

[54] **CABLE TIE**

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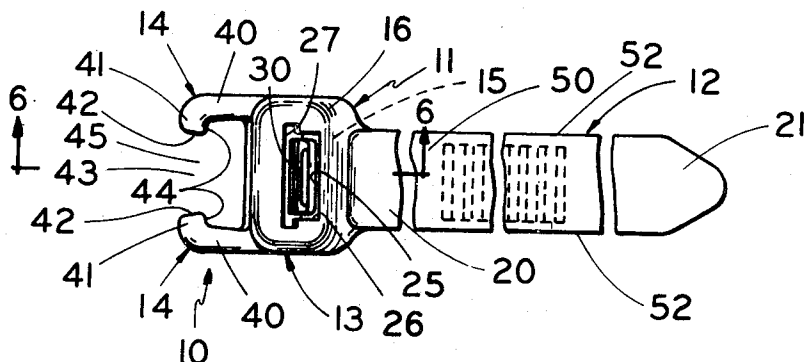
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[57] **ABSTRACT**

A cable tie and several embodiments thereof are disclosed herein and include generally an elongated strap having a retaining head and a tongue portion. The retaining head is provided with first and second strap receiving means to respectively retain the strap in a looped condition and to position the tongue end portion of the strap adjacent the looped portion thereof.

9 Claims, 11 Drawing Figures



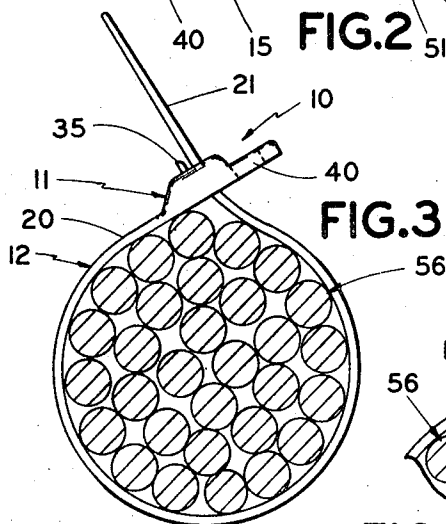
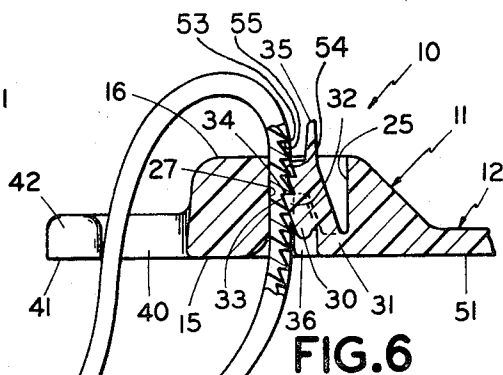
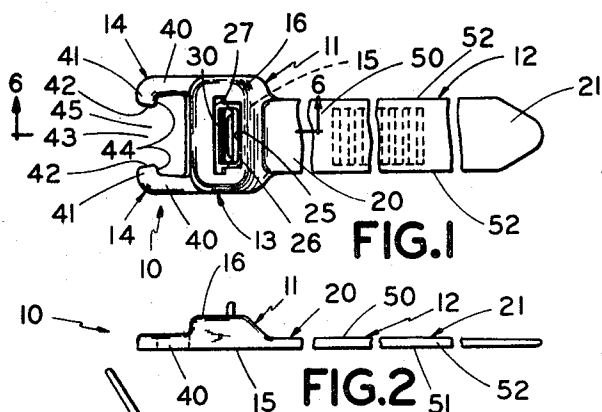
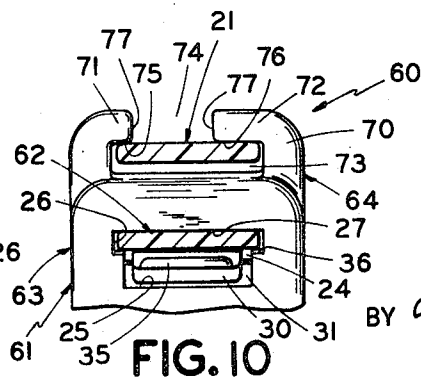
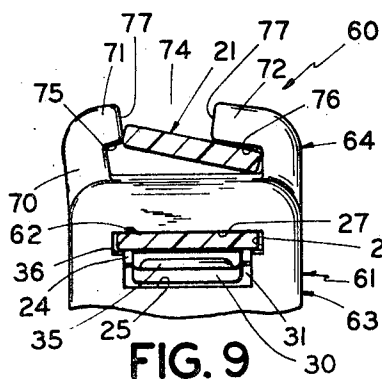
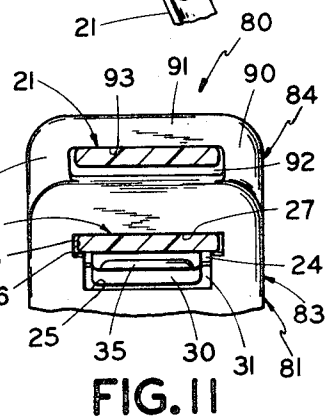
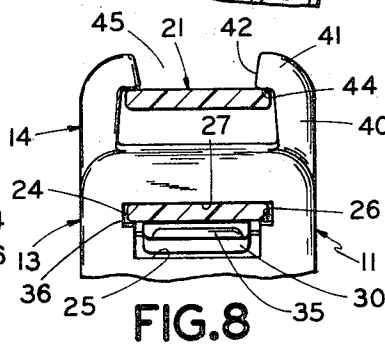
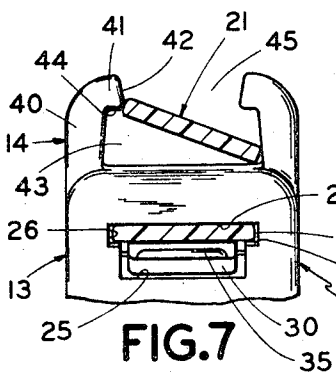


FIG. 5



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CABLE TIE

SUMMARY OF THE INVENTION

This invention provides a flexible flat and generally normally straight cable tie which is readily securable about a bundle of wires or the like to retain the wires, and which is further provided with a second strap receiving means as a part of said retaining head to provide means whereby the tongue end portion of the cable tie may be readily retained adjacent the looped portion thereof.

In particular, the cable tie of this invention is adapted to be permanently secured around a bundle of wires or the like by placing the strap around the wires to be bundled and by insertion of the tongue end of the strap through a strap locking means in the strap retaining head. The locking means normally permits only unidirectional movement of the strap tongue through the head, but is selectively releasable for withdrawal of the strap. The strap can thereby be normally permanently retained around the bundle of wires or the like and yet selectively releasable.

However, the normally straight tongue end portion of the strap extending through the retaining head and therebeyond presents an obstacle which interferes with the movement of workmen and the like in the area of the retaining head of a cable tie as thus applied. This interfering situation becomes a great irritant when many cable ties are utilized in a given installation as is quite often the case.

The retaining head of the cable tie of this invention is provided with a strap receiving and positioning means to position the tongue end out of the way of workmen, and is adapted to readily and releasably receive the otherwise extended tongue end of the strap to bend the tongue end double without causing the release of the locking portion. The strap will thereby be doubled back on itself with the tongue end adjacent the portion of the strap looped about a bundle of wires or the like and thereby releasably position the tongue end away from the undesirable extended position.

Thus, the present invention provides a cable tie which is releasably securable to a bundle of wires or the like, and yet has the normally protruding tongue end thereof readily and releasably positionable adjacent the bundle of wires to retain the bundle and to position the tongue out of the way of workmen or other persons operating in the area of the cable tie.

It is a primary object of this invention to provide an improved cable tie having a retaining and locking means in conjunction with a tongue receiving and positioning means wherein the tongue or strap thereof is releasably retainable in a retaining head to form the cable tie into a retaining loop about a bundle of wires or the like with the normally extending tongue end further retained by the retaining head to bend the tongue end in a sharply doubled back position to position the tongue end adjacent the looped portion of the strap.

A further object of this invention is to provide an improved cable tie having a retaining and locking means in conjunction with a tongue receiving and positioning means wherein a releasable pawl arrangement is provided in the locking means thereof which will normally retain the tongue against withdrawal therefrom, and yet which will also releasably retain the tongue against

withdrawal when the tongue end is bent double and positioned along the looped portion of the strap.

Another object of this invention is to provide an improved cable tie having a retaining and locking means in conjunction with a tongue receiving and positioning means wherein the straight tongue end thereof normally extending beyond the secured looped portion thereof, is readily insertable in a positioning means in the retaining head to position the normally extended tongue end adjacent the looped portion of the cable tie.

A further object of this invention is to provide an improved cable tie having a retaining and locking means in conjunction with a resilient tongue receiving and positioning means with an offset tongue receiving opening within the general lateral limits of the tongue wherein the positioning portion is resiliently deflected from its normal configuration by the insertion of the tongue end of the cable tie in the offset opening thereof to cause confined retention of the tongue end upon complete entry of the tongue into a position in the positioning means as determined by the normal configuration of the positioning means.

Another object of this invention is to provide an improved cable tie having retaining and locking means in conjunction with a tongue receiving and positioning means, wherein the tongue end is readily insertable in the positioning means by a slight twisting and lateral insertion of the tongue end with respect to the positioning means and generally within the lateral limits of the cable tie, and yet which is readily selectively releasable therefrom in a similar manner of movement.

Still another object of this invention is to provide an improved cable tie having a retaining and locking means in conjunction with a tongue receiving and positioning means wherein the tongue receiving and positioning means is provided with a readily accessible opening with converging guide surfaces for ready insertability of the tongue end therein while providing the maximum retaining surface for preventing inadvertent removal of the tongue from the positioning portion.

Other objects, advantages and novel aspects of the invention will become apparent upon consideration of the following detailed description in conjunction with the accompanying drawings wherein:

FIG. 1 is a partial top plan view of a first preferred illustrative embodiment of the cable tie of this invention illustrating the general configuration thereof and the relative position of the strap receiving portions of the retaining head;

FIG. 2 is a side view of the first illustrative embodiment of the cable tie illustrated in FIG. 1 showing the general configuration thereof;

FIG. 3 is a side view of the first illustrative embodiment of the cable tie of this invention showing the cable tie assembled about a bundle of wires or the like with the tongue thereof normally extending through and beyond the retaining head;

FIG. 4 is a partial view of the first illustrative embodiment of the cable tie of this invention showing the normally extended tongue portion illustrated in FIG. 3 being bent double or substantially 180°, twisted, and partially inserted in the strap receiving and positioning means of the retaining head thereof;

FIG. 5 is a partial view of the preferred illustrative embodiment of the cable tie of this invention showing

the cable tie completely installed on a bundle of wires with the tongue end positioned laterally parallel and adjacent to the looped portion of the cable tie;

FIG. 6 is a partial sectional view of the first illustrative embodiment of this invention taken along line 6—6 of FIG. 1 showing the interrelationship of the tongue and the retaining head in the fully installed condition of the strap as illustrated in FIG. 5;

FIG. 7 is a partial plan view of the first illustrative embodiment of the cable tie of this invention showing the tongue inserted in the receiving and locking means and in position as it is partially inserted in a centrally opening strap receiving and positioning means of the retaining head;

FIG. 8 is a partial plan view of the first illustrative embodiment of the cable tie of this invention showing the relationship of the tongue and retaining head when the cable tie is installed as generally illustrated in FIG. 5;

FIG. 9 is a partial plan view of a second illustrative embodiment of the cable tie of this invention showing the tongue inserted in the receiving and locking means and in position as it is partially inserted in an offset opening strap receiving and positioning means of the retaining head;

FIG. 10 is a partial plan view of the second illustrative embodiment of the cable tie of this invention showing the relationship of the tongue and retaining head when the cable tie is installed as generally illustrated in FIG. 5; and

FIG. 11 is a partial plan view of the third illustrative embodiment of the cable tie of this invention showing the tongue inserted in the receiving and locking means and as it is inserted in a completely enclosed centrally opening strap receiving and positioning means of the retaining head adapted to receive the tongue end insertably therethrough.

Referring to the drawings, there is illustrated (FIGS. 1-8) a first preferred illustrative embodiment 10 of the cable tie of this invention which includes generally a retaining head 11 and a strap or tongue portion 12.

Retaining head 11 includes generally a strap or tongue locking portion or means 13, and a strap positioning portion or means 14 having common entry and exit surfaces 15 and 16. Tongue portion 12 includes generally a normally straight but flexible flat ribbon or strap tongue 20 attached at one end to retaining head 11, and terminating at the other end in a tongue end portion 21 extending in the opposite direction.

Locking portion 13 (FIGS. 1 and 6-8) of retaining head 11 is provided with a passage 24 formed by the intersection of a back wall surface 25, two side wall surfaces 26 and a bearing wall surface 27 having guide rails 36 (FIGS. 6-11). A locking pawl 30 is pivotally secured to a ledge 31 extending longitudinally from back wall 25 adjacent entry surface 15, and is provided with a frictional surface such as teeth or abutments 32. Pawl teeth 32 (FIG. 6) each have one surface 33 substantially inclined with respect to entry surface 15, and another surface 34 substantially parallel with exit surface 16 of head 11. A release tab 35 is illustrated on exit side 16 of pawl 30 to allow manual clockwise (FIG. 6) rotation of pawl 30 on ledge 31 to release pawl 30 from tongue 21 in turn, release cable tie 10. Rails 36 are provided on side walls 26 to guide tongue 21 through passage 24.

Strap positioning portion 14 (FIGS. 1-8) of retaining head 11 includes, generally, two longitudinal projections 40 with partially bridging lateral projections 41 extending inwardly therefrom and terminating in surfaces 42 to form a retaining or positioning space or passage 43. Surfaces 42 are tapered or inclined so as to converge toward locking portion 13 whereby an opening or space 45 therebetween is larger away from locking portion 13 and provides larger retaining and positioning surfaces 44.

Tongue 12 (FIGS. 1, 2 and 6) is provided with top surface 50, bottom surface 51, side surfaces 52 and abutments or teeth 53 positioned laterally in bottom surface 51. Tongue teeth 53 are substantially formed to be complementary to teeth 32 of said pawl 30, when tongue end portion 21 is inserted in passage 24 (FIG. 6) by having surface 54 inclined away from retaining head 11 and another surface 55 substantially perpendicular to the normal as-molded longitudinal axis of tongue 12.

In assembly operation, first embodiment 10 of the cable tie of this invention is first looped around bundle of wires or the like 56 (FIGS. 3-6) and tongue end 21 of cable tie 10 is inserted through passage 24 of locking portion 13 to extend therebeyond. Tongue end 21 is thereafter pulled through locking portion 13 until cable tie 10 is tightly looped about bundle 56 (FIG. 3). Tongue end 21 is then released so that teeth 32 (FIG. 6) of the pawl will complementarily engage teeth 53 of tongue 12 causing pawl 30 to pivot on ledge 31 into firm engagement with tongue teeth 53 to lock tongue 12 against withdrawal from passage 24 of locking portion 13, resulting in the retention locking of cable tie 10 about bundle 56.

With first embodiment 10 of the cable tie thus locked about bundle 56 (FIG. 3), tongue end 21 will tend to extend outwardly from bundle 56 and tend to present an obstruction to movement adjacent the bundle. Tongue end 21 is thereafter simultaneously gripped by the hand (FIG. 4), bent clockwise (FIG. 3) so as to be substantially doubled upon itself, twisted slightly to a diagonal position with respect to locking portion 13 of tongue 12 (FIGS. 4 and 7), and inserted between partially bridging lateral projections 41 to initiate insertion of tongue end 21 into space 43 within positioning portion 14 of retaining head 11.

Tongue end 21 is thereafter untwisted by being released within passage or space 43 of positioning portion 14, whereby the normal tendency of tongue 12 to extend straight (FIGS. 1-3) will cause tongue end 21 to tend to rotate generally counterclockwise (FIG. 5). This will bring top surface 50 of tongue end 21 into engagement with retaining surfaces 44 of lateral projections 41 of positioning portion 14 (FIG. 8) to position tongue end 21 laterally parallel and adjacent to the looped portion of cable tie 10 (FIG. 5).

Thus, cable tie 10 may be assembled about a bundle of wires 56 and normally extending tongue end 21 thereof is retainable in a position adjacent bundle 56 to prevent obstruction of movement in the area of bundle 56, while cable tie 10 is maintained assembled around bundle of wires 56.

A second illustrative embodiment 60 of the cable tie of this invention is illustrated specifically (FIGS. 9 and 10), and generally (FIGS. 3-6). Second embodiment 60 includes a retaining head 61 (FIGS. 9 and 10), and a strap or tongue portion 62. Retaining head 61, in turn,

includes a locking means 63 and a positioning means 64. Strap or tongue means 62, as well as locking means 63, are identical with tongue 12 and locking means 13 set forth in detail above with respect to first embodiment 10 of the cable tie of this invention, and accordingly, the same numerals and description are applied thereto.

However, strap positioning means 64 (FIGS. 9 and 10) of second embodiment 60 differs somewhat from positioning means 14 of first embodiment 10, and includes generally, two longitudinal projections 70 with a partially bridging short lateral projection 71 and a partially bridging longer lateral projection 72. Both projections 71 and 72 extend inwardly and terminate in surfaces 77 to form a retaining or positioning space or passage 73 with an offset opening 74 therebetween and within the lateral limits of tongue 62.

It should be particularly noted that longitudinal projections 70 (FIGS. 9 and 10) are substantially shorter than longitudinal projections 40 of first embodiment 10 (FIGS. 7 and 8), and that lateral projections 71 and 72 are proportionately closer to positioning means 64 with respective short and long retaining or positioning surfaces 75 and 76 accordingly closer to locking means 63. This particular positioning means configuration 64 thereby provides a more restricted passage 73, and one that is closer to positioning means 64, which in conjunction with the resilient longitudinal and lateral projections 70-72, the size and configuration of tongue 12 and offset opening 74 provide positioning means 64 with resilient tongue receiving and positioning characteristics. Projections 70 and 71 are resiliently deflected from a normal configuration when tongue end 21 is forceably inserted through opening 74 and into passage 73 (FIGS. 4 and 9). Thus, the second embodiment 60, with modified positioning means 64, provides a confined and stronger retention and positioning of tongue end 21 upon complete entry of tongue end 21 into positioning means 64, as determined by the normal resilient configuration of the modified positioning portion 64 of second embodiment 60.

In operation, second embodiment 60 of the cable tie of this invention is first looped around bundle of wires or the like 56 (FIGS. 3-6), and is locked thereon in the same manner as that referred to above with respect to first embodiment 10. With second embodiment 60 of the cable tie thus locked about bundle of wires (FIG. 3), tongue end 21 will tend to extend outwardly from bundle 56 and tend to present an obstruction to movement adjacent bundle 56. Tongue end 21 is thereafter simultaneously bent clockwise (FIG. 3) so as to be substantially doubled upon itself, twisted slightly to a diagonal position with respect to the locked portion of the tongue 12 (FIGS. 4 and 9), and forceably inserted through opening 74 against the resilient normal restrictive configuration of partially bridging lateral projections 71 and 72 and longitudinal projections 70 (FIGS. 4 and 9) to accomplish insertion of tongue end 21 into passage space 73 within positioning means 64 of retaining head 11.

Tongue end 21 of second embodiment 60 is thereafter untwisted by being released within passage or space 73 of positioning means 64, whereby the normal tendency of tongue 12 to extend straight (FIGS. 1-3) will cause tongue end 21 to tend to rotate

generally counterclockwise (FIG. 5). This will bring top surface 50 of tongue end 21 into engagement with retaining surfaces 75 and 76 of lateral projections 71 and 72 of positioning means 64 (FIG. 8) to position tongue end 21 laterally parallel and adjacent to the looped portion of cable tie 10 (FIG. 5).

Thus, second embodiment 60 may be assembled about a bundle of wires 56 and normally extending tongue end 21 thereof is resiliently retainable in a restricted position adjacent bundle 56 to prevent obstruction of movement in the area of bundle 56, while maintaining retention of cable tie 60 around wires 56.

A third illustrative embodiment 80 of the cable tie of this invention is illustrated specifically (FIG. 11), and generally (FIGS. 3-6). Third embodiment 80 includes a retaining head 81 (FIG. 11), and a strap or tongue portion 82. Retaining head 81, in turn, includes a locking means 83 and a positioning means 84. Strap or tongue means 82, as well as locking means 83, are identical with tongue 12, and locking means 13 set forth in detail above with respect to first embodiment 10 of the cable tie of this invention, and accordingly, the same numerals and description are applied thereto.

However, strap positioning means 84 (FIG. 11) of third embodiment 80 differs from positioning means 14 of first embodiment 10, and includes generally, two longitudinal projections 90 with a bridging lateral projection portion 91 extending therebetween to form a retaining or positioning space or passage 92 within the lateral limits of tongue 82. It should be noted that longitudinal projections 90 and lateral projection 91 completely enclose passage 92, and lateral projection 91 is provided with a retaining or positioning surface 93 in passage 92.

In operation, third embodiment 80 of the cable tie of this invention is first looped around wires or the like 56 (FIGS. 3-6), and is locked thereon in the same manner as that referred to above with respect to first embodiment 10. With third embodiment 80 of the cable tie thus locked about bundle of wires (FIG. 3), tongue end 21 will tend to extend outwardly from bundle 56 and tend to present an objection to movement adjacent bundle 56. Tongue end 21 is thereafter threadably inserted through passage 92, whereby the normal tendency of tongue 12 to extend straight (FIGS. 1-3) will cause tongue end 21 to tend to rotate generally counterclockwise (FIG. 5) bringing top surface 50 of tongue end 21 into engagement with retaining surface 93 of lateral projection 91 of positioning means 84 (FIG. 11) to position tongue end 21 laterally parallel and adjacent to the looped portion of cable tie 10 (FIG. 5).

Thus, third embodiment 80 may be assembled about a bundle of wires 56 and normally extending tongue end 21 thereof is resiliently and releasably retainable in a position adjacent bundle 56 to prevent obstruction of movement in the area of bundle 56, while maintaining retention of cable tie 60 around wires 56.

It is to be understood that the invention is not to be limited to the specific constructions and arrangements shown and described, as it will be understood to those skilled in the art that certain changes may be made without departing from the principles of the invention.

What is claimed is:

1. A cable tie to be tensioned around a bundle of wires or the like comprising an elongated strap having a

retaining head at one end and a tongue portion at the other end, said retaining head having a strap receiving locking means for normally receiving and positively retaining said tongue portion against movement in one direction to form said cable tie in a loop around the bundle of wires or the like, said strap receiving locking means comprising a single passage through said retaining head and means for engaging said tongue portion to permit only unidirectional movement of said tongue portion through said passage, said retaining head having a strap receiving and positioning means spaced from said strap receiving locking means for receiving and positively positioning the end of said tongue portion in said direction whereby said end is substantially bent double and thereby positioned parallel and generally adjacent to a portion of said strap, said portion of said strap being positioned between said end and said bundle of wires or the like.

2. A cable tie as defined in claim 1 wherein said strap locking means comprises a pawl pivotally mounted in said passage.

3. A cable tie as defined in claim 2 wherein a tab is provided on said pawl opposite said pivot and extending beyond said retaining head whereby said tab is engageable to cause said pawl to pivot out of locking engagement with said strap to release said strap.

4. A cable tie as defined in claim 2 wherein said means for engaging said tongue comprises unidirectional abutments on said pawl and said tongue has cooperating complementary unidirectional abutments.

5. A cable tie to be tensioned around a bundle of wires or the like comprising an elongated strap having a retaining head at one end and a tongue portion at the other end, said retaining head having a strap receiving locking means for normally receiving and positively retaining said tongue portion against movement in one direction to form said cable tie in a loop around the bundle of wires or the like, said strap receiving locking means comprising a single passage through said retaining head and means for engaging said tongue portion to permit only unidirectional movement of said tongue portion through said passage, said retaining head having a strap receiving and positioning means for receiving and positively positioning the end of said tongue portion in said direction whereby said end is substantially bent double and thereby positioned parallel and generally adjacent to a portion of said strap, said portion of said strap being positioned between said end and said bundle of wires or the like, said strap positioning means comprising a pair of longitudinal projections adapted to receive said tongue therebetween, and a lateral portion laterally bridging said pair of projections and spaced from said locking means to provide a passage for receiving and positioning said tongue

between said strap locking means and said lateral bridge portion.

6. A cable tie to be tensioned around a bundle of wires or the like comprising an elongated strap having a retaining head at one end and a tongue portion at the other end, said retaining head having a strap receiving locking means for normally receiving and positively retaining said tongue portion against movement in one direction to form said cable tie in a loop around the bundle of wires or the like, said strap receiving locking means comprising a single passage through said retaining head and means for engaging said tongue portion to permit only unidirectional movement of said tongue portion through said passage, said retaining head having a strap receiving and positioning means for receiving and positively positioning the end of said tongue portion in said direction whereby said end is substantially bent double and thereby positioned parallel and generally adjacent to a portion of said strap, said portion of said strap being positioned between said end and said bundle of wires or the like, said strap receiving and positioning means comprising a pair of longitudinal projections each having a lateral projection extending inwardly therefrom to define a space between said strap locking means and said lateral projections, said lateral projections defining an opening therebetween adapted to permit entry of said tongue portion, said opening being larger than the thickness of said tongue portion and smaller than the width of said tongue portion whereby said tongue portion is laterally insertable directly into said space by twisting and inserting said tongue portion on a lateral diagonal between said lateral projections.

7. A cable tie as defined in claim 6 wherein said inner ends of said lateral projections comprise surfaces which converge generally inwardly toward said locking means of said head whereby said lateral projections provide an entry space therebetween which is larger than the exit space therebetween to respectively augment entry and retention of said tongue end within said lateral and longitudinal projections.

8. A cable tie as defined in claim 6 wherein said strap positioning means comprises a pair of longitudinal projections laterally spaced to receive said tongue therebetween, and one of said lateral projections extends further laterally inwardly than the other of said projections to provide a laterally offset opening in said positioning means for receiving said tongue end.

9. A cable tie as defined in claim 8 wherein said longitudinal and lateral projections are positioned to provide a restricted tongue end retaining space requiring resilient deflection of said projections upon insertion of said tongue end therebetween whereby said tongue end will be retained in a restricted space.

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