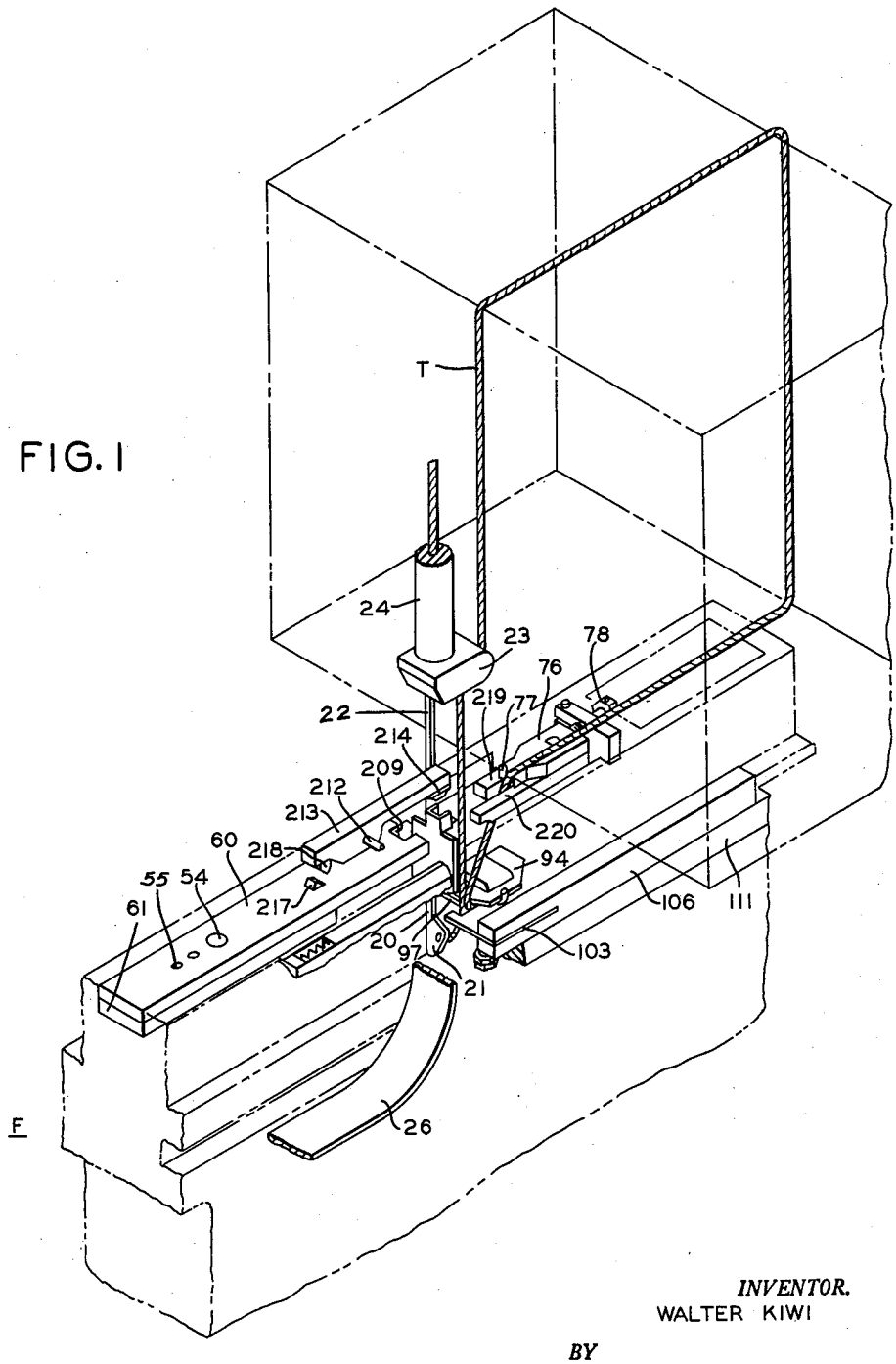
Jan. 1, 1963 W. KIWI 3,070,929

APPARATUS FOR APPLYING A CORD IN ENCIRCLING RELATION TO AN ARTICLE

Filed Feb. 20, 1961 5 Sheets-Sheet 1

FIG. 1



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APPARATUS FOR APPLYING A CORD IN ENCIRCLING RELATION TO AN ARTICLE

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FIG. 2

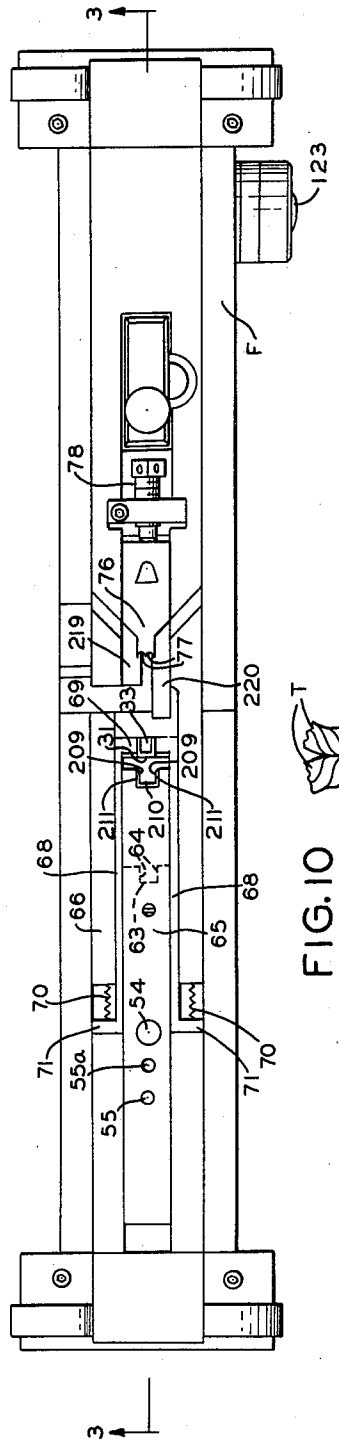


FIG. 5

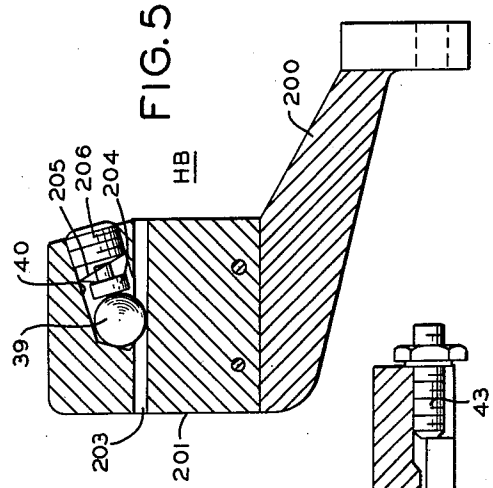


FIG. 10

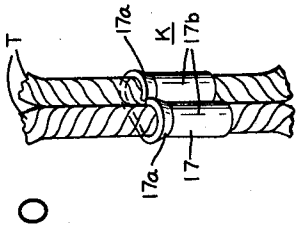
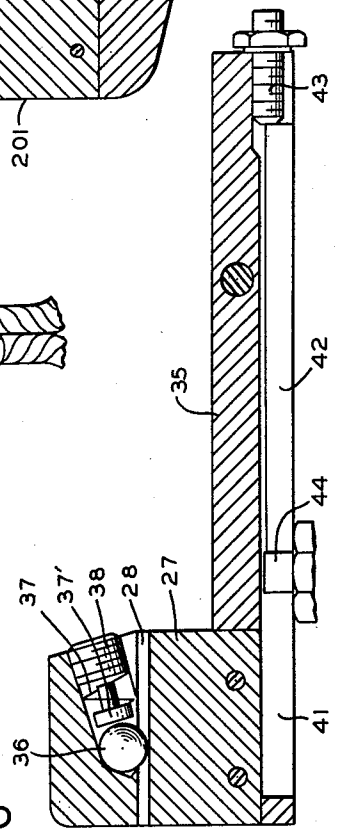


FIG. 6



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APPARATUS FOR APPLYING A CORD IN ENCIRCLING RELATION TO AN ARTICLE

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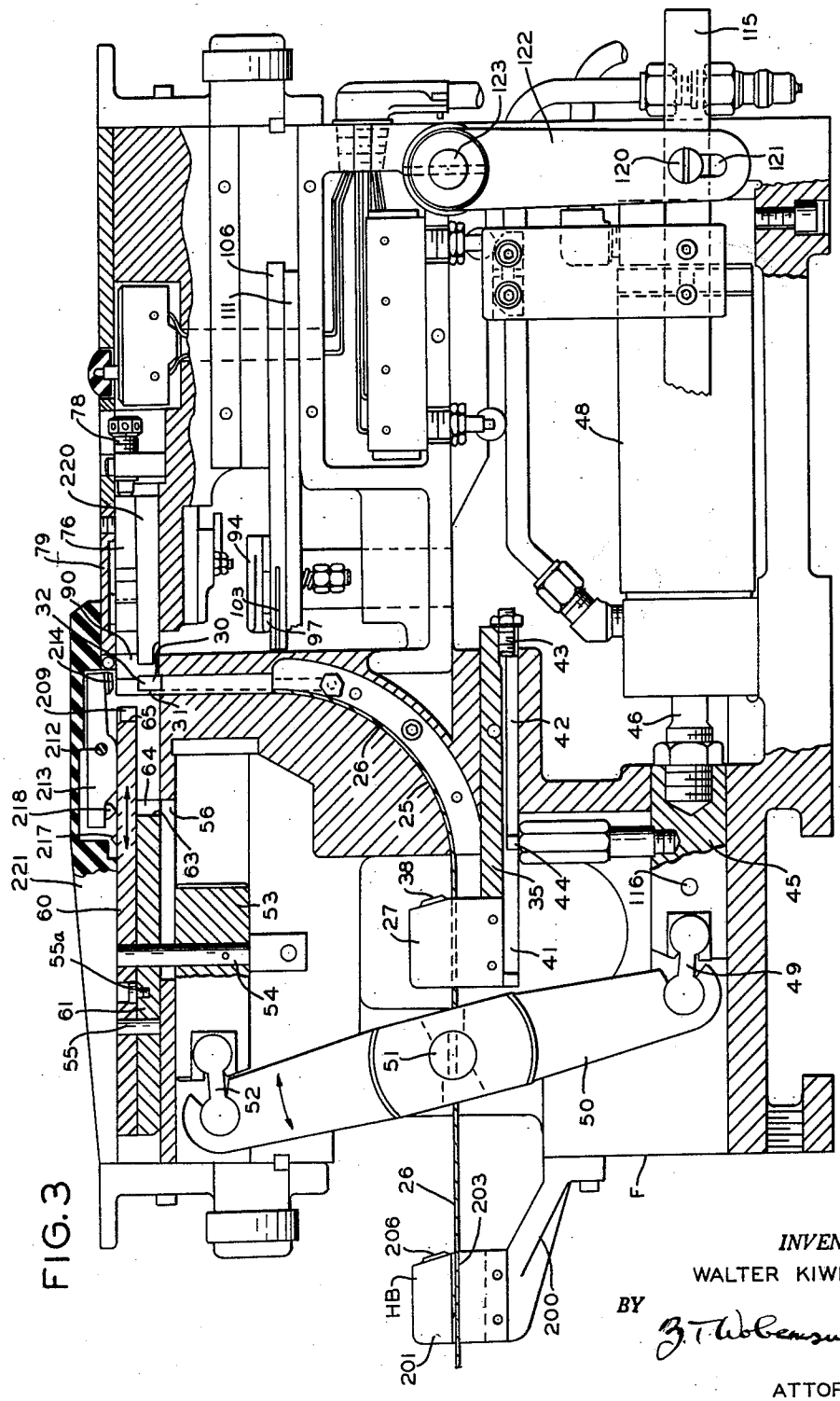


FIG. 3

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APPARATUS FOR APPLYING A CORD IN ENCIRCLING RELATION TO AN ARTICLE

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FIG. 7

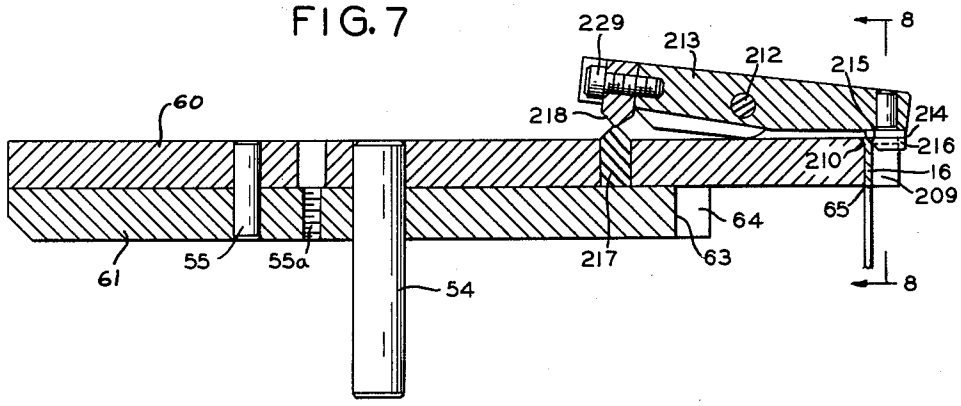


FIG. 4

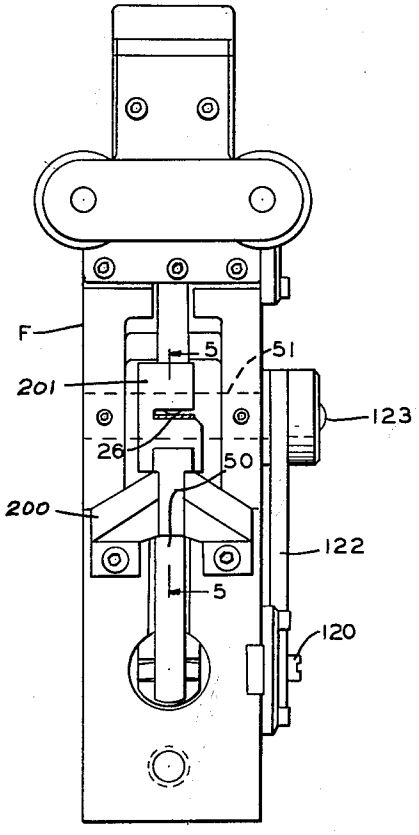


FIG. 8

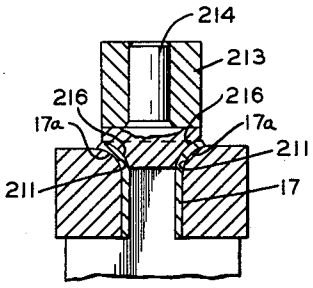
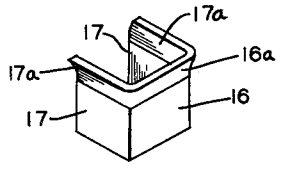


FIG. 9



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FIG. 12

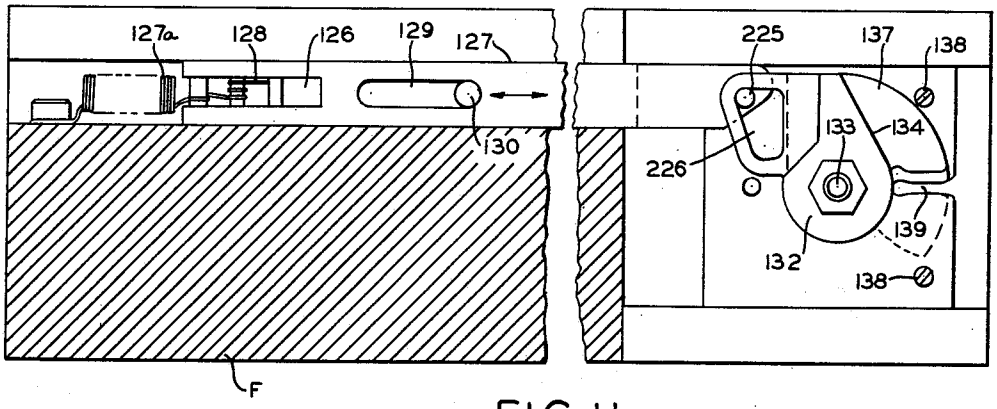
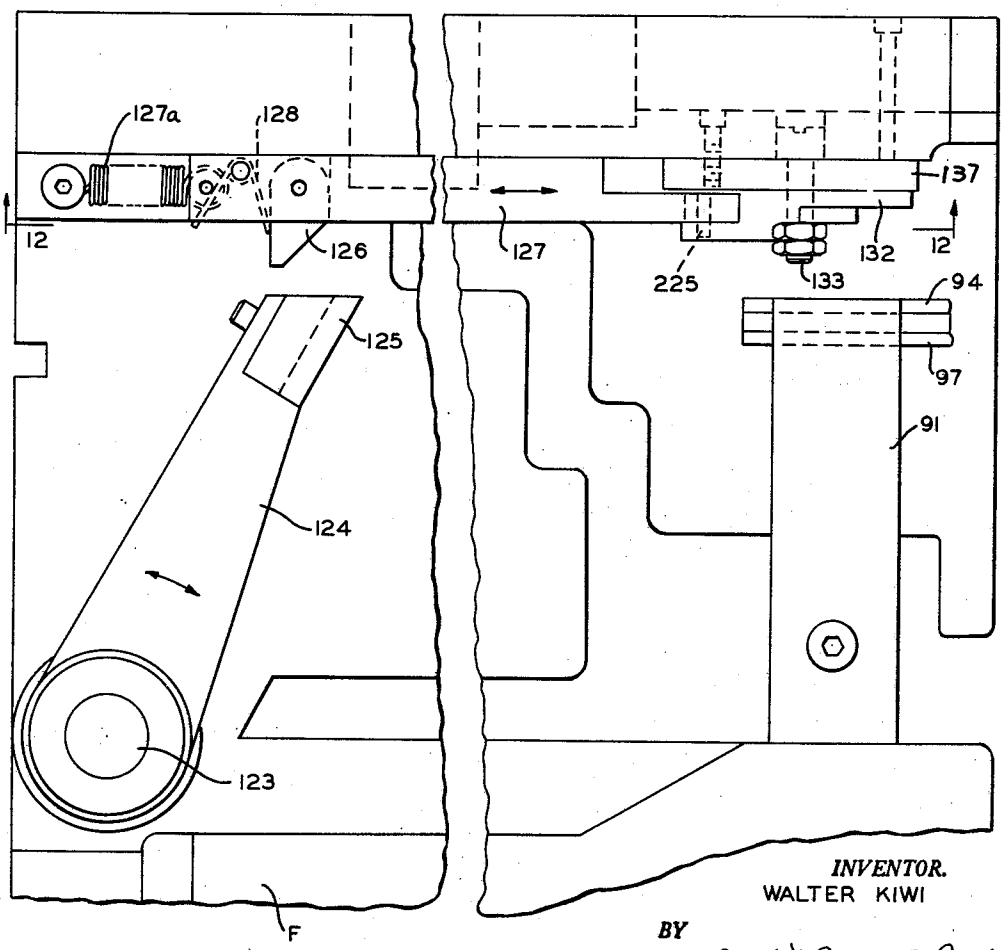


FIG. 11



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United States Patent Office 3,070,929
Patented Jan. 1, 1963

3,070,929

APPARATUS FOR APPLYING A CORD IN ENCIRCLING RELATION TO AN ARTICLE

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Filed Feb. 20, 1961, Ser. No. 90,568
6 Claims. (Cl. 53—135)

This invention relates to securing apparatus.

In my prior application for Letters Patent filed July 2, 1959, Serial No. 824, 610, now Patent No. 3,001,346, there is shown apparatus in which a cord is placed in surrounding relation to an article, such as a bundle of flat pieces, and the cord has its ends secured together by a metal band or clip which is formed from a flat strip of metal at the location of application to the cord ends, and the cord is severed subsequent to the application of the metal band or clip.

It is the principal object of the present invention to provide improved apparatus for forming the metal clip or band as aforesaid by which an improved clip or band is applied to the cord ends and which has a reduced tendency to abrade or weaken the cord.

It is a further object of the present invention to provide improved clip forming apparatus in which metal in strip form is fed to a predetermined location and, in timed relation, is formed into a clip, is provided with a flared portion, is severed from the strip and is applied in gripping relation to the cord ends.

It is a further object of the present invention to provide cord applying and securing apparatus in which a clip formed and ready for application to cord ends is provided in a simple but effective manner with a flared portion whereby a more effective gripping action is obtained with a reduced tendency to abrade or weaken the cord at the clip.

It is a further object of the present invention to provide apparatus for applying a cord around a bundle or package and applying a clip around the ends of the cord in which the cord is gripped and held in an improved manner.

It is a further object of the present invention to provide securing apparatus in which metal in strip form is fed to a predetermined location, is formed into a clip, the clip is severed and the clip is applied in gripping relation to cord ends, the feeding mechanism having improved provisions for preventing return of the metal strip.

It is a further object of the present invention to provide securing apparatus for applying a cord around a bundle or package, forming, severing and securing a clip around the ends of the cord which apparatus may be shifted to a selected location to locate the cord on the package as desired.

It is a further object of the present invention to provide a cord applying, securing and severing means which is economical in its use of cord and which is particularly suitable for use with relatively light cord.

It is a further object of the present invention to provide apparatus for wrapping a bundle or securing articles together in a bundle which has a wide range of usefulness and is suitable for securing many different articles or types of articles in a bundle.

Other objects and adanvtageous features of the invention will be apparent from the description and claims.

The nature and characteristic features of the invention will be more readily understood from the following description, taken in connection with the accompanying drawings forming part thereof, in which:

FIGURE 1 is a perspective view of a portion of the apparatus of the present invention showing the needle in its downward position and prior to the application of the clip, parts being omitted in the interest of clarity;

FIG. 2 is a top plan view of the clipper assembly with the cover plates removed to show the interior construction of the clip forming and delivering mechanism;

FIG. 3 is a vertical sectional view taken approximately on the line 3—3 of FIG. 2;

FIG. 4 is an end elevational view of the clipper assembly as seen from the left of FIG. 3;

FIG. 5 is a vertical sectional view of the metal strip holdback structure;

FIG. 6 is a vertical sectional view of the metal strip feeder structure;

FIG. 7 is an enlarged fragmentary vertical sectional view of the clip flanging mechanism employed with the securing apparatus of the present invention;

FIG. 8 is a fragmentary vertical sectional view, enlarged, taken approximately on the line 8—8 of FIG. 7;

FIG. 9 is a fragmentary perspective view, enlarged, of a clip formed and prior to clenching;

FIG. 10 is a fragmentary perspective view, enlarged, showing a securing clip on the ends of the cord in secured position;

FIG. 11 is a fragmentary rear elevational view showing the cord cutting mechanism; and

FIG. 12 is a horizontal sectional view taken approximately on the line 12—12 of FIG. 11.

It should, of course, be understood that the description and drawings herein are illustrative merely and that various modifications and changes can be made in the structure disclosed without departing from the spirit of the invention.

Like numerals refer to like parts throughout the several views.

Referring now more particularly to the drawings, a machine similar in type to that shown in my prior application Serial No. 824,610, is there shown and includes a frame F which carries strip metal feeding, clip forming and flaring, cutting off and applying apparatus, cord end receiving and retaining devices, cord severing or cutting mechanism, and actuating mechanism for the foregoing together with a cord supplying needle for the delivery and positioning of cord or twine T for wrapping.

The clip K, for application to the parallel ends of the cord T, is shown particularly in FIGS. 9 and 10, and includes a single piece of metal with a back **16** having a flared portion **16***a* with side arms **17** initially straight but subsequently flared as at **17***a* and curled as at **17***b* in surrounding and gripping engagement with parallel portions of the cord T. The flaring at **16***a* and at **17***a* while permitting firm gripping and holding by other portions of the clip K greatly reduces any tendency to abrade or cut the cord T at the time of application or in use.

In order to provide a supply of cord positioned as desired, a vertically reciprocable needle **20** is utilized as in my prior application referred to above, and has a head **21** with a tube **22** extending therefrom and carried by a needle actuator **23**. The needle actuator **23** has a hollow tube **24** through which the cord T extends from any suitable source such as a package of twine or cord (not shown) at a convenient location.

The frame F is also provided with an interior guide portion having a guide slot **25** therein extending from a horizontal entrance location to a vertical delivery location. An elongated metal strip **26** is provided from which the clips K are formed and cut.

The metal strip **26** can be stored, preferably in coil form, at any convenient location, and extends to and along the slot **25**. In advance of the entrance to the slot **25**, a metal strip holdback structure HB is provided. The holdback structure HB is shown in detail in FIG. 5 and includes a bracket **200** carrying a guide block **201** with

a strip slot 203 therein. A wedging ball 39, mounted in a recess 40 in the block 201 intersecting the slot 203 has a spring abutment 204 in engagement therewith. A spring 205 in engagement with the abutment 204 and with an adjustable threaded plug 206 in the block 201 is adjustable by changing the position of the plug 206. The wedging ball 39 prevents backward movement of the strip 26 when the same is not otherwise held.

At the entrance to the slot 25, a strip feeder 27, shown in detail in FIG. 6, is provided, has a slot 28 through which the strip 26 extends and has a wedge ball 36 normally urged into wedging engagement with the metal strip 26 by a spring 37 engaged at one end with a spring abutment 37' and at the other end with an adjustable threaded plug 38. The feeder 27 by engagement of the ball 36 with the strip 26 will advance the strip 26 to the right and upwardly as shown in FIG. 1 and 3, but will slide to the left past the portion of the strip 26 which has been advanced for clip formation and clenching. The wedging ball 39 prevents return of the strip 26 when the strip is not held by the ball 36. The strip feeder 27 is actuated by a feed slide 35 reciprocable in the frame F.

At the upper or exit end of the slot 25, a vertically disposed former die 30 is provided having a central portion with a face 31 for forming the back 16 of the clip K and side faces 32 for initial formation of the side arms 17 and has an upper face 33 for the shear severing of a partially formed clip.

In order to actuate the slide 35, a slot 41 is provided in the lower end thereof within which a bar 42 is mounted and is adjustably positioned along the slot 41 by an adjusting screw 43. A head 44 is provided for engagement in the slot 41 with one end of the slot 41 and with the bar 42. The head 44 is mounted in a slide bar 45 which is slidably carried in the frame F and is connected by a piston rod 46 to an actuating piston (not shown) in a fluid cylinder 48 carried by the frame F. The rod 46 has pivotally connected at the front end thereof by a link 49, a rocker arm 50 which is pivotally mounted on a pivot shaft 51 carried by the frame F. The upper end of the rocker arm 50 is connected by a link 52 to an upper slide 53 which is slidably mounted in the frame F.

The slide 53 has an actuating pin 54 extending upwardly through an opening 56 in the frame F and into actuating engagement with upper and lower clip dies 60 and 61. The dies 60 and 61 can be held for movement together by a shear pin 55 and the die 61 has a threaded opening 55*a* for inserting a tool for removal of the dies. The lower clip die 61 has an end cut out with a central portion 63 and side portions 64 for pressing the strip 26 against the former die 30 and bending the sides 17 of the strip 26 to U-shaped positions for clip formation. The upper die plate 60 has an end cut out with a central portion 65 for cutting off the central portion 16 of the previously formed clip K by a shearing action across the top face 33 of the former die 30 and has side faces 209.

Supporting bars 68 are provided slidably mounted in the frame F (see FIG. 2) and have upper faces 69 supporting the sides 17 of the clip K as it is advanced for clenching. Springs 70 abutting against outward projectors 71 permit the forward and return movement of the supporting bars 68 as required.

The upper die plate 60 has, along the upper margins of the central portion 65 and side faces 209, recesses 210 and 211 to aid in further forming of the clip K.

The frame F has pivotally mounted therein a horizontal pivot pin 212 on which a former lever 213 is pivotally mounted. The former lever 213 at one end thereof has mounted thereon a flange former 214 having an end bevel 215 and curved side bevels 216 which coact with the recesses 210 and 211 as hereinafter explained.

The upper die plate 60, at a predetermined location, has a cam pin 217 mounted therein for engagement with a lever cam 218 which is held in position by a cap screw 229 (see FIG. 7). The distribution of the weight of the former lever 213 is preferably such that a preponderance is to the left of the pivot pin 212 so that the flange former 214 is normally retracted unless moved downwardly by the engagement of the cam pin 217 and lever cam 218.

The frame F, in spaced relation to the former die 30, has spaced clip supports 219 and 220 and thereabove and supported thereby a curling die 76. The curling die 76 has curved end face portions 77 for guiding the ends 17 of the clip K toward each other and in curled relation to parallel portions of the cord T. An adjusting screw 78 is provided which engages the rear end of the curling die 76 for positioning that die and taking up wear. Above the curling die 76, an upper die cover plate 79 is provided and above the upper die plate 60 and former lever 213, a cover 221 can be provided.

The frame F has an opening 90 therein for the reception of the needle head 21 upon its downward movement. Structure is provided for retaining the cord T after severing so that the needle 20 may be impelled upwardly to provide a cord for the next binding operation. The structure for this purpose can comprise gripping plates 94 and 97 and a cord directing plate 103 actuated by an actuating bar 106 from an operating bar 111 which is in turn actuated by the upper slide 53, as shown and described in my prior application Serial No. 824,610.

The slide bar 45 has a control bar 115 connected thereto by a pin 116 for movement therewith. The bar 115 has a driving stud 120 which is connected thereto in engagement in a slot 121 in a lever 122. The lever 122 is keyed to a shaft 123 which extends through the frame F.

On the opposite end of the shaft 123 a cutter actuating lever 124 is mounted. The cutter actuating lever 124 has an actuating finger 125 on the upper end thereof for engagement with a downwardly projecting finger 126 on a cutter operating slide 127. The slide 127 is normally urged to the left as shown in FIG. 12 by a tension spring 127*a*. The finger 126 is normally urged by a spring 128 to downward position for advancing movement of the slide 127 upon engagement of the finger 125 therewith but permits turning movement against the force of the spring 128 to permit the finger 125 to clear the finger 126 upon return movement. The slide 127 has a slot 129 through which a stop pin 130 extends and the slide 127 has a pin 225 at the end thereof for engagement in a cam opening 226 on a movable cutter 132. The cutter 132 is supported on a stud 133 and has a cutting edge 134. The cutter 132 is positively retracted by the return movement of the slide 127 by the spring 127*a* and the engagement of the pin 225 in the opening 226.

A shear plate 137 is removably mounted on the frame F above the movable cutter 132 by studs 138 and has a slot 139 therein into which the parallel cords T are urged for severing by the cutting edge 134 moving in shearing relation thereacross.

Suitable control mechanism such as that shown in my prior application Serial No. 824,610, is preferably provided.

The mode of operation will now be pointed out.

At the beginning and before an operation cycle is commenced, an end portion of the cord T will be gripped and held by the gripping plates 97 and 94, and the needle 20 will be in elevated position with the cord T supplied therethrough from the source.

A vertical run of cord will be available and after a bundle or other article to be secured is moved thereagainst additional cord will be withdrawn from the supply through the needle 20 to extend below, in front of and across the top of the bundle or article to be secured.

Initiation of operations is preferably effected by the advance of a bundle into engagement with the cord T and while the needle 20 is in its upper position. Downward movement of the needle 20 advances the head 21 to a

position in the opening **90** and brings the cord T in back of the article.

Upon downward movement of the needle **20** the needle actuator **23** urges the cord T into engagement with the article thereby reducing the slack and permitting of securing the cord T in tight condition on the bundle and at a corner thereof.

It will be noted that during the downward movement of the needle **20** the dies **60** and **61** are in retracted position. When the needle head **21** is in its lowermost position fluid under pressure is supplied to move the piston rod in the cylinder **47** to actuate the rocker arm **50**.

As the rocker arm **50** is thus actuated the head **44** is moved to retract the strip feeder **27** to a position for subsequent advance movement upon the return of the rocker arm **50** and is effective for moving the upper slide **53**. Movement of the slide **53** through the pin **54** moves the lower die **61** to a position to move the side faces thereof to form the side arms **17** of the clip K and simultaneously cut off by advance of the upper die **60** across the face **33** a previously partially formed but unsevered clip K.

As the upper die **60** advances toward the cut off position, and before the severing has been commenced, the cam pin **217** engages the lever cam **218** thereby moving the former lever **213** to bring the flange former **214** into engagement with the upper margins of the partially formed clip K and force these margins against the recesses **210** and **211** to provide the flange.

As the clip K is severed it is supported by the upper faces of the clip supports **219** and **220** and is advanced to a clenching position as directed by the faces **77** of the die **76**.

As the dies **60** and **61** are advanced the operating bar **111** is also simultaneously moved to the right to effect the gripping of the cord by the gripper plates **97** and **94**, retraction being prevented by the cord directing plate **103**. After the cord ends have been brought together and the clip K has been clenched therearound, the arm **124**, by its advance and movement of the bar **127**, effects shearing movement of the parallel cords beyond the clenched clip K in engagement therewith.

The movement of the piston in the cylinder **48** can itself be utilized to initiate return movement to restore the bar **127** to its initial position and to restore the dies **60** and **61** to their initial positions.

I claim:

1. Securing apparatus for applying and securing a cord in encircling relation to an article comprising a frame, members in said frame for applying the cord to the article with parallel ends extending therefrom, a supply of material in strip form members for forming clips from said strip and applying said clips to parallel cord portions including dies having portions for forming said strip into U-shape and portions for severing said formed strip, a former member movable into engagement with the end of said strip in U-shape and providing a flare therealong, and an additional die member for curling the free ends of the formed strip into gripping engagement with parallel cord portions, and members for actuating said dies in timed relation to the movement of the cord applying members, said former member comprising a lever having a former thereon and one of said dies has a portion thereon for engagement with a portion of said lever to move said former into forming position.

2. Securing apparatus for applying and securing a cord in encircling relation to an article comprising a frame, members in said frame for applying the cord to the article with parallel ends extending therefrom, a supply of material in strip form, members for forming clips from said strip and applying said clips to parallel cord portions including dies having portions for forming said strip into U-shape and portions for severing said formed strip, a former member movable into engagement with the end of said strip in U-shape and providing a flare therealong, and an additional die member for curling the free ends of the formed strip into gripping engagement with parallel cord portions, and members for actuating said dies in timed relation to the movement of the cord applying members, said former member comprising a lever, said lever having a former thereon and an actuating portion, said second die member having an actuating portion thereon movable with said second die member to lever actuating position.

3. Securing apparatus for applying and securing a cord in encircling relation to an article comprising a frame, members in said frame for applying the cord to the article with parallel ends extending therefrom, a supply of material in strip form, members for forming clips from said strip and applying said clips to parallel cord portions including first and second die members having portions for forming said strip into U-shape and portions for severing said formed strip, said first die member being fixedly mounted in said frame and said second die member having a plurality of portions movable together, one of said portions of said second die member being a severing portion coacting with said first die member, one of said portions of said second die member having faces of C-shape with their upper margins flared outwardly, a former member movable into engagement with the end of said strip in U-shape and providing a flare therealong, an additional die member for curling the free ends of the formed strip into gripping engagement with parallel cord portions, and members for operating said die members in timed relation to the movement of the cord applying members.

4. Securing apparatus for applying and securing a cord in encircling relation to an article comprising a frame, members in said frame for applying the cord to the article with parallel ends extending therefrom, a supply of material in strip form, members for successively forming clips from said strip and applying said clips to parallel cord portions including a first die member having a vertically extending face and vertical side faces extending therefrom, a second die member horizontally movable with respect to said first die member and having portions for forming said strip into U-shape and portions for severing said formed strip, a former member movable into engagement with the end of said strip in U-shape and providing a flare along the upper margin thereof, and an additional die member for curling the free ends of the formed strip into gripping engagement with the parallel cord portions, and members for actuating said second die member in timed relation to the movement of the cord applying members, said former member comprising a lever having a former thereon, and one of said dies having a portion thereon for engagement with a portion of said lever to move said former into forming position.

5. Securing apparatus for applying and securing a cord in encircling relation to an article comprising a frame, members in said frame for applying the cord to the article with parallel ends extending therefrom, a supply of material in strip form, members for successively forming clips from said strip and applying said clips to parallel cord portions including a first die member having a vertically extending face and vertical side faces extending therefrom, a second die member horizontally movable with respect to said first die member and having portions for forming said strip into U-shape and portions for severing said formed strip, a former member movable into engagement with the end of said strip in U-shape and providing a flare along the upper margin thereof, and an additional die member for curling the free ends of the formed strip into gripping engagement with the parallel cord portions, and members for actuating said second die member in timed relation to the movement of the cord applying members, said former member comprising a lever, said lever having a former thereon and an actuating portion, said second die member having an actuating portion thereon movable with said second die member to lever actuating position.

6. Securing apparatus for applying and securing a cord

in encircling relation to an article comprising a frame, members in said frame for applying the cord to the article with parallel ends extending therefrom, a supply of material in strip form, members for successively forming clips from said strip and applying said clips to parallel cord portions including a first die member fixedly mounted in said frame having a vertically extending face and vertical side faces extending therefrom, a second die member horizontally movable with respect to said first die member and having first portions for forming said strip into U-shape and second portions for severing said formed strip, said portions of said second die member being movable together, said first portion of said second die member having faces of C-shape with their upper

margins flared outwardly, a former member movable into engagement with the end of said strip in U-shape and providing a flare along the upper margin thereof, an additional die member for curling the free ends of the formed strip into gripping engagement with the parallel cord portions, and members for actuating said second die member in timed relation to the movement of the cord applying members.

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