

June 24, 1924.

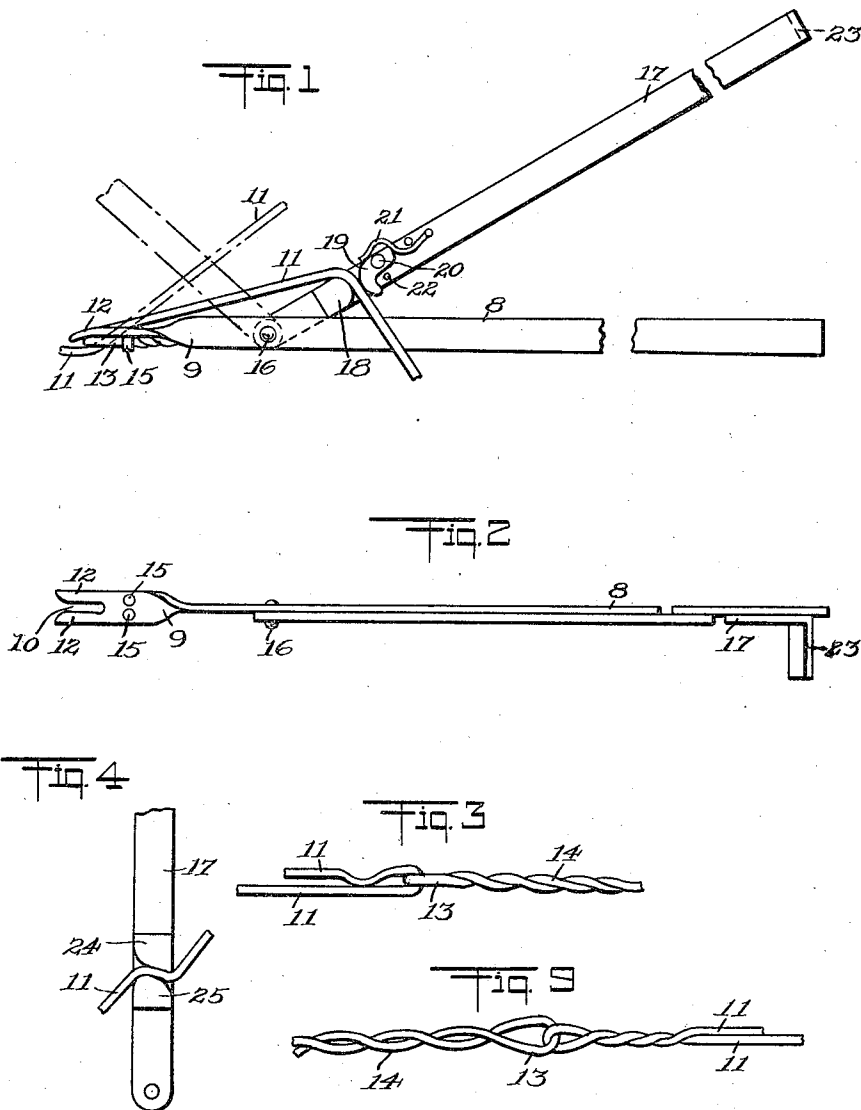
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L. CAMPBELL

METHOD OF APPLYING BALE TIES

Filed Sept. 8, 1922

4 Sheets-Sheet 1



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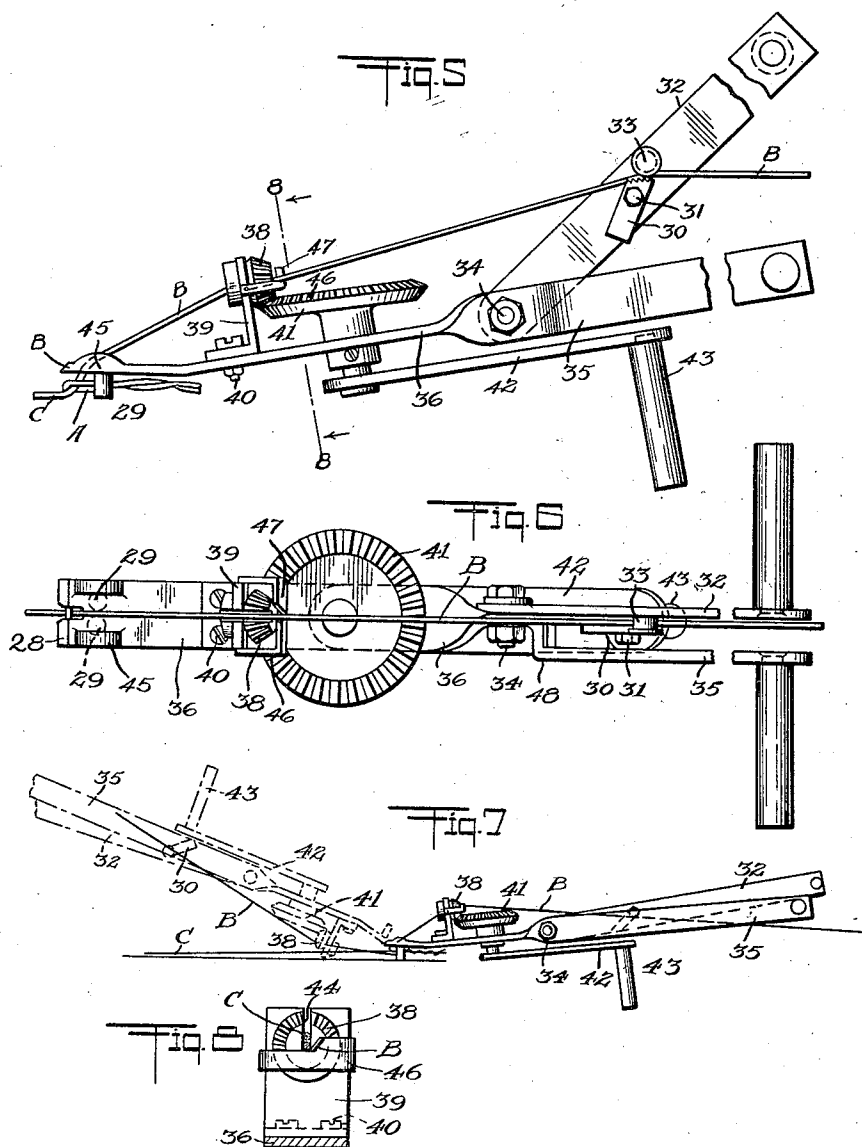
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4 Sheets-Sheet 2



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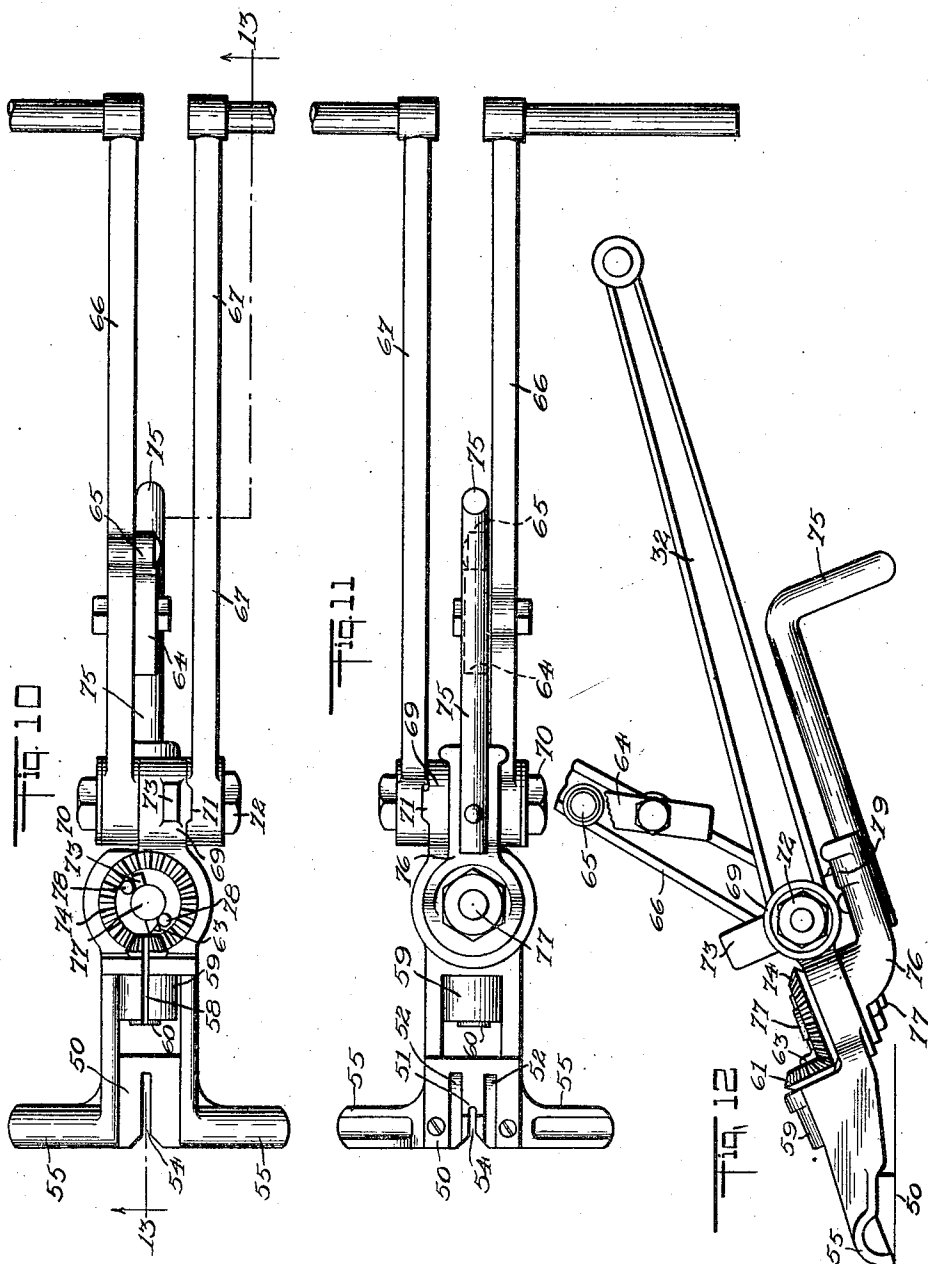
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METHOD OF APPLYING BALE TIES

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4 Sheets-Sheet 3



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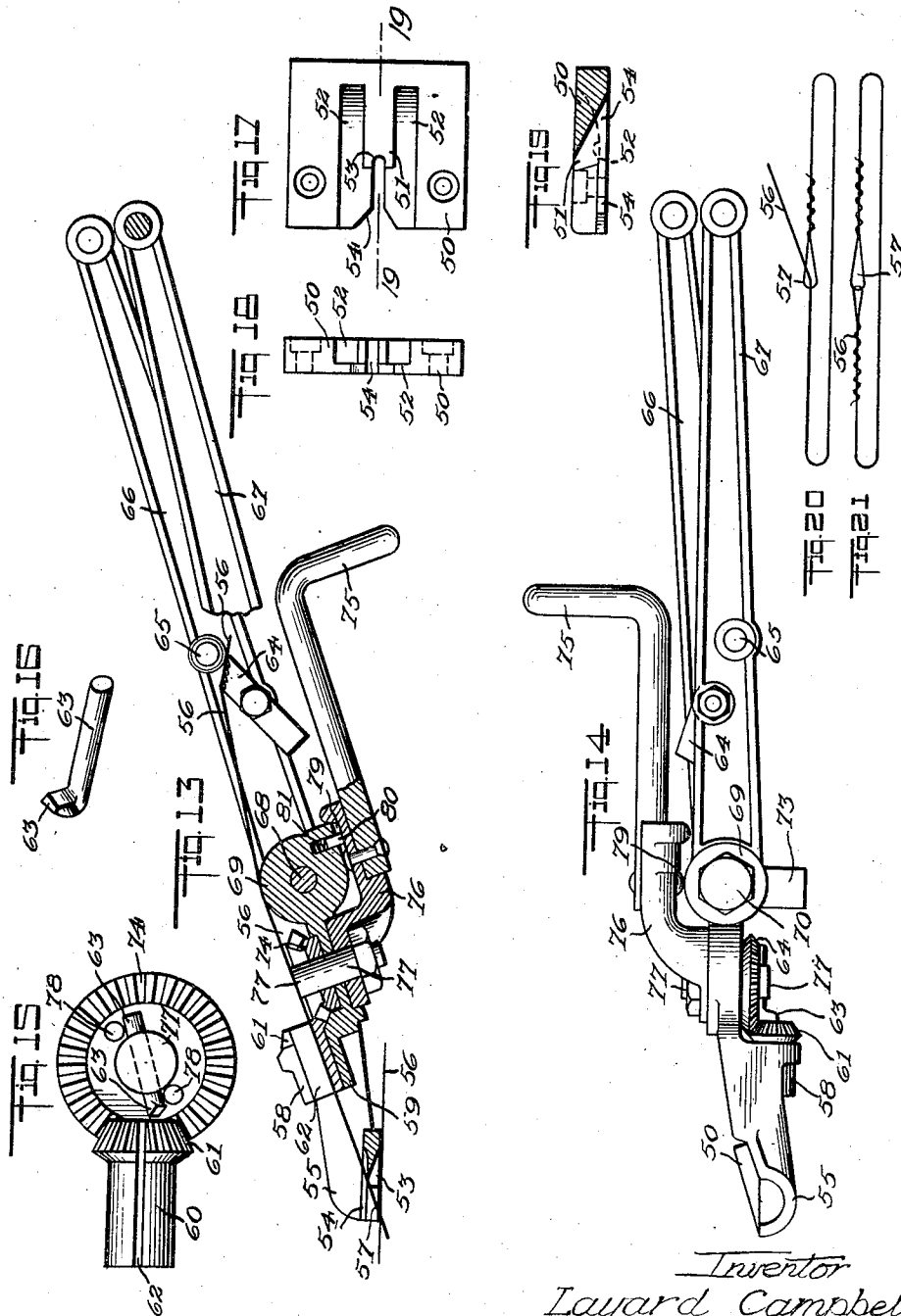
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METHOD OF APPLYING BALE TIES

Filed Sept. 8, 1922

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE.

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TWIST SEAL COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF DELAWARE.

METHOD OF APPLYING BALE TIES.

Application filed September 8, 1922. Serial No. 587,015.

To all whom it may concern:

Be it known that I, LAYARD CAMPBELL, a citizen of the United States, and resident of New York city, in the county of New York and State of New York, have invented a certain new and useful Improvement in Methods of Applying Bale Ties, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

The present invention relates to improvements in the method of applying bale ties, and particularly to that class of tool which is employed in connection with bale wire straps.

Among the principal objects which the present invention has in view are: To tighten the wire in service; to provide a tie for the straps which cannot easily be released; to automatically finish the operation of strapping by cutting the surplus wire from the main portion thereof at the completion of the tightening operation; to dispose the cut end of the wire in such position as to avoid lacerating the hands or tearing the clothes of operators and others; and to construct a light and workable tool.

Other features and advantages will appear from time to time, as the description of the invention progresses, reference being had to the accompanying drawings in which—

Figure 1 is a side view of a tool of the character mentioned, constructed and arranged in accordance with the present invention, showing in conjunction therewith fragments of a bale wire held by the tool in operative relation;

Figure 2 is a bottom view of the same, the fragments of bale wire being omitted;

Figure 3 is a view showing two end fragments of the bale wire, disposed in the relation formed by the operation of the tool;

Figure 4 is a detail view showing a modified form of holding device for drawing up the wire;

Figure 5 is a side elevation of an alternative form of tool incorporating wire twisting means;

Figure 6 is a plan view of same;

Figure 7 is a view indicating the operative positions assumed by the tool at the beginning and completion of the sealing operation.

Figure 8 is a cross section taken as on the line 8—8 of Figure 5;

Figure 9 is a view showing the completed knot resultant from the operation of the form of the invention disclosed in Figures 5 to 8 inclusive;

Figures 10 to 21 show another form of tightening tool;

Figure 10 is a top view of the tool;

Figure 11 is a bottom plan view of the same;

Figure 12 is an elevation of a portion of the tightening lever being cut away;

Figure 13 is a longitudinal section, the section being taken on the line 13—13 of Figure 10;

Figure 14 is a side elevation of a tool in service position after having completed its function;

Figure 15 is a detail view showing the wire twisting and cutting mechanism;

Figure 16 is a detail view showing the cutter;

Figure 17 is a detail view showing the foot plate employed for holding the loop provided on the wire strap;

Figure 18 is an edge view of the same;

Figure 19 is a longitudinal section taken on the line 19—19 of Figure 17;

Figure 20 is a diagrammatic view of a wire strap showing the initial position of the free end of the said strap to the loop with which it is provided; and

Figure 21 is a similar view showing the free end of the said strap as twisted about the adjacent portion of the strap at the completion of the operation of the said tool.

Heretofore bale wires have been secured to packing cases, boxes and other cartons, by tools of various shape and construction, which have been faulty in several particulars. They have been too heavy, and have been unwieldy in operation. Also objection has been found to the complication of construction and to the cost of the former tools.

In the present invention, a claw bar 8 is furnished preferably formed from a bar of metal, the end 9 of which is twisted as seen in the drawings, to a plate perpendicular to the plane of the extension of said bar. The end 9 of the bar is bifurcated to form the open end slot 10. The slot 10 is adapted to receive the bale wire 11, when

the tines 12 of the claw bar are extended over the loop 13 of the bale wire.

The bale wires are furnished each with a loop 13, formed by twisting the end of the wire back upon itself. The free end of the bale wire is passed through the loop after the bale wire has been loosely adjusted around a bale or package. It is then that the tool herein described is brought into operation by placing the tines 12 of the claw bar above the loop 13 and by passing the free end of the bale wire 11 to the inner end of the slot 10. In this position it will be found the twisted section 14 of the bale wire, adjacent the loop 13, extends between the pins 15, which are projected from the under side of the end 9 of the claw bar. In practice, the pins 15 rest against the sides of the loop 13 at the inner end thereof.

Pivotally mounted on the claw bar 8, by means of a pivot pin 16, is a lever 17. The lever 17 is preferably constructed of the same material as the claw bar 8, and is provided with a gripping block 18, and dog 19. The dog 19 is provided with teeth or serrations on the lower edge, to frictionally engage the wire 11. The dog 19 has a pivot 20, on which it turns when drawn by the wire 11. Normally the dog is held away from the block 18 by a release spring 21, which presses the dog 19 against the stop pin when the dog is not engaged by the wire 11.

The free end of the lever 17 is bent to form a handle 23, as best seen in Figure 2 of the drawings. The operator employs the handle 23 to rock the lever 17 forward from the position shown in full lines in Figure 1 to the position indicated by dotted lines therein. In this position it will be seen the dog 19 being held open by the spring 21, the free end of the wire 11, which has been extended through the loop 13 and slot 10 is easily placed between the block 18 and the dog 19. The operator now manually depresses the dog 19, until it engages firmly the wire 11.

In this position, the lever 17 is drawn toward the position shown by full lines in Figure 1. In the inauguration of this movement of the lever 17, the dog 19 grips the wire 11, and holds the same rigidly, the grip thereon increasing with the strain on the wire imparted by the lever 17.

After the dog 19 has become firmly engaged with the wire 11, the operator holds the bar 8 with the one hand, while forcefully drawing the lever with the other hand, until the desired stress or strain has been imparted to the wire 11. During the operation of drawing the free end of the wire 11 through the loop 13, the loop 13 is held stationary by the pins 15, so that when the bale wire is sufficiently tightened

the loop 13 is in the position assumed thereby at the beginning of the operation.

The wire 11 having been drawn tight, the operator now holding the lever 17 firmly lifts the bar 8, and rocks the same on the tines 12, and the loop 13, until the lever 17 has carried fully over to lay on the bale or package. In doing this it will be found the free end of the wire 11 has been drawn tightly around and lapped over the loop 13, to the position substantially as shown in Figure 3 of the drawings.

In this position the strain on the wire 11 is not sufficient to straighten the said wire.

To insure against accident, the operator now grips the surplus material from the free end of the wire 11, and sets the end thereof down, either passing it under the adjacent extension of the wire 11, or returns the same back against the loop 13, forming a complete wrap thereabout.

While I have herein described the dog 19 as having a toothed surface for engaging the wire 11, the same result may be attained by providing the teeth on the block 18, and furnishing the dog 19 with a free edge.

In Figure 4 of the drawings a modified form of the invention is shown, the modification consisting in providing the lever 17 with two stationary blocks, 24 and 25. The blocks 24 and 25, as shown, are disposed in spaced relation, the said blocks being removed from each other to form a passage therebetween, wherein the operator may place the wire 11 when the lever 17 is disposed in the position shown by dotted lines in Figure 1.

After the wire has been placed in the passage between the blocks 24 and 25, the wire is manually bent or snubbed around the sharp edge of the block 24, to prevent the wire slipping when the strain of drawing the same is imparted by the lever 17. As the lever 17 is rocked on its pivot to the position shown in full lines in Figure 1, the bite of the wire over the rear edge of the block 25 holds the same in conjunction with the block 24 as rigidly as it would be held by the dog 19.

The tool herein described may be constructed of as light a material as the employment permits. The tool is, therefore, as light as may be commensurate with the strength required. By removing the pin 16 the bar 8 and lever 17 may be separated, and packed in close relation, thereby reducing the size of the packet, and avoiding the discomfort of an otherwise awkwardly shaped packet.

In the modified form of the tool shown in Figures 5 to 8, the point 28 is bifurcated, as in the former tool, in advance of the studs 29. As in the former tool, the studs 29 hold the loop A of the strap, while the free end

B thereof is being drawn through the loop A, to tighten the strap on the carton or package. The free end is primarily held by a dog 30, which is pivoted on the pin 31 extended from the side of the take-up lever 32. The dog 30 has a serrated end which grips the wire and holds the same against the stud 33 set out from the side of the lever 32.

In the present tool provision is made for twisting the free end B of the strap on the body of the strap adjacent to the loop A, for the purpose of forming a second loop on the so-called free end of the wire. This loop when formed prevents the free end of the wire from loosening or straightening out, so that there is no danger of pulling through the loop A. Also provision is made for severing the free end to rid the same of the surplus material which may result from the use of straps which are of over length. The wires are twisted primarily by means of a slotted gear pinion 38. The pinion 38 has a bearing in a bracket standard 39, which is made fast as by the bolt 40 to the flattened sections 36 of the bar 35. The flattened section 36 is bored to form a bearing for the beveled gear wheel 41 which is meshed with the pinion 38. A crank 42 is employed for rotating the gear wheel 41 and the pinion 38. To this end the crank is furnished with the handle 43. As shown best in Figure 8, of the drawings, the slot 44 in the said pinion extends from the perimeter thereof past the center thereof. The distance to which the said slot is cut past the said center is equal to one and one-half times the diameter of the wire on which the strap is made. As hereinafter explained, the purpose of so forming the slot is to permit the free end of the wire being sheared or severed without endangering the body of the wire around which the free end is then twisted.

The ratio between the pinion 38 and the wheel 41 is such that the pinion 41 is revolved the necessary number of turns to the one complete revolution of the wheel 41, and the relation further provides that when the crank 42 is parallel with the bar 35, the slot 44 is perpendicular to the section 36 with the open end of the slot uppermost. This is the natural position for the crank 42 when the loop A of the strap is primarily placed between the studs 29. As the strap is placed loosely in position on the package before the tool is brought into operation, the free end B is passed between the studs 29. As the free end is placed between the dog 30 and the stud 33 the body of the said free end naturally drops into the slot 44 in the pinion 38, and through the opening provided therefor at the upper edge of the bracket 39. With the wires so disposed the lever 32 is shifted forward, rocking on the bolt 34 to engage the free end B as far forward as the operation suggests or permits.

With the tool then braced against the loop A and the loop A being held by the studs 29, the lever 32 is drawn back, the dogs A gripping the wire, so that the full force of the lever is exerted to draw the free end B through the loop A, through the slot in the point 28, and through the slot 44 in the pinion 38, seating the wire firmly in the bottom of the said slot.

When the strap has been drawn sufficiently tight the tool is turned over on the point 28, as shown in Figure 7 of the drawings, where the full line representation of the tool is the position assumed thereby when the wire has been tightened, and the broken lines in the figure show the position assumed by the tool when overturned upon the point 28 and upon the rockers 45. The rockers 45 operate to lift the body of the strap from the package as shown in Figure 6 of the drawings, and dispose the wire within the slot 44, when the end of the bracket 39 rests on the package.

It will now be observed that the handle 43 of the crank 42 is upturned, and in position to be easily engaged by the operator, who, holding the lever 32 and bar 35 with one hand in the overturned position, grasps the handle 43, and revolves thereby the wheel 41, and the pinion 38. As the pinion 38 revolves, it picks up the body of the strap and draws the same to the center of the pinion 38, where it continues to remain while the free end B of the wire is being twisted thereabout. During three-quarters of the first revolution of the pinion 38, the free end B is held taut by the dog 30, and the lever 32. During the further rotation of the pinion 38, the wire forming the free end B is severed by the cutter bar 46, the cutting edge 47 whereof is disposed in the path of the wire forming the free end B, and out of the path of the body wire C of the strap. The cutter bar 46 is a square loop which is rigidly mounted upon the bracket 39. After the surplus material of the free end B has been severed, the pinion 38 continuing to revolve, twists the remainder of the free end B about the body of the wire C, making a substantial and perfect seal, which is not in danger of becoming detached to pull through the loop A.

When the crank 42 has completed a cycle, and assumed its initial position, it will be found that the slot 44 is in position to permit the wire C and free end B twisted about the same to be delivered from the said pinion. The tool is then rocked back to the position shown by full lines in Figure 6 of the drawings, and the studs 29 are drawn backward out of engagement with the loop A, the sealing of the strap having been completed.

As seen best in Figure 6 of the drawings, the hand bar 35 is offset from the lever 32

by the bracket extension 48. The offset thus formed is provided to allow the passage of the stud 33 and dog 30 when the lever 32 is disposed in juxtaposed parallel relation to the bar 35. While I have found the bar 35 a helpful feature, it is not essential to the complete operation of the tool. In some instances it is preferred to sever the bar 35 adjacent the bolt 34, and between the said bolt and the offset bracket 48. It is found that the tool may be readily manipulated when using the crank 42 and the lever 32 for this purpose. It is obvious that after the tool has been set to engage the loop A and free end B, the hand bar 35 performs almost no function that cannot as well be performed by the crank 42, to wit, the overturning of the tool to the position shown by broken lines in Figure 7 of the drawings.

The tool shown in Figures 10 to 19 operates to hold the looped end of the bale wire while first drawing taut the wire on a carton or package to be shipped, and then tying the free end of the wire on the loop and then removing the superfluous wire from the strap. To this end the tool is provided with a foot plate. The plate 50 is best shown in Figures 17 to 19 inclusive, where is shown the spur 51 formed by cutting the slots 52 in the plate 50 at opposite sides of the spur 51. The forward end of the spur 51 is inclined backwardly to provide a hook-like structure for engaging the loop in the bale wire. The front edge of the spur 51 has a groove 53 to hold the free end of the bale wire when passed there-through. The groove 53 is coincident with the open flared end slot 54 to guide the tool over the wire when the tool is rolled on the nose pieces 55 with which the body of the tool is provided.

As seen best in Figures 10 and 19, the slot 54 is extended backward from the end of the spur 51 to afford a passageway for the loose end wire 56 when the same is drawn through the loop 57 of the wire 56. The slot 54 aligns with the slot 58 formed in the housing 59 provided for the elongated shank 60 on the end of which is rigidly mounted a bevel pinion 61. The shank 60 and pinion 61 have a slot 62 cut lengthwise thereof extending to below the axis of said shank and pinion a distance approximately equal to the thickness of the wire 56. The width of the slots 54, 58, and 62 is substantially the same as the diameter or gage of the wire 56, hence whenever two sections of wire are disposed in the said slots, one of the said sections is removed from the center of the pinion 61 in the path of the severing end of the cutter 63. In practice this is generally the section of wire known as the free end and which in service is held taut by the ratchet jaw 64 and the bolster block

65 which is mounted on the tightening lever 66.

The tightening lever 66 is pivotally mounted on the handle 67 by means of the pivot bolt 68. The bolt 68 binds the handle 67 on the body 69, said bolt having a head 70 which draws the recess in the handle 67 over the lug 71 in the side of the body 69 whenever the nut 72 is tightened. The body 69 also has mounted thereon a resting stub 73 which in conjunction with the nose pieces 55 supports the tool in the position shown in Figure 14 of the drawings, which is that assumed by the tool at the moment of severing the waste end of the wire 56.

In Figure 20 there is shown on diminutive scale, a wire strap in the initial stage of forming the tie where the free end 56 of the bale wire has been passed loosely through the loop 57 thereof. When operating in conjunction with the tool herein described, it will be understood that the spur 51 of the tool extends into and is engaged by the loop 57, while the free ends 56 extend through the loop and the slots 54, 58 and 62 to be engaged by the jaw 64 and the bolster 65 when the lever 66 is thrown to the forward position shown in Figure 12 of the drawings. In Figure 21 the same parts of the wire are disclosed as in the position assumed at the completion of the operation of the tool, the free end 56 having been overturned to form a second loop which engages the loop 57 and twist about the body of the wire to hold the same intact.

The twist formed by the tool as above referred to is performed by the pinion 61 which is rotated on the bearing of the shank 60 within the housing 59. It is preferred that the bevel gear wheel has a ratio to the pinion 61 which provides two complete revolutions of the pinion 61, for one complete revolution of the wheel 74. At the time when the pinion 61 is rotated the free end of the wire 56 and the body of the wire adjacent to the loop 57 rests within the slot 62 in the shank 60 and pinion 61. As the slot is narrower than the combined diameters of the two sections of wire, the said sections are compelled one to wrap on the other in correspondence with the rotation of the said shank and pinion.

As above mentioned the free end 56 of the wire is first laid in the bottom of the slot 62 and extends beyond the axial center of the said shank and the pinion 61, therefore, the free end referred to is carried on and twisted about the body of the wire forming the twisted section shown in Figure 21 of the drawings.

To rotate the wheel 74 it is operatively connected with the handle 75 and the handle head 76. The head 76 has rigidly mounted thereon a stub shaft 77, the upper end whereof extends above the body of the

wheel 74 and is perforated to hold the cutter 63. The cutter 63 engages upstanding pins 78, set in the wheel 74, and thereby imparts the rotation to the said wheel from the handle head 76. It will be noted that by means of this construction the shock and strain on the wire 56 is not borne by the wheel 74 but is transmitted direct to the head 76 and handle 75 during the operation of severing the waste end of the wire.

It has been found advantageous to rotate the wheel 61, two and a half revolutions, the last half revolution being imparted after the waste end of the wire has been severed. The result of the continuation of the revolution of the pinion 61 is that the severed end of the wire 56 is carried beneath or to the underside of that section of the wire around which it is wound. The result of this operation is that the sharp or jagged end of the severed portion of the wire is disposed out of harm's way in close juxtaposition to the cover or package which is being strapped. It is also essential in order that the shank 60 and pinion 61 may be freed from the wire after the same has been twisted that the wheel 74 and pinion 61 be reversely rotated for the said half revolution so that the slot 62 may be placed in alignment with the slot 58 in the housing 59, in which position the tool may be removed from engagement with the wire which will pass through the said slots out of engagement with the said tool.

To provide a definite stop for the wheel 74 and pinion 61, the handle head 76 has a lug 79 which is engaged by a spring operated latch pin 80 mounted in a shank provided in the body 69 for the spring 81 and the said pin. The normally advancing side of the lug 79 is inclined to ride under the pin 45 and to remove the same from the path of the said lug. As soon as the lug has passed, the pin resumes its normal position against the back of the head 76 and in the path of the square shoulder formed at the back of the lug 79 when the said lug is retractively rotated. The direct result of this action is that when the lug 79 is engaged with the pin 80, the slots 58 and 62 are aligned.

When provided with a tool constructed and arranged as herein shown and described the operation of strapping a shipping carton or other package is as follows: A bale wire strap such as shown in Figure 20 of the drawings is extended about the package to be strapped, and the free end 56 thereof is extended through the loop 57 with which the said strap is furnished. The tool is then addressed to the wire by placing the spur 51 within the loop 57 and by drawing the free end 56 of the wire through the slots 54, 58 and 62, and between the bolster 65 and the jaw 64, the lever 66 having

swung forward towards the engaged end of the tool as far as the possibilities of the construction and the needs of the operation demand.

The slack of the wire on the package may be now taken up with the tool resting in the position as shown in Figure 12 of the drawings by rocking the lever 66, the jaw 64 gripping the wire of the forward rocks of the lever 66 to draw the same forward by the frictional engagement imparted by the said jaw and the bolster 65 on the said lever. When the wire has been drawn sufficiently tight on the box or package, the lever 66 and the handle 67 are drawn to the parallel relation shown best in Figure 13 of the drawings. The tool is then rocked forward to carry the handle 67 away from the operator or from the position shown in Figure 13 of the drawings to the position shown in Figure 14 of the drawings where the tool rests on the nose pieces 55 and the resting stub 73. It will now be found that when the tool is rocked over the section of the wire adjacent or forming part of the free end 56 and adjacent, the loop 57 has been disposed in the slots 54 and 62 and rests in the slot 62 at the axial center of the shank 60 and pinion 61. In reversing the tool in the manner described it will be found that the handle 75 has been drawn to the uppermost position shown in Figure 14 of the drawings where it is free to be manipulated by the operator who then turns the handle one and a half complete revolutions at the end of which he reverses the handle until the movement is arrested by the engagement of the lug 79 with the pin 80.

It will be observed that during the complete revolution of the handle 79 around the center of the shank 77, the pinion 61 and sections of wire contained therein have been revolved two complete revolutions, or the free end 56 of the wire 56 has been twisted twice about the body of the said wire and that due to the further half revolution of the pinion 61 the severed end of the free end 56 has been turned beneath the body of the wire in juxtaposed relation to the box or package being prepared for transportation.

I do not limit myself to the particular embodiments of my invention herein shown and described, as I appreciate that my invention may be variously modified without departing from the scope of the invention covered by the appended claims.

What I claim is new and desire to secure by Letters Patent of the United States is:

1. The method of applying a bale tie having a loop at one end which consists, first, in extending the tie around a bale or the like, second, passing the unlooped end of the tie through the loop, third, placing said tie under tension by drawing the unlooped end thereof through the looped end with the aid of a tightening tool having one end con-

formed to engage said loop, fourth, turning said tool in the plane of the tie while maintaining the tie under tension and without disengaging the tool from the loop to turn the untwisted tie end back upon itself, and, fifth, twisting the adjacent portions of the untwisted tie end together to form a second loop while utilizing the tool to prevent rotation of the portions of the untwisted tie end immediately adjacent to the first-mentioned loop by engagement of the tool therewith, and simultaneously utilizing the tool to maintain the tie under tension until the twisting operation has so far progressed that the tie will remain under tension unaided by said tool.

2. The method of applying a bale tie having a loop at one end which consists, first, in extending the tie around a bale or the like, second, passing the unlooped end of the tie through said loop, third, placing said tie under tension by drawing the unlooped end thereof through the looped end thereof with the aid of a tightening tool having one end conformed to engage said loop, fourth, turning said tool in the plane of the tie while maintaining the tie under tension and without disengaging the tool from the loop to turn the untwisted tie end back upon itself, and, fifth, utilizing the tool to twist the adjacent portions of the untwisted tie end together to form a second loop while utilizing the tool to prevent rotation of the portions of the untwisted tie end immediately adjacent to the first-mentioned loop by engagement of the tool therewith and simultaneously utilizing the tool to maintain the tie under tension until the twisting operation has so far progressed that the tie will remain under tension unaided by said tool.

3. The method of applying a bale tie having a loop at one end which consists, first, in extending the tie around a bale or the like, second, passing the unlooped end of the tie through said loop, third, placing said tie under tension by drawing the unlooped end

thereof through the looped end with the aid of a tightening tool having one end conformed to engage said loop, fourth, turning said tool in the plane of the tie while maintaining the tie under tension and without disengaging the tool from the loop to turn the untwisted tie end back upon itself, and, fifth, utilizing the tool to twist the adjacent portions of the untwisted tie end together to form a second loop while simultaneously utilizing the tool to prevent rotation of the tie and also to maintain the tie under tension until the twisting operation has so far progressed that the tie will remain under tension unaided by said tool.

4. The method of applying a bale tie having a loop at one end which consists, first, in extending the tie around a bale or the like, second, passing the unlooped end of the tie through said loop, third, placing said tie under tension by drawing the unlooped end thereof through the loop with the aid of a tightening tool adapted to engage the said unlooped end, fourth, utilizing the said tool to turn the untwisted tie end back upon itself, fifth, twisting the adjacent portions of the untwisted tie end together to form a second loop while utilizing the tool to prevent rotation of the portions of the untwisted tie end immediately adjacent to the first-mentioned loop by engagement of the tool therewith and simultaneously utilizing the tool to prevent rotation of the untwisted tie end by engagement thereof immediately adjacent to the first mentioned loop, and, finally, removing the excess portion of the tie by severing it intermediate the second loop and a band on said tie engaged and held by said tool.

In witness whereof, I hereunto subscribe my name this 29th day of August, 1922.

LAYARD CAMPBELL.

Witnesses:

E. F. MURDOCK,

M. R. SEARS.