and bar 45 are thus reciprocated as a unit to be projected over and retracted from the bending members 36 and 33, respectively.

A die 55 is mounted for vertical movement above the bending and anvil member 33, being slotted to engage the pins 56 and 57 carried by the frame, and a lever 58 is fulcrumed on the pin 56 and is connected by a link 59 with the die 55, for reciprocating said die. A bar 60 is connected to the upper long arm of the lever 58 and extends past the feeder or advancer 30. Said bar 60 is moved forwardly by a spring 61, so as to swing the lever 58 to the position as shown in Fig. 3, thereby pulling the link 59 upwardly and raising the die 55. The bar 60 carries a pin 62 projecting behind the feeder 30, so that when said feeder is moved to its rearmost position, the feeder contacts with the pin 62, thereby moving the bar 60 rearwardly and swinging the lever 58 toward a vertical position, thereby shoving the link 59 downwardly, said link and lever providing a toggle connection, whereby to force the die 55 down with considerable pressure in its lowermost position, the lower end of said die being formed to close and shape the hooks 35 of the cross tie link on the chain.

The die 55 also carries a die for spreading

or separating the side portions of the cross tie link 34, such die 63 being pivoted, as at 64, to the die 55 and having a wedge 65 projecting downwardly to pass into the link 34 between the members 33 and 36. The die 63 has shoulders 66 to seat on the side portions of the link when the wedge has been forced down into the link. The wedge 65 is offset away from the die 55, so as to have a vertical motion relatively to the die 55, and the die 63 has an arm 67 projecting upwardly. A spring 68 between the die 55 and arm 67 swings the arm 67 away from said die 55 to yieldingly depress the wedge 65 relatively to the die 55. The frame of the machine has the support 69 between the members 33 and 36 on which the intermediate portion of the link 34 seats to support the link when the wedge 65 is being forced into the link.

The operation of the machine is as follows: While the mechanism A is advancing the chain the length of one chain link through the tubular guide 43 over the bar 45, the feeder 30 of the mechanism B advances the doubled wire 31 over the member 33 and onto the member 36, to bring the bend or loop of the wire 32 on the member 36. The cross head 51 is moved forwardly so as to project the extension 46 of the bar 45 and the forward end of the rod 53 over the members 33 and 36, respectively, so that the doubled wire 31 is disposed below the extension 46 and rod 53, and when the chain has been advanced the length of one link, a link of the chain is so arranged that the portion thereof between the loop 26 and offsets 28 is disposed on the extension or tongue 46 of the bar 45, as seen in Fig. 5. The rack 41 is now moved to turn the shafts 37 and 38, and the member 33 is turned clock-wise as seen in Fig. 3, so as to cut the wire 31, the member 33 having a cutting edge 70 movable past a cutting edge 71 on the frame under which the wire 31 passes, thereby severing the cross tie link from the wire. The turning movement of the bending member 33 will also bend the terminals of the wire constituting the cross tie link, such terminals being bent upwardly over and around the extension or tongue 46 and chain link between the loop 26 and offsets 28 thereof, the tongue 46 providing a rigid portion around which the wire can be bent by the member 33 without distorting or displacing the chain link during the bending of the hooks 35. The bending member 33 has bevelled lugs 102 adjacent to the cutting edge 70 and said lugs have converging faces to force and hold the terminals or hooks 35 of the wire together between the lugs when bending them into hooks. The member 36 has a stop 72 against which the loop or bend of the link 34 abuts, and the member 36 also carries a finger 73 which engages within the bend of the loop. The member 36 is rotated in a direction reverse to that of the member 33, thereby bending the loop upwardly at an angle beyond the rod 53, as indicated in dotted lines in Fig. 3. The rack 41 is then retracted, so as to turn the shafts 37 and 38 and members 33 and 36 to normal position, and the cross head 51 is returned to withdraw the bar 45 and rod 53 from over the members 33 and 36. Then, when the feeder 30 returns to its rearmost position it strikes the pin 62, thereby moving the rod 60 rearwardly slightly, and swinging the lever 58 to force the die 55 down, as shown in dotted lines in Fig. 9, thereby closing the hooks 35 of the cross tie link 34 tightly on the chain link, the member 33 serving as an anvil while the hooks are being crushed down around the chain link, the tongue or extension 46 having been withdrawn from the hooks 35 so that they can be closed on the chain link. When the die 55 is being moved downwardly, the wedge 65 of the die 63 is forced down into the link 34, thereby separating or spreading the side portions of said link, as seen in Fig. 5, and the shoulders 66 seat on the side portions of the link 34 just before the die 55 bends the hooks 35 down, the die 63 yielding so as to hold the link 34 under pressure on the supports 69, to prevent the link 34 being displaced during the bending of the hooks 35 by the die 55. The member 33 has the lugs or stops 103 on the face thereof between which the terminals of the cross tie link wire are disposed during the descent of the die 63 to prevent the wedge 65 from spreading or separating the terminals or hooks 35 of the wire. When the feeder 30 starts forward to advance the wire 31 to produce the next cross tie link, the rod 60 is moved forwardly by the spring 61, thereby raising the dies 55 and 63, and the chain being advanced one step will carry the cross tie link with it off the members 33 and 36. The operation is then repeated as before, so as to apply a cross tie link to each link of the chain.

The chain thus made with the cross tie links thereon can then be fabricated into bed springs.

The chain mechanism A is driven from the cross tie link mechanism B, whereby the chain link and cross tie link are made substantially simultaneously, and the cross tie links are applied, when made, to the links of the chain so as to be permanently assembled therewith, with the looped ends of the cross tie links projecting from the chain links, without the liability of the chain becoming tangled during the handling thereof.

Having thus described the invention, what is claimed as new is:—

1. A machine of the character described comprising means for advancing a chain, a guide through which the chain is advanced, means for supplying cross tie links beyond one end of the guide, a bending member op-

erable at said end of the guide to turn around the chain for bending the cross tie links on the chain links, and a bar reciprocated within said guide and projected therefrom for the bending of the cross tie links around said member when they are bent around the chain links.

2. A machine of the character described comprising means for advancing a chain, a guide through which the chain is advanced, means for supplying cross tie links beyond one end of the guide, a bending member operable at said end of the guide to turn around the chain for bending the cross tie links on the chain links, a bar reciprocated within said guide and projected therefrom for the bending of the cross tie links around said member when they are bent around the chain links, and means for closing the bent portions of the cross tie links on the chain links when said member is retracted.

3. A machine of the character described comprising means for advancing a chain, a guide through which the chain is advanced, means for supplying cross tie links one at a time beyond one end of said guide, a bending member movable around the chain at said end of the guide for bending the cross tie links into hooks around the chain links, and a bar reciprocated within the guide and having a portion to be projected for the bending of the cross tie link hooks around the projected portion of the bar.

4. A machine of the character described comprising means for advancing a chain, a guide through which the chain is advanced, means for supplying cross tie links one at a time beyond one end of said guide, a bending member movable around the chain at said end of the guide for bending the cross tie links into hooks around the chain links, and a bar reciprocated within the guide and having a portion to be projected for the bending of the cross tie link hooks around the projected portion of the bar, and a die operable to bend the hooks of the cross tie links closed on the chain links when said bar is retracted.

5. A machine of the character described comprising means for advancing a chain, a guide through which the chain is advanced, a bar reciprocable within the guide to be projected and retracted, means for supplying cross tie links beyond one end of the guide, and a bending member mounted for rotary movement at said end of the guide, said bar being projected and bending member rotated to bend the cross tie links around the projected portion of the bar and chain links.

6. A machine of the character described comprising means for advancing a chain, a guide through which the chain is advanced, a bar reciprocable within the guide to be projected and retracted, means for supplying cross tie links beyond one end of the guide, a bending member mounted for rotary movement at said end of the guide, said bar being projected and the bending member rotated to bend the cross tie links around the projected portion of the bar and chain links, and a die operable when said bar is retracted and the bending member returned for pressing the bent portions of the links down on the bending member to close said bent portions on the chain links.

7. A machine of the character described comprising means for advancing a chain, a tubular shaft through which the chain is advanced, means for supplying cross tie links for application to the chain links at one end of said shaft, a bending member carried by said end of the shaft to bend the cross tie links around the chain links, and means for guiding and supporting the chain links for the bending of the cross tie links therearound.

8. A machine of the character described comprising means for advancing a chain, a guide through which the chain is advanced, a tubular shaft rotatable on said guide, means for supplying cross tie links for application to the chain links at one end of said guide, a bar reciprocated in said guide to be projected and retracted at said end thereof, and a bending member carried by the corresponding end of the shaft for bending the cross tie links around the projected portion of the bar and chain links.

9. A machine of the character described comprising means for advancing a chain, a guide through which the chain is advanced, a tubular shaft rotatable on said guide, means for supplying cross tie links for application to the chain links at one end of said guide, a bar reciprocated in said guide to be projected and retracted at said end thereof, a bending member carried by the corresponding end of the shaft for bending the cross tie links around the projected portion of the bar and chain links, and a die for pressing the bent portions of the cross tie links down on said bending member when the bar is retracted and the bending member returned, to close the bent portions of the cross tie links on the chain links.

10. A machine of the character described comprising means for advancing a chain, a tubular guide through which the chain is advanced, said guide being slotted for the movement of portions of the chain links, a reciprocable bar slidable in the guide to be projected and retracted at one end of the guide, a tubular shaft rotatable around said guide, means for supplying cross tie links at said end of the guide, and a bending member carried by the shaft at said end of the guide to bend hooks in the cross tie links around the projected portion of said bar and the chain links.

11. A machine of the character described comprising means for advancing a chain, a tubular guide through which the chain is advanced, said guide being slotted for the movement of portions of the chain links, a reciprocable bar slidable in the guide to be projected and retracted at one end of the guide, a tubular shaft rotatable around said guide, means for supplying cross tie links at said end of the guide, a bending member carried by the shaft at said end of the guide to bend hooks in the cross tie links around the projected portion of said bar and the chain links, and a die for pressing cross tie link hooks closed against the bending member and around the chain links when said bar is retracted and the bending member returned.

12. A machine of the character described comprising a bar to be projected and retracted, a bending member mounted for turning movement to bend a cross tie link around the projected portion of the bar and a chain or other member extending along the bar, and a die for pressing the bent portion of the link closed around the chain or other member against the bending member when the bar is retracted and the bending member returned.

13. A machine of the character described including a die for closing a hook of a link, and a second die movable in advance of and yieldable relatively to the first named die to separate the side portions of the link and hold the link in position under pressure before the action of the first named die on the link.

14. A machine of the character described comprising a die operable for closing a hook on a link, and a second die movable with the first named die and having a wedge to enter the link and separate the side portions thereof, the second named die having a portion to bear on the link and hold it in place for the action of the first named die, and the dies being yieldable relatively for the action of the first named die while the second named die holds the link.

15. A machine of the character described including a reciprocatory die for closing a hook on a link, a second die pivoted to the first named die and having an offset wedge to enter the link and separate the side portions thereof, the second named die having shoulders to bear on said side portions of the link for holding the link in place during the action of the first named die on the link, and spring means between the dies for advancing the second named die relatively to the first named die and permitting yielding action between them when the shoulders bear on the link.

16. A machine of the character described comprising a member for bending terminals of a double wire, and means for separating the side portions of the wire, said member having means for preventing the separation of said terminals.

17. A machine of the character described comprising a rotary bending member for bending the terminals of a double wire into hooks, to form a link having a loop at one end and terminal hooks at the opposite end, and a wedge to enter the link for separating the side portions thereof, said member having means for preventing said terminal hooks from being separated by the action of the wedge in the link.

In testimony whereof I hereunto affix my signature.

GARY B. SMITH.