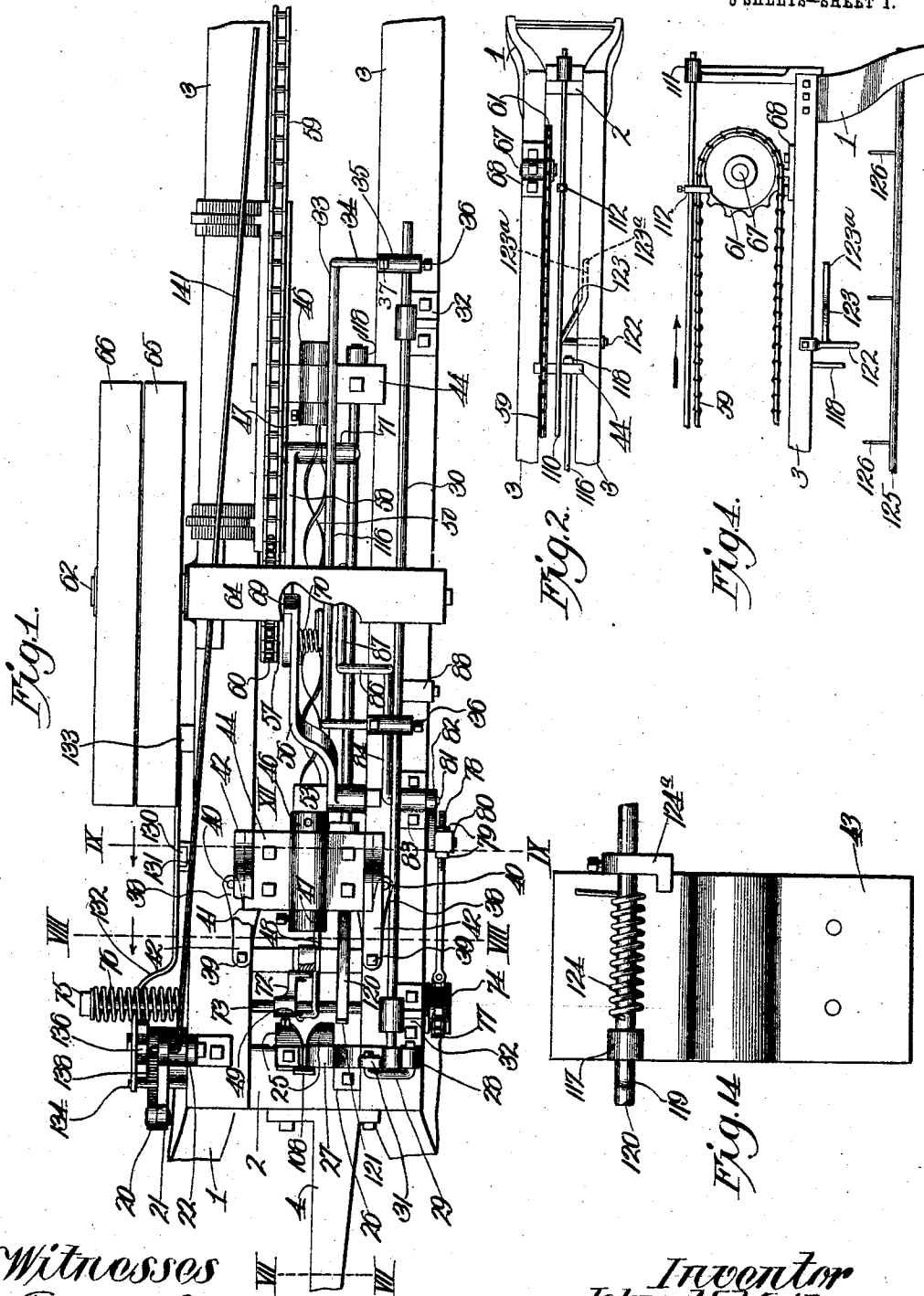


915,619.

Patented Mar. 16, 1909.

5 SHEETS—SHEET 1.



Witnesses
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 BALE TIE MACHINE.
 APPLICATION FILED AUG. 25, 1908.

915,619.

Patented Mar. 16, 1909.

6 SHEETS—SHEET 2.

Fig. 3.

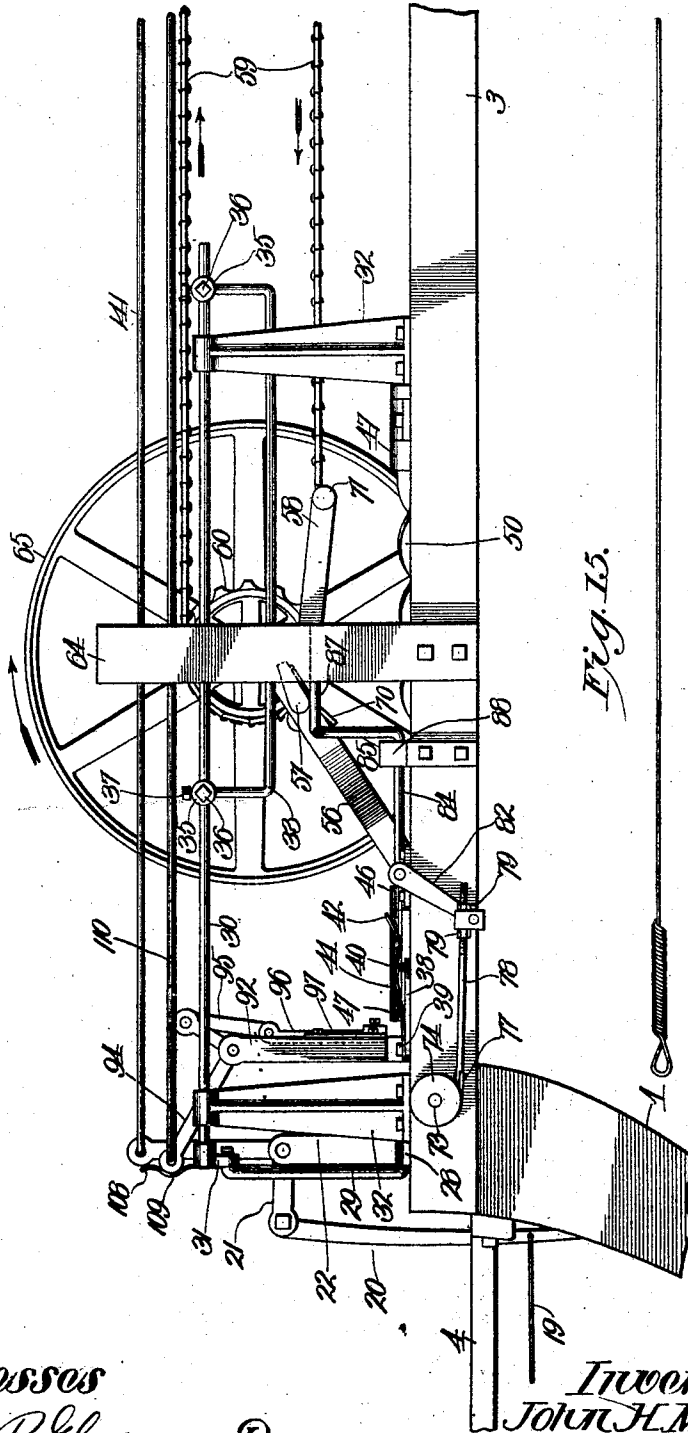


Fig. 15.

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5 SHEETS—SHEET 3.

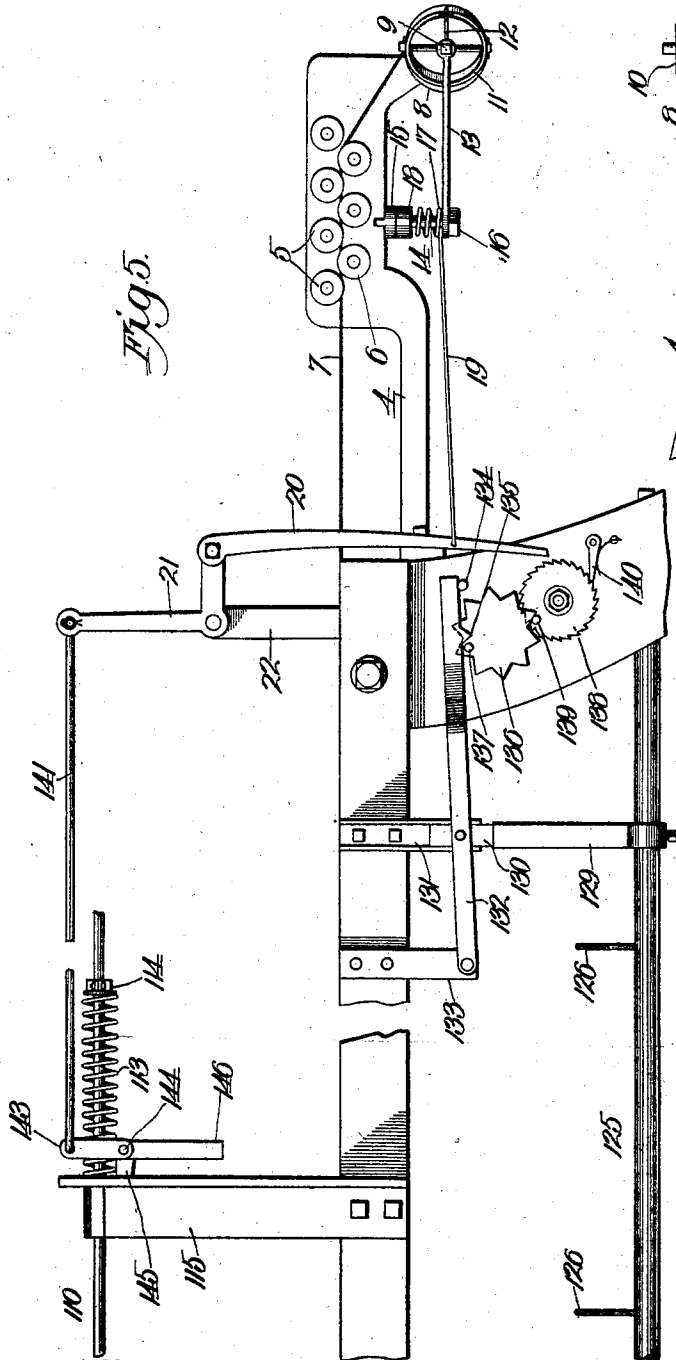


Fig. 5.

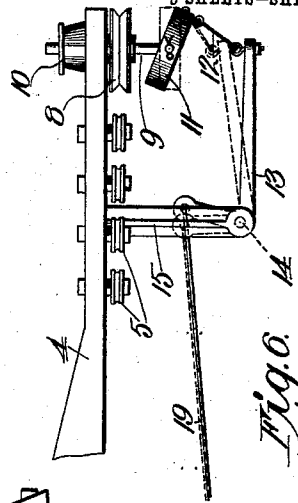


Fig. 6.

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915,619.

Patented Mar. 16, 1909.
 5 SHEETS—SHEET 5.

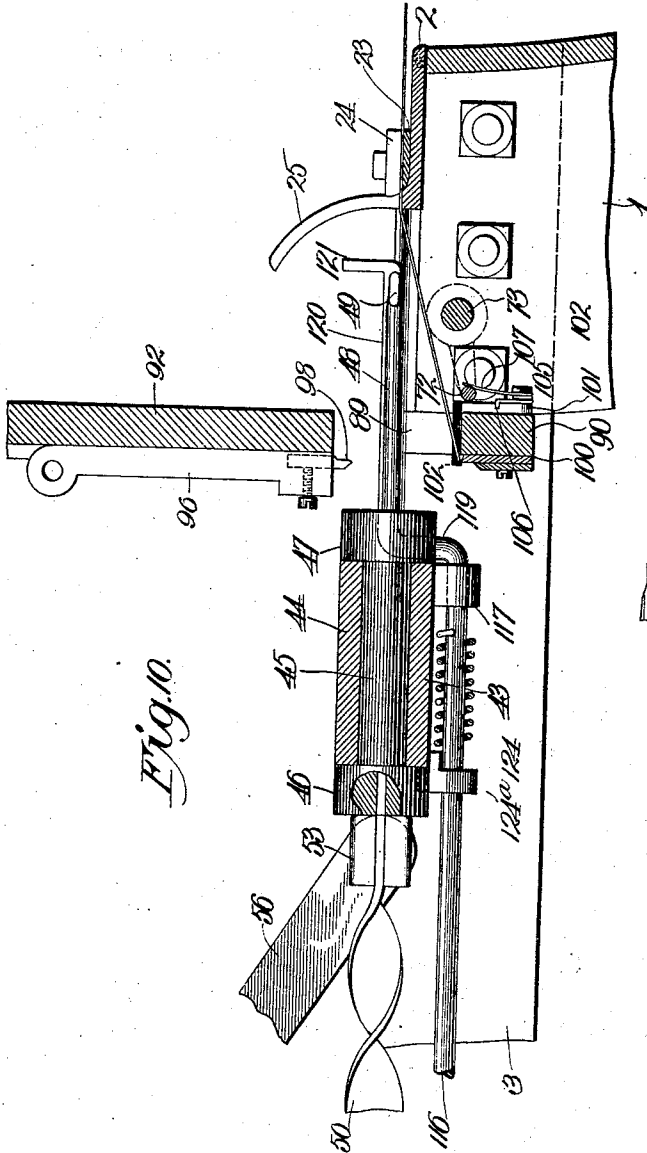


Fig. 10.

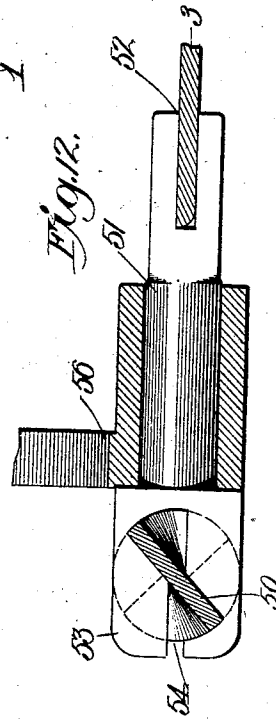


Fig. 12.

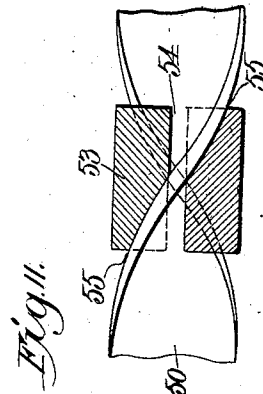


Fig. 11.

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UNITED STATES PATENT OFFICE.

JOHN H. MEIK, OF FREDONIA, KANSAS, ASSIGNOR TO ALVAH M. GRIFFIN, OF FREDONIA, KANSAS.

BALE-TIE MACHINE.

No. 915,619.

Specification of Letters Patent.

Patented March 16, 1909.

Application filed August 25, 1908. Serial No. 450,230.

To all whom it may concern:

Be it known that I, JOHN H. MEIK, a citizen of the United States, residing at Fredonia, in the county of Wilson and State of Kansas, have invented certain new and useful Improvements in Bale-Tie Machines, of which the following is a specification.

This invention relates to bale-tie machines, and has for its object to produce a bale-tie machine which will operate efficiently and reliably and which is of simple, strong, durable and comparatively inexpensive construction.

With this and other objects in view as hereinafter appear, the invention consists in certain novel and peculiar features of construction and organization as hereinafter described and claimed; and in order that it may be fully understood reference is to be had to the accompanying drawings, in which:—

Figure 1 is a top plan view of the front end of a bale-tie machine embodying my invention, with the knife-carrying standard in section. Fig. 2 is a plan view on a smaller scale of the rear end of the machine. Fig. 3 is a side view of the front end of the machine. Fig. 4 is a side view on a reduced scale, of the rear end of the machine. Fig. 5 is a side view of the opposite side of the front end of the machine. Fig. 6 is a plan view of the wire-straightening mechanism and also part of the counting mechanism. Fig. 7 is a vertical section on the line VII—VII of Fig. 1. Fig. 8 is a vertical section on the line VIII—VIII of Fig. 1. Fig. 9 is a vertical section on the line IX—IX of Fig. 1. Fig. 10 is a central vertical section of the front end of the machine, of the cutting and part of the twisting mechanism. Fig. 11 is a longitudinal section of one of the twisted-bar heads of the reciprocary carriage and also shows the twisted bar engaging the head. Fig. 12 is a cross sectional view of the twisted bar, the header for twisting the same, a part of the machine frame and a link to reciprocate the header and the carriage. Fig. 13 is a sectional perspective view of the knife-carrying standard, the jaws to hold the wire while being cut and a part of the folder. Fig. 14 is an inverted plan view of part of the carriage to

disclose more clearly the construction of the bale-tie throw-off device. Fig. 15 is a view of the completed bale-tie.

In the said drawings where like reference numerals indicate corresponding parts, 1 indicates a pair of similar leg-frames, 2 a pair of transverse plates mounted upon said leg-frames, and 3 a pair of parallel angle bars connecting and secured to the leg-frames and overlying by preference, the ends of plates 2.

4 indicates a bracket secured to the front leg-frame and projecting forwardly therefrom and journaled on said frame in the vertical plane of the center of the machine is a longitudinal series of rolls 5 and a second longitudinal series of rolls 6, the rolls of one series being staggered with respect to the rolls of the other series in order that as the wire 7 is drawn between said staggered series of rolls it will be straightened.

8 indicates a grooved wheel arranged in the vertical plane of rolls 5 and 6 and secured on a horizontal shaft 9 journaled in bracket 4 and the boss 10 thereof, and secured on said shaft is a wheel 11 pivotally connected by a link 12 with the horizontally-arranged bell-crank 13 pivoted on a pin 14 depending vertically from an arm 15 projecting laterally from bracket 4, a nut 16 engaging the lower end of pin 14 to hold the bell-crank thereon. A helical spring 17 is mounted on pin 14 above the bell-crank and presses at one end against the latter and at the other against a tension nut or collar 18 adjustably secured to the pin, the action of said spring being to hold wheel 11 as shown in Fig. 6.

In the operation of the machine the wire 7 passes over wheel 8 and revolves the same by frictional contact therewith, this revolution of said wheel resulting in causing wheel 11 through centrifugal force to swing out to the position shown by dotted lines in Fig. 6, and thus through the connections described rock the bell-crank 13. The bell-crank is pivotally connected by a link 19 to a pawl 20 pivotally pendent from an upright bell-crank 21, mounted upon a standard 22 erected upon the front end of the frame of the machine, said bell-crank 21 being adapted as hereinafter explained, to impart endwise movement to the pawl and the link 19 to swing the rear end of the said pawl rearward in order that such endwise movement shall re-

sult in operating certain mechanism hereinafter described.

23 indicates a stationary gripper secured upon the front cross bar 2, and provided in its upper side with a wire-guide groove 24 through which the wire is adapted to travel, said groove communicating with the space between a pair of upwardly and rearwardly curved horns 25 projecting from the rear edge of said plate in order to retain the wire in proper relation to said groove.

26 indicates a block secured to plate 2 at the opposite side of the same from standard 22, and pivoted to said block for movement in a vertical plane is an arched gripper 27, of such proportions that its free end normally is at one side of groove 24 and capable of moving downward into such groove so as to clamp the wire therein. To operate said gripper 27 it is provided with an arm 28 pivotally connected by a link 29 with a crank arm 31 of a longitudinally extending rock-shaft 30 journaled in a pair of standards 32 mounted upon the frame of the machine.

A normally vertically-pendent U-shaped crank 33 for said shaft is provided at the upper ends of its arms with outwardly projecting arms 34 fitting in sleeves 35 secured rigidly on the shaft 30 by set screws 36, set screws 37 being carried by the sleeves to engage arms 34 and thus clamp the U-shaped crank rigidly in position.

38 indicates a pair of stop-bars secured upon angle bars 3 near the front ends of the latter, by bolts 39 and pins 40, the latter projecting upwardly beyond the stop bars for a purpose which hereinafter appears, the said bars 38 being formed with rearwardly disposed shoulders 41 and flaring rearwardly from said shoulders.

42 indicates a pair of resilient plates or brakes overlying and projecting rearwardly beyond bars 38, and secured to the same and to the frame by the bolts 39, the said brakes being prevented by the upwardly projecting pins 40 from swinging outwardly beyond the position shown in Fig. 1, it being further noticed by reference to Fig. 3 that the rear ends of the brakes extend upwardly and rearwardly so as to form in conjunction with the angle-bars 3 flaring mouths, for a purpose which hereinafter appears.

A slidable carriage mounted on the angle bars to travel thereon, consists of front and rear lower plates 43 underlying the inwardly projecting arms of the angle bars and caps 44 overlying said arms of the angle bars and the front bar is of such proportion as to be capable of passing into the flaring mouths formed by the latter and said brakes and into the flaring mouths formed by the stop bars until arrested by the shoulders of the same, it being understood that said brakes impose sufficient friction upon the front bearing cap to prevent the same from striking the shoul-

ders with any considerable impact or force and to prevent rebounding movement of the carriage.

45 indicates short longitudinally-alined shafts journaled in the bearings of the slidable carriage and equipped with enlargements or heads 46, at their rear ends and with collars 47 at their front ends to guard against endwise movement in the bearings and clamped on the front shaft 45 by its collar 47 and projecting forward is a twister rod 48 terminating in a flattened former 49 projecting radially inward in order that the eye formed in the end of the wire as hereinafter explained, upon said twister rod, shall be elongated.

50 indicates a spirally twisted bar of uniform width and thickness and arranged in longitudinal alinement with said shafts and secured at its front end in the headed end 46 of the front shaft and at its rear end in the front end and collar 47 of the rear shaft, said bar having a sufficient number of twists to cause it as hereinafter explained, to rotate about two and three fourths revolutions, the ends of the spiral bar being disposed at right angles to each other, as shown clearly in Fig. 1, so that when the device which turns the spiral bar and thus effects the twisting operation, is engaged with the front end of said bar, the "former" on the twister rod shall be disposed horizontally, as shown in Fig. 1, and that when said device shall engage the rear end of said spiral bar it shall hold said end horizontally and thus hold the "former" of the twister rod depending. The said device consists of a cylindrical pin 51 provided with a bifurcation 52 at one end, receiving the horizontal arm of the adjacent angle bar, and with a head 53 at the other end provided with a horizontal bifurcation 54 to accommodate either of the flat ends of the spiral bar and with internal spiral grooves 55 opening into the bifurcation 54 to accommodate the twisted portion of said bar, and in order to move said device longitudinally and thus rotate the spiral bar and the parts rigid therewith in one direction or the other accordingly as the said device is moving toward the rear or front end of the machine, I pivotally mount a link 56 upon the pin 51 as shown most clearly in Figs. 1 and 12, the opposite end of the link being pivoted to a headed pin 57 rigidly secured to and projecting rearwardly from a link 58 pivotally connected to an endless chain 59 engaging sprocket wheels 60 and 61. The sprocket wheel 60 is secured on the inner end of a short shaft 62, journaled in the hub-portion 63 of an arch 64 erected upon the machine frame, and mounted upon the outer end of said shaft are fast and loose belt wheels 65 and 66 respectively. The sprocket wheel 61 is journaled on a stub shaft 67 carried by a bearing standard 68 mounted upon the machine-frame near its rear end.

In practice the belt wheels are driven in the direction indicated by the arrow, Fig. 3, and thus move the chain as indicated by the arrow adjacent thereto. When the link 58 is moving rearwardly it first imparts rotary movement to the twisting mechanism by pulling the pin 51 rearward from the front to the rear end of the spirally twisted bar and then carries said bar and the parts connected thereto rearwardly, the rotary movement of the bar effecting the twisting of the wire to complete the eye or loop in its end as hereinafter explained, and the longitudinal movement of the bar drawing the wire rearwardly through the machine. The forward movement of said link which occurs after it travels down around the sprocket wheel 61, results in first reversing the rotation of the spirally twisted bar, through the travel of the bifurcated and grooved head 53 thereof and then effects forward movement of said twisted bar and the connected parts until they have attained their original positions as shown in Figs. 1 and 3. It will thus be seen that when moving rearwardly link 58 pulls upon link 56 and that in its opposite or return movement it pushes against said link, and in order to prevent said links from buckling at their pivotal point of connection downwardly beyond a certain plane at any time, or from buckling upward unduly when performing its pushing function, the link 56 is preferably projected upward beyond the pivot pin 57 and terminates in a flange 69, which overhangs link 58, this flange obviously preventing the pivotal point of connection between said links, dropping below the plane of the pivotal points of connection of link 56 with pin 51 and link 58 with the chain. To prevent the said links buckling upward when the link 58 is performing its pushing function, a helical spring 70 is mounted upon the headed pin and has one end hooked under link 56 and the other end secured to the head of said pin, this spring as explained prevents the links buckling upward but will yield to permit of the necessary pivotal operation which must occur when link 58 is rounding wheels 60 and 61. When rounding the former the links assume the positions indicated by the dotted lines in Fig. 3, at a certain period of the travel of link 58, during which period of course the lower end of link 56 remains fixed and the parts connected thereto are stationary. When the link 58 is rounding the rear sprocket 61, the parts referred to are also stationary except that link 56 is at the front end and operates pivotally to accommodate the changing positions of link 58. It will thus be seen that although link 58 is moving constantly the link 56 and the parts connected thereto are momentarily stationary at each end of their travel. As the link 58 travels upwardly around sprocket 36 it engages the crank arm 33 that is to say,

the anti-friction roller 71 journaled on the end of the pivot pin uniting the chain and said link engages said crank arm and forces the same upward and thus rocks shaft 30 and through the instrumentality of crank arm 31 and link 29 forces the gripper 27 down upon the wire running through groove 24 so as to clamp the same rigidly on plate 23 preliminary to the formation of the eye or loop at the front end of the wire, it being understood that the wire at such time lies under the "former" of the twister rod and over the angular folder 72 secured rigidly on and forming a crank of the transverse shaft 73 journaled in the frame of the machine and equipped at one end with a grooved drum 74 and at the other end with a nut 75, and mounted upon said shaft and secured in any suitable manner at one end to said nut and at the other to the machine frame is a spring 76 for a purpose which presently appears.

77 is a chain engaging the grooved drum and secured to the same at one end and at the other to a longitudinally extending rod 78. Adjustably secured upon said rod by means of nuts 79 is a block 80 pivotally connected to the lower end of the crank arm 82 of a rock shaft 81 journaled in a bearing 83 secured to the machine frame, said shaft being provided with a rearwardly projecting crank arm 84 terminating in a double crank arm, consisting of an upwardly projecting portion 85, an inwardly projecting portion 86 and a rearwardly projecting portion 87, the last-named portion being adapted to be engaged by an anti-friction roller 71 hereinafter described in the forward movement of the same and pushed upward as said roller travels upwardly around sprocket wheel 60 with the chain, being pushed upward against the resistance of a spring 88 secured to the machine frame for the purpose of guarding against accidental pivotal movement of the shaft 81, said spring being of such form that it will yield likewise to downward movement of crank 84, effected through the action of spring 76, as hereinafter explained, the upward movement of said double crank arm rocks shaft 81 which imparts rearward endwise movement to rod 78 through the medium of drum 74, and chain 77 turns rock shaft 73 about one hundred and eighty degrees against the resistance of the torsional spring 76 so as to cause the folder 72 to bend the end of the wire upwardly and forwardly over the "former" of the twister rod and down into the groove of plate 23, this action immediately preceding the action already described of gripper 27, which as will be readily understood, presses the doubled or bent-back portion of the wire tightly down against the body portion underlying it in said groove. Immediately after the bent-back end of the wire is thus clamped to its body portion the link 58 completes its up-

ward movement around sprocket wheel 60 and traveling rearward with the chain swings link 56 downward until the flange 69 of the latter strikes the upper edge of link 58, the continued movement of the chain and link thus causing head 53 to travel rearwardly upon and rapidly revolve the spirally-twisted bar so as to cause the twister shaft and the twister pin to revolve and twist the beveled portions of the wire together and complete the formation of the eye or loop therein. As this action is completed, the roller 71 clears the rear end of the crank 33, to permit said crank to gravitate back to its original position and thus reverse the rotation of rock shaft 30 and reelevate the gripper 27, it being understood that immediately after the gripper was caused to clamp the bent back portion of the wire against its body portion, the rollers 71 passed from under crank 87 to permit the spring 76 to return the folder and said crank thereof hereinbefore described, to their original positions. Immediately after the gripper 27 is reelevated as explained, the head 53 comes into engagement with the front end of the rear shaft of the carriage and the collar 47 thereon and pulls said carriage rearwardly, the "former" being instrumental in this movement in pulling the wire from a reel or coil, not shown, toward the rear of the machine, and as the front end of link 58 starts down around sprocket 61, the wire is severed by cutting mechanism constructed as follows:—89 indicates a casting, disposed at the underside and secured in any suitable manner to the inwardly projecting arms of angle bars 3, and embodying a depressed central portion 90, a quadrant-shaped portion 91 arching over the center of the depressed portion and an upwardly projecting standard 92 rising from the upper end of the arched portion 91, which standard is preferably bifurcated at its upper end at 93, to receive the bell-crank lever 94, pivotally connected by a link 95 with the vertically slidable bar 96 retained against the rear ends of the standard 92 by guides 97 secured to said standard, said slidable bar 96 being equipped at its lower end with a knife or cutting blade 98 having a segmental cavity 99 in its lower or cutting edge and underlying said blade is a stationary blade 100 secured to the depressed portion 90 of the casting, the parts being so arranged that when the knife is forced downwardly, its cutting edge will pass the upper edge of the blade 100 with a shearing action.

Secured to the front side of the depressed portion 90 of casting 89 is a stationary dog 101 provided with a tooth 102 extending longitudinally over said depressed portion and the stationary knife 100, and of quadrant-shape in cross section. Pivoted to the casting adjacent to arm 101, is a dog 103 capable of movement toward and from dog 101, said dog

103, being provided with a tooth 104 paralleling and adapted to contact with tooth 102.

105 is a coil spring mounted on the pivot of dog 103 and secured to the same at one end as at 106 and having its other end 107 flaring upwardly and forwardly from the dog, and when engaged by the folder 72 holding said dog with its tooth yieldingly against the tooth of the stationary dog. To hold the movable knife-blade of the cutting mechanism elevated, I employ a spring 108 which is secured to the grooved or stationary gripper jaw 23 and projects upwardly therefrom and is formed with a recess 109, to receive and yieldingly grip bell-crank 94, which bell-crank is pivoted to the front end of a rod 110 which extends longitudinally of the machine and through a suitable guide standard 111 erected upon the rear end of the frame thereof, and is provided with an adjustable depending arm 112 adapted to be engaged by the roller 71 as the latter arrives in its rearward travel opposite sprocket wheel 61. By this engagement, the rod is moved rearward and through the instrumentality of bell-crank 94 and link 95 forces the knife-carrying bar 96 downward and depresses the wire extending from the gripper mechanism longitudinally through the machine to the "former" at such time adjacent to the rear end of the machine, the front half of the depressed portion passing between the teeth of said dogs, the continued downward movement of the knife severs the wire leaving the portion forward of the knife clamped between the dogs. This longitudinal movement of the rod 110 occurs against the resistance of spring 113, interposed between an adjustable collar 114 on said rod, and a guide standard 115 for the rod which standard is preferably adjacent to the rear end of the machine, this spring immediately after the roller clears the depending arm 112 returns the rod 110 and the connected parts to their original positions.

Immediately after the wire is severed as explained, the eye or loop of the bale tie completed by the severing of the wire, is stripped off the "former" of the twister rod, the throw-off mechanism for accomplishing this purpose being constructed as follows:—116 indicates a rock shaft journaled in bearing lugs 117 depending from bearing plates 42 of the carriage and provided at its rear end with a depending crank 118 and at its front end with an upwardly projecting crank 119 from which projects forwardly an arm 120 equipped with a normally upwardly projecting crank 121 adapted at times to swing downwardly and inwardly past the "former" when the latter is projecting downward, to throw or strip the eye or loop of the bale-tie downwardly therefrom.

122 indicates a J-shaped bracket secured rigidly to and depending from one side of the

framework near its rear end, the hook-portion of the bracket projecting inwardly and terminating in an oblique or inclined arm 123 and a straight extension 123^a thereof, the inclined arm being in the path of the crank arm 118 depending from the rear end of rock shaft 116, which crank arm, in the rearward movement of the carriage, passes over the bridge or lower portion of the J-shaped bracket and comes into engagement with the oblique or inclined arm 123 thereof and is swung outwardly thereby, and is maintained in such position by the extension 123^a until shortly after the return movement of the carriage begins. The outward movement of said crank arm causes the rock shaft to operate and swing its double-cranked front end inwardly and downwardly to cause the crank 121 to perform the stripping or throw-off function referred to. The rock-shaft is operated against the resistance of a coiled torsion spring 124 mounted upon it and secured at one end to said shaft and at the other bearing against the adjacent part of the carriage which spring returns the rock-shaft to its original position shortly after the carriage is started on its return travel occasioned by the link 58 rounding the rear sprocket wheel 61, as will be readily understood, it being noticed in this connection that the angle arm 124^a of shaft 116 by contact with the carriage limits the return movement of shaft 116 so as to insure the proper disposition of the crank 121 to reliably strip or throw from the "former" the eye or loop of the next bale-tie completed.

As the bale tie is completed as explained by the severing of its rear end and is freed by the tripping of its eye or loop from the "former" it drops down upon the underlying crank arms 126, of the longitudinal rock-shaft 125 journaled in the leg portion of the machine frame and provided with a weighted arm 127 which normally holds said rock-shaft with its crank arms disposed as shown in Figs. 5 and 7, said rock-shaft also having a short arm 128 to engage one of the end arms to limit rotatable movement imparted to said shaft by the weighted arm. The shaft is also provided with a longer arm 129, which is normally disposed outward of and against the slide-plate 130 mounted in a guide 131 depending from the machine frame, said slide-plate being adapted to prevent the rock-shaft from operating prematurely under the weight of the bale ties as they accumulate upon the arms 126. The slide-plate 130 is pivotally connected to a lever 132 fulcrumed on a hanger 133 of the machine frame and having its front or free end limited as to downward movement by the pin 134 projecting outward from the adjacent leg frame, the free end of said lever being provided with a depending V-shaped tooth 135 and bowed outwardly so that at its free end said tooth

shall overlap a star or toothed wheel 136 journaled on said leg frame, said wheel by preference having ten teeth and an outwardly projecting pin 137 for engagement with the V-shaped tooth 135 once in each revolution for the purpose of raising the free end of the lever and therewith withdrawing the slide plate 130 from the path of arm 129 of rock-shaft 125.

138 is a ratchet wheel journaled on the leg frame and overlapped slightly by the toothed wheel 136 and provided with a pin 139 for engagement with one of the teeth of said wheel 136 once in each revolution, to turn said wheel one step, a spring-actuated dog 140 carried by the leg frame guarding against accidental rotation of the ratchet wheel.

141 is a link pivotally connecting the upper end of crank arm 21 with the upwardly projecting crank arm 143 of the rock shaft 144 journaled in the bar 145 carried by standard 115, the inner end of said rock shaft 144 being equipped with a depending crank 146 which is engaged and pushed rearwardly by the roller 71 on its rearward travel, this action taking place while the wire is being drawn through the machine and consequently while the pawl 20 is being held in position to engage the ratchet wheel 138, so that as said pawl is forced downward through the connections between it and arm 146, it will rotate wheel 138 one step. It will thus be seen that said wheel is rotated one step with each bale tie made and that each tie is completed and drops upon the arms 126 shortly after it is thus counted. Ten complete revolutions of the ratchet wheel impart one complete revolution to wheel 136, which once in each revolution trips slide plate 130 from the path of arm 129 and thus permits each bunch of two hundred and fifty bale ties deposited upon arm 126 to automatically rock shaft 125 and fall upon the floor or into any suitable receptacle (not shown) placed to receive them.

From the above description it will be apparent that I have produced a bale tie machine possessing the features of advantage enumerated as desirable and I wish it to be understood that I do not desire to be restricted to the exact details of construction shown and described as obvious modifications will suggest themselves to one skilled in the art.

Having thus described the invention what I claim as new and desire to secure by Letters-Patent, is:—

1. In a bale-tie machine, the combination of a rotatable "former" to overlie the front end of a bale-tie wire, a folder to bend the end of such wire back over the "former", grippers to clamp the bent-back end and the body portion of the wire together, means to withdraw the folder to its original position after the wire is thus gripped, a spirally-

twisted bar movable with the "former", and longitudinally-movable means for rotating the twisted bar to cause the "former" to twist the body portion and bent-back portion of the wire together to form an eye or loop in the wire around the "former."

2. In a bale-tie machine, the combination of a rotatable "former" to overlie the front end of a bale-tie wire, a folder to bend the end of such wire back over the "former", grippers to clamp the bent-back end and the body portion of the wire together, means to withdraw the folder to its original position after the wire is thus gripped, a spirally-twisted bar movable with the "former", longitudinally-movable means for rotating the twisted bar to cause the "former" to twist the body portion and bent-back portion of the wire together to form an eye or loop in the wire around the "former", and means to effect the release of the wire from the grippers.

3. In a bale-tie machine, the combination of a rotatable "former" to overlie the front end of a bale-tie wire, a folder to bend the end of such wire back over the "former", grippers to clamp the bent-back end and the body portion of the wire together, means to withdraw the folder to its original position after the wire is thus gripped, a spirally-twisted bar movable with the "former", longitudinally-movable means for rotating the twisted bar to cause the "former" to twist the body portion and bent-back-portion of the wire together to form an eye or loop in the wire around the "former", means to effect the release of the wire from the grippers, and a carriage carrying the twisted bar and "former" and adapted to be moved longitudinally by the twisted-bar-operating means as it ceases to rotate the twisted bar and the wire is released by the grippers.

4. In a bale-tie machine, the combination of a rotatable "former" to overlie the front end of a bale-tie wire, a folder to bend the end of such wire back over the "former", grippers to clamp the bent-back end and the body portion of the wire together, means to withdraw the folder to its original position after the wire is thus gripped, a spirally-twisted bar movable with the "former", longitudinally-movable means for rotating the twisted bar to cause the "former" to twist the body portion and bent-back portion of the wire together to form an eye or loop in the wire around the "former", means to effect the release of the wire from the grippers, a carriage carrying the twisted bar and "former" and adapted to be moved longitudinally by the twisted-bar-operating means as it ceases to rotate the twisted bar and the wire is released by the grippers, and a cutting mechanism to sever the wire after the carriage has completed its travel in one direction.

5. In a bale tie machine, the combination

of a rotatable "former" to overlie the front end of a bale-tie wire, a folder to bend the end of such wire back over the "former", grippers to clamp the bent-back end and body portion of the wire together, means to withdraw the folder to its original position after the wire is thus gripped, a spirally-twisted bar movable with the "former", longitudinally-movable means for rotating the twisted bar to cause the "former" to twist the body portion and bent-back portion of the wire together to form an eye or loop in the wire around the "former", means to effect the release of the wire from the grippers, a carriage carrying the twisted bar and "former" and adapted to be moved longitudinally by the twisted-bar-operating means as it ceases to rotate the twisted bar and the wire is released by the grippers, a cutting mechanism to sever the wire after the carriage has completed its travel in one direction, and means to strip or throw the eye or loop of the wire off the "former."

6. In a bale-tie machine, the combination of a rotatable "former" to overlie the front end of a bale-tie wire, a folder to bend the end of such wire back over the "former", grippers to clamp the bent-back end and the body portion of the wire together, means to withdraw the folder to its original position after the wire is thus gripped, a spirally-twisted bar movable with the "former", longitudinally-movable means for rotating the twisted bar to cause the "former" to twist the body portion and bent-back portion of the wire together to form an eye or loop in the wire around the "former", means to effect the release of the wire from the grippers, a carriage carrying the twisted bar and "former" and adapted to be moved longitudinally by the twisted-bar-operating means as it ceases to rotate the twisted bar and the wire is released from the grippers, a cutting mechanism to sever the wire after the carriage has completed its travel in one direction, means to strip or throw the eye or loop of the wire off the "former", a counting mechanism, and a longitudinally-movable means for operating the counting mechanism for each bale-tie made.

7. In a bale-tie machine, the combination of a rotatable "former" to overlie the front end of a bale-tie wire, a folder to bend the end of such wire back over the "former", grippers to clamp the bent-back end and the body portion of the wire together, means to withdraw the folder to its original position after the wire is thus gripped, a spirally-twisted bar movable with the "former", longitudinally-movable means for rotating the twisted bar to cause the "former" to twist the body portion and bent-back portion of the wire together to form an eye or loop in the wire around the "former", means to effect the release of the wire from the

grippers, a carriage carrying the twisted bar and "former" and adapted to be moved longitudinally by the twisted - bar - operating means as it ceases to rotate the twisted bar and the wire is released by the grippers, a cutting mechanism to sever the wire after the carriage has completed its travel in one direction, means to strip or throw the eye or loop of the wire off the "former", a counting mechanism, a longitudinally-movable means for operating the counting mechanism for each bale tie made, a rock shaft provided with arms to catch the bale-ties as they fall from the "former" and the cutting mechanism, movable means holding the rock-shaft in normal position until its arms support a predetermined number of bale-ties, means for tripping said rock-shaft when it is supporting such number of bale-ties to permit the ties to operate the shaft and fall from the arms thereof, and means to return the rock shaft to its original position after such discharge of the bale-ties is effected.

8. In a bale-tie machine, a suitable frame, a slidable carriage mounted thereon for movement longitudinally thereof, a shaft journaled in the carriage and provided with a twister rod terminating in a "former" standing at an angle to the rod, a twisted bar longitudinally alined and rotatable with said shaft and having its end portions disposed at right-angles to each other, and a head to reciprocate on the twisted bar to rotate the same, and when it engages the front end of said twisted bar to hold the "former" in a horizontal position and when it engages the rear end of the twisted bar to hold the "former" in a pendent position.

9. In a bale-tie machine, a suitable frame, a slidable carriage mounted thereon for movement longitudinally thereof, a shaft journaled in the carriage and provided with a twister rod terminating in a "former" standing at an angle to the rod, a twisted bar longitudinally alined and rotatable with said shaft and having its end portions disposed at right angles to each other, and a head slidably mounted on the twisted bar and frame, an endless conveyer, and a foldable coupling between said head and endless conveyer and consisting of a pair of links pivotally connected together and one of them pivoted to said head and the other to said endless conveyer.

10. In a bale-tie machine, a suitable frame, a slidable carriage mounted thereon for movement longitudinally thereof, a shaft journaled in the carriage and provided with a twister rod terminating in a "former" standing at an angle to the rod, a twisted bar longitudinally alined and rotatable with said shaft and having its end portions disposed at right angles to each other, a head slidably mounted on the twisted bar and frame, an endless conveyer, a foldable coupling be-

tween said head and endless conveyer and consisting of a pair of links pivotally connected together and one of them pivoted to said head and the other to said endless conveyer, and a spring tending to depress said links at their pivotal point of connection.

11. In a bale-tie machine, a suitable frame, a slidable carriage mounted thereon for movement longitudinally thereof, a shaft journaled in the carriage and provided with a twister rod terminating in a "former" standing at an angle to the rod, a twisted bar longitudinally alined and rotatable with said shaft and having its end portions disposed at right-angles to each other, a head slidably mounted on the twisted bar and frame, a driven sprocket wheel rotating around a horizontal axis, a second sprocket wheel suitably journaled to rotate around a horizontal axis, an endless chain connecting said sprocket wheels, a foldable coupling between the said chain and head, and consisting of a pair of links pivoted together, and one pivoted to the head and the other to the chain, and one engaging the other to limit downward movement at their pivotal point of connection, and yielding means to resist upward movement of said links at the pivotal point of connection.

12. In a bale-tie machine, a suitable frame, a carriage slidably mounted thereon and consisting of a front and a rear member, a pair of alined shafts journaled in said members, a twisted bar rigidly connecting said shafts, a head mounted to reciprocate on said twisted bar, and means to cause the head to travel rearwardly on and incidentally rotate the twisted bar and eventually engage the front end of the rear member of the carriage and slide the same rearwardly on the frame, and then reverse its movement and slide forwardly upon the twisted bar to rotate the latter in the opposite direction and then eventually engage the rear end of the front member of the carriage and move the latter forwardly.

13. In a bale-tie machine, a suitable frame, a carriage slidably mounted thereon and consisting of a front and a rear member, a pair of alined shafts journaled in said members, a twisted bar rigidly connecting said shafts, a head mounted to reciprocate on said twisted bar, means to cause the head to travel rearwardly on and incidentally rotate the twisted bar and eventually engage the front end of the rear member of the carriage and slide the same rearwardly on the frame, and then reverse its movement and slide forwardly upon the twisted bar to rotate the latter in the opposite direction and then eventually engage the rear end of the front member of the carriage and move the latter forwardly, and means to arrest the forward movement of the carriage at a predetermined point.

14. In a bale-tie machine, a suitable frame, a carriage slidably mounted thereon and consisting of a front and a rear member, a pair of aligned shafts journaled in said members, a twisted bar rigidly connecting said shafts, a head mounted to reciprocate on said twisted bar, means to cause the head to travel rearwardly on and incidentally rotate the twisted bar and eventually engage the front end of the rear member of the carriage and slide the same rearwardly on the frame, and then reverse its movement and slide forwardly upon the twisted bar to rotate the latter in the opposite direction and then eventually engage the rear end of the front member of the carriage and move the latter forwardly, means to arrest the forward movement of the carriage at a predetermined point, and resilient means to prevent rebounding movement of the carriage when it is arrested.

15. In a bale-tie machine, a suitable frame, a carriage slidably mounted thereon and consisting of a front and a rear member, a pair of aligned shafts journaled in said members, a twisted bar rigidly connecting said shafts, a head mounted to reciprocate on said twisted bar, a driven endless conveyer operating in a vertical plane, and a foldable coupling to operate in a vertical plane connecting the conveyer with said head and consisting of a pair of links pivotally connected together and to said head and conveyer, and one of them arranged to engage the other to limit downward movement at their pivotal point of connection and a spring tending to force them upward at said point.

16. In a bale-tie machine, a suitable frame, a slidable carriage mounted for longitudinal movement upon said frame, a twister rod carried by and extending longitudinally of the carriage and provided with a "former" adapted to depend from said rod when the carriage occupies its rearmost position on the frame, a rotary throw-off device journaled on the carriage and provided with a depending arm at its rear end, and a bracket carried by the frame and provided with an oblique portion to engage and rock said arm to cause the throw-off to strip the eye or loop of a bale-tie from the depending "former."

17. In a bale-tie machine, a suitable frame, a slidable carriage mounted for longitudinal movement upon said frame, a twister-rod carried by and extending longitudinally of the carriage and provided with a "former" adapted to depend from said rod when the carriage occupies its rearmost position on the frame, a rotary throw-off device journaled on the carriage and provided with a depending arm at its rear end, a bracket carried by the frame and provided with an oblique portion to engage and rock said arm to cause the throw-off to strip the eye of a bale-tie from the depending "former", and means

to return the throw-off device to its original position after its arm becomes disengaged from said bracket.

18. In a device of the character described, a suitable frame, a cutting mechanism carried thereby and comprising a stationary knife and a vertically movable knife, a dog having a tooth overlying said stationary knife, a pivoted dog having a tooth also overlying said stationary knife, a spring secured to the pivoted dog at one end, a folder engaging the other end of said spring to press the tooth of the pivoted dog toward the tooth of the stationary dog, and means to cause the movable knife to move downward and press an underlying wire between the teeth of said dogs and sever it upon the underlying stationary knife.

19. In a machine of the character described, a suitable frame, a cutting mechanism carried thereby and comprising a stationary knife and a vertically movable knife, a dog having a tooth overlying said stationary knife, a pivoted dog having a tooth also overlying said stationary knife, a spring secured to the pivoted dog at one end, a folder engaging the other end of said spring to press the tooth of the pivoted dog toward the tooth of the stationary dog, means to cause the movable knife to move downward and press an underlying wire between the teeth of said dogs and sever it upon the underlying stationary knife, a rotatable twister rod having a laterally projecting "former" overlying said wire near and forward of said dogs, and means to cause the folder to swing upward to remove the yielding pressure of the pivoted dog from the wire, and then engage said wire and bend it up around and forwardly over said "former."

20. In a machine of the character described, a suitable frame, a reciprocatory carriage mounted thereon, comprising two members equipped with aligned shafts, a flat bar, comprising non-twisted end portions disposed at right angles to each other, and a twisted intermediate portion, rotatable with and connecting said shafts, a head having a bifurcation at one end slidably engaging said frame and a bifurcation at the other end to engage either of the non-twisted portions of said twisted bar and formed with spiral grooves opening into said bifurcations for engagement with the twisted portion of said bar, and means to reciprocate said head for the purpose of imparting rotation to said twisted bar and said shafts.

21. In a bale tie machine, the combination of a "former" underlying the end of a bale-tie wire, a transverse shaft journaled in the machine frame, an angular folder projecting from said shaft below the end of said wire rearward of the "former," a torsion spring to hold said shaft with the "former" yieldingly depressed, a doubled crank rod pivoted at

its front end on the frame, a crank arm depending from said rod, a rod adjustably connected to said crank arm, a drum rigid on said shaft, a flexible connection engaging and secured to said drum at one end and to said adjustable rod at the other, a driven endless conveyer, and means movable therewith and adapted when moved forwardly to engage the free or rear end of said double crank and raise the same and thereby impart rocking movement to the said shaft to cause the folder to swing upwardly and forwardly and bend the overlying end of the wire upwardly and forwardly around the "former."

22. In a bale tie machine, a suitable frame, a stationary gripper mounted thereon and provided in its upper side with a longitudinal groove and at its rear end with a pair of upwardly and rearwardly extending horns, a pivoted gripper, a longitudinal shaft suitably journaled and provided at its front end with a crank arm, a link pivotally connecting said crank arm with the pivoted gripper, a depending crank having outwardly projecting arms connected to said rock shaft, an endless driven conveyer, and means movable with said conveyer and adapted to press upwardly against said depending crank to raise the

same and thereby rock said shaft and cause said pivoted gripper to move downward for the purpose of clamping the body portion and bent-back portion of the bale-tie wire into the groove of the stationary gripper.

23. In a bale-tie machine, a suitable frame, a shaft suitably journaled forward of said frame and provided with a grooved wheel to be rotated by the frictional engagement therewith of the bale-tie wire as it is drawn through the machine, a wheel rotatable with and bearing a pivoted relation to said shaft, a counting mechanism embodying a ratchet wheel, a pivoted pawl to be moved downward once for each bale-tie formed, a bell-crank suitably pivoted and pivotally linked to said pawl, means for holding the pawl yieldingly forward of the periphery of the ratchet wheel, and a link pivotally connecting the opposite end of said bell-crank with said pivoted pawl.

In testimony whereof I affix my signature, in the presence of two witnesses.

JOHN H. MEIK.

Witnesses:

RAYMOND O. BERNAUER,
HENRY KITSMILLER.