The abstract of the patent application describes a side notched cable tie. The tie has notches on either one or both sides of a strap that allows breaking off the unused end when pulling the tie tight, eliminating the need for a trimming tool. The strap is pulled sideways against a mating head to cause the strap to break off, leaving no sharp edges.
Side Notched Cable Tie

BACKGROUND

Field of the Invention

The present invention relates generally to the field of cable ties and more particularly to a side-notched cable tie where the unused end can be broken off without tools.

Description of the Problem Solved

Cable ties are used in a tremendous range of applications. In most of these applications their usage is to control the location of wires, cables, hoses, tubes and all other types of routed components of an assembly. Cable ties can even be used to mount components or join components in an assembly. In all these applications, the length of the cable tie is longer than needed. The unused ends that remain after the cable tie has been tightened need to be cut off with some sort of tool such as a diagonal cutter (pair of dikes), wire cutter or even a knife. This can be difficult if the space is small where the cable tie is utilized. It can be difficult to get the tool inside an
assembly to cut off the unused ends of the cable ties. Also, once the unused end of the cable tie is cut off, the cut end can be very sharp; this can lead to abrasion of other cables in the bundle and even to scratches or cuts to a worker.

Several wire ties are known in the art. The most popular is the common wire tie used by many electricians and trade-workers. It has a plastic tail with notches on the top. At one end is a slotted, generally rectangular head with a notch. When the tail is threaded through the notch in the head, a small locking device slides into each notch on the body as the notch is pulled into place. Because of the shape of the notches, the pull direction is one-way. The tail cannot be pulled backwards out of the head. The worker simply wraps the tail around a cable bundle, threads the tail through the head, and then pulls the tail through the head until the desired tightness is achieved. The tie clicks past notches finally resting at the right notch for the chosen tightness. The tail (unused end) is then cut off and discarded.

Some prior art ties contain knife blades in their heads and other devices to allow cutting the tie. It would be
advantageous to have a cable tie that allows easy removal of the unused end without needing any tools, and that could be produced at the same cost as the standard cable tie.

SUMMARY OF THE INVENTION

The present invention relates to an improved cable tie with a number of notches on at least one surface of a tie strap so that these extra notches cause the strap to break near the latching head when the strap is threaded through the head in the normal way and then is moved back and forth sideways or twisted.

The tie is normally made as a flat, elongated strap with top and bottom surfaces, two sides, and two ends, where the strap has a number of engaging notches on the top surface and a mating latching head attached to one end of the strap containing a lock for engaging the top notches when the second end of the strap is threaded through the head. The present invention adds extra notches on one or both sides of the strap or on some other surface to allow the strap to break easily.
The present invention is completely complimentary to wire ties currently in use. A small side to side motion of the unused strap cleanly breaks the unused end off immediately during cable tie installation without the use of any tools.

DESCRIPTION OF THE FIGURES

Fig. 1 shows a top view of an embodiment of the present invention.

Fig. 2 shows a side view of the tie from Fig. 1.

Fig. 3 shows a sectional view of the tie from Fig. 1.

Fig. 4 shows an enlarged view of the embodiment of Fig. 1.

Figs. 5-6 show an enlarged view of the notch structure, how it functions, and how the remaining, unused end, of a cable tie may be moved to initiate breaking off.

Fig. 7 shows a enlarged side view of a cable tie with side notches.
Fig. 8. shows a possible notch shape 8 that would leave a rounded edge after being broken off.

Fig. 9. shows a notch shape described in Fig. 8 after it's been broken off.

Fig. 10. shows notches in an embodiment where they appear on the back of the cable tie or the opposite side from the latching notches.

Fig. 11. shows notches in an embodiment where they might be used on the corners of the cable tie.

Fig. 12. shows notches in an embodiment where they might be used on the front of the cable tie on the same side the latching notches are on.

Several illustrations and figures have been presented to better aid in understanding the present invention. The scope of the present invention is not limited to the figures.
The present invention eliminates the need for using a tool to trim the ends off a cable tie by adding at least one simple feature to the side edge or edges of the strap or some other surface of the strap. This strap is normally pulled when tightening the cable tie around wires, cables, hoses, tubes or other items in a bundle. The present invention contains a series of notches along either one or on both sides of the strap portion of the tie. When the tie is pulled straight, for example, when tightening the tie around a bundle, the tie remains very strong and can be pulled very tight. Once the tie is tight, the unused end can be forced to one side or twisted. This motion can create a pulling stress along one of the outsides of the strap, either the left or right side. This causes the additional notches of the present invention to act as stress raisers. Stress increases at the inside corner of a notch, and a crack in the material is initiated. The start of a crack increases the stress even more. A complete break of the strap portion follows shortly with little more applied force.

The present invention allows the cable tie user to break
off unused ends of a cable tie immediately when installing the
cable tie, without using any tools. The break takes place at
the head of the tie with minimal unused strap protruding from
the head and without sharp edges. The shape of the strap and
notch can be designed to alter the load capacity of the tie, the
breaking force required to break off unused ends, and to insure
no sharp edges remain to injure workers.

Figure 1 shows a top view of a cable tie with side notches
1 added to the both side edges of the strap portion 4 of the
cable tie. The notches 1 run the length of the strap so that
any amount of unused strap desired can be broken off. The
notches can also be spaced by design to encourage breaking the
unused strap off at predetermined distances from the latching
feature 5 of the cable tie. The notches 1 may optionally be
added to only one side of the strap to further increase the load
rating of the cable tie. The present invention includes
embodiments with side notches on one side and also on both sides
as well as on other surfaces and at other locations.

Fig. 2 shows a side view of the cable tie shown in Fig. 1
with the top notches 1 added for visual clarification.
Fig. 3 shows a section view as projected from Fig 1 showing the latching feature 5 and locking serrations 2 which are standard on all cable ties.

Fig. 4 shows a larger view of the same orientation as Fig 1. Fig. 4 is shown as a 4 to 1 scale partial view of a part of Fig 1. Fig. 4 shows the notches 1 in more detail. The notches 1 can have sharp internal corners. Such sharp internal corners can create a maximum stress raiser which initiates a crack in the strap 4 with minimal lateral force 6, or minimal twisting force 11 as shown. The designed shape of the notch can be altered to design particular load ratings of the tie and the breaking force required to break off unused ends. The shape of the side notch can also be designed to create a particular "broken" edge without sharp edges for user safety.

Figs. 5-6 show a view of two cable ties being used. This view shows how the latching feature or head 5 of the cable tie supports the strap when the unused end of the strap is being broken off. This support causes the unused end of the strap to break exactly at the latching feature or head 5. This leaves no extra unused strap 4 protruding from the head 5. The head 5 may
be designed such that the point at which the strap 4 breaks is inside the head thus further protecting users from scratches and cuts. Fig. 6 shows two possible directions, namely twisting 7 and bending 6 that the unused end may be moved in to initiate a break.

Figure 7 shows an enlarged side view of a cable tie with side notches.

Figure 8 shows one of many possible notch shapes 8 with a rounded corner 9 that may be used to encourage a break that decreases or eliminates remaining sharp edges once the unused end of the cable tie has been broken off. This feature can greatly decrease the likelihood of workers injuring themselves on the sharp edges that remain when the unused end of the cable tie has been cut off with dikes.

Fig. 9 shows a broken wire tie with no sharp edges.

Fig. 10 shows a cable tie with the notches 11 added to the bottom or the side opposite the latching notches.

Fig. 11 shows a cable tie with notches 12 added to two
corners of the flange.

Fig. 12 shows a cable tie with notches 13 added to the top surface or on the same side the latching notches are. It should be noted that notches may be added to any side of a tie in order to act as a stress raiser and initiate a crack where a crack is desired to be started.

Several descriptions and illustrations have been presented to better aid in the understanding of the present invention. One skilled in the art will realize that many changes and variations are possible. Each of these changes and variations is within the scope of the present invention.
1. A cable tie comprising:

   a flat, elongated strap with top and bottom surfaces, first and second sides, and a first and second end, said strap having a plurality of notches on said top surface;

   a mating head attached to said first end of said strap containing a locking means for engaging said notches when said second end of said strap is threaded through said mating head;

   a plurality of side notches on at least one of said first or second sides of said strap, whereby said side notches cause said strap to break near said mating head when said strap is threaded through said mating head and is moved back and forth sideways.

2. The cable tie of claim 1 wherein both said first and second sides of said strap contain side notches.
3. The cable tie of claim 1 wherein said strap is plastic.

4. The cable tie of claim 1 wherein said side notches begin a distance from said mating head.

5. The cable tie of claim 1 further containing a tongue on said second end of said strap that is generally narrower than said strap.

6. A cable tie of the type used to bundle cables, tubing and the like normally provided with a strap containing a plurality of notches on a top surface, said notches mating with a head mounted on an end of said strap, the improvement comprising a plurality of additional notches on at least one side of said strap.

7. The cable tie of claim 6 further comprising a plurality of side notches on at least one side of said strap.

8. The cable tie of claim 6 wherein said strap is plastic.

9. The cable tie of claim 6 wherein said plurality of side notches begins a distance from said head.
10. A method of removing an unused end of a cable tie without tools comprising the steps of:

providing a cable tie with a strap containing a plurality of notches on a top surface, said notches on said top surface engaging with a head mounted on a first end of said strap, said strap also containing a plurality of side notches on at least one side surface;

threading a second end of said strap through said head;

pulling said strap to cause said cable tie to reach a desired tightness;

causing said strap to move from side-to-side or circularly near said head causing an unused portion of said strap to break at one of said side notches.

11. The method of claim 10 wherein said strap contains a plurality of notches on each of two sides.
12. The method of claim 10 wherein said strap is plastic.

13. The method of claim 10 wherein said notches on said side surface begin a distance from said head.

14. The method of claim 10 wherein the second end of said includes a tongue generally narrower than said strap.

15. A method for making a cable tie where an unused end can be removed with no tools comprising:

producing a narrow strap with a plurality of notches on a top surface and a plurality of side notches on at least one side;

producing a head attached to a first end of said strap, said head capable of engaging said notches on said top surface.

16. The method of claim 15 wherein said strap is produced with a plurality of notches on each side.
17. The method of claim 15 wherein said strap is plastic.

18. The method of claim 15 wherein said strap is extruded.

19. The method of claim 15 wherein said notches on said side of said strap are cut after said strap is extruded.

20. The method of claim 15 wherein said strap breaks inside of said head.
INTERNATIONAL SEARCH REPORT

International application No.
PCT/US06/0853S

A. CLASSIFICATION OF SUBJECT MATTER
IPC: B65D 63/00(2006.01), 63/10(2006.01); B65B 67/00(2006.01), 67/02(2006.01)

USPC: 24/16.R, 17A, 17AP, 16PB; 248/68.1, 74.1-74.4

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S.: 24/16.R, 17A, 17AP, 16PB; 248/68.1, 74.1-74.4

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<tr>
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<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

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Date of the actual completion of the international search
12 June 2006 (12.06.2006)

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Nath C. Rodriguez
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C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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