

Tech-Tips

COTTER PINS

by Dave Sannich
Portland, ME

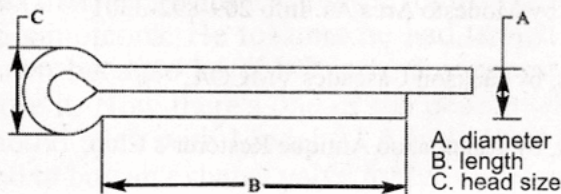
It's so simple that we all know how to use it. Or do we? There is a right way and a wrong way to install a cotter pin, or as it is sometimes called, a split pin.

A cotter/split pin is formed of semi-circular wire that is bent over its flattened side to create a bulbous head. One of the two legs is longer than the other. It is designed to fit into a pre-

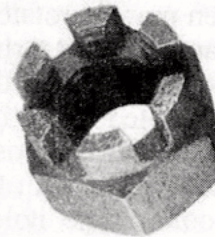
drilled hole. Once fitted, it will prevent the fastener (nut) from working loose. Cotter pins, and their sister

applicance, the hairpin, are also used to secure clevis pins. The wire of which the cotter pin is constructed is a soft malleable material so that the pin may be bent to lock it into position without the legs snapping off. Stainless steel pins are also available for use in corrosive environments. The hairpin is a spring-like material not designed to be bent. The spring action and the profile of the pin hold it in position.

The typical cotter pin has three measurements: diameter, length and head size. The



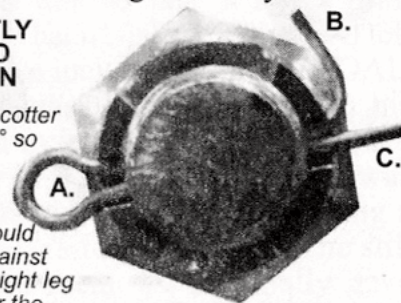
diameter is measured below the head, and encompasses both legs. The length is measured from just below the head to the end of the shortest leg. Use of a pin with the legs too long is acceptable; the legs can be cut off. But using a too short a pin will not allow proper strength in securing the fastener. Cotter pins are generally used to secure a fitting onto a pre-drilled rod, or to keep a nut from loosening on a threaded shaft. In the second case, a castellated nut is often used. A castellated nut has grooves cut into it for the cotter pin. It is used with a thread shaft with a pre-drilled hole. In either case, the cotter pin should fit into the pre-drilled hole with very little side play. The various diameter cotter pins are designed to accommodate that need.



When using a castellated nut, the head of the cotter pin should be parallel with the groove in the nut so that it slides into the groove. The legs on the cotter pin will be bent over the nut and sometimes the bolt end. If the leg is too long, it may be cut off. The legs should be tapped with a mallet to conform them to the nut/bolt. The legs of the cotter pin should not be left sticking out. They are liable

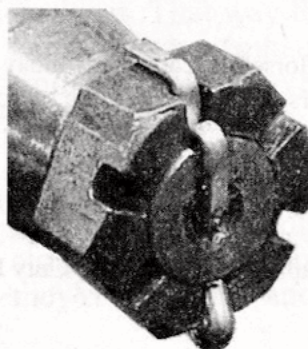
INCORRECTLY INSTALLED COTTER PIN

- A. The head of the cotter pin should be at 90° so that it fits into the groove of the castellated nut.
- B. The bent leg should be tapped down against the nut.
- C. The straight leg should be bent over the bolt end.



CORRECTLY INSTALLED COTTER PIN

The head of the cotter pin fits into the groove of the castellated nut. Both legs are trimmed to size and tapped against the nut and bolt end giving a neat appearance with no sharp ends extended.



to catch or interfere with some part of the mechanism.

It is imperative that the hole in the threaded shaft line up exactly with two opposite grooves in the castellated nut. The nut must be tightened to specifications and then may be rotated no more than 1/12 of a turn (there are six grooves in the typical castellated nut; 1/12 of a turn should fully expose the hole and align it with the nearest groove). The hole must be fully exposed. The correct diameter cotter pin will not fit into a hole that is not completely exposed. DO NOT open the cotter pin and use just one leg to secure the nut. It will not be strong enough, nor will it provide the necessary holding power.



It is also not recommended that a piece of thin wire be used in place of the cotter pin. Vibration can allow the nut to move slightly. The rigidity and strength of the cotter pin is designed to withstand those slight vibrations, and hold the nut in place. The wire is not designed to do the job of the cotter pin.

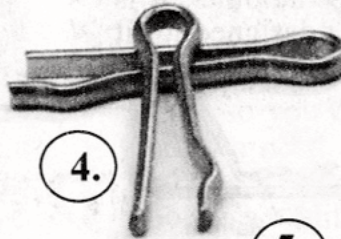
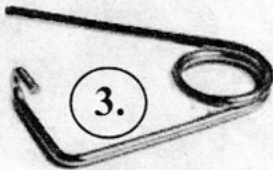
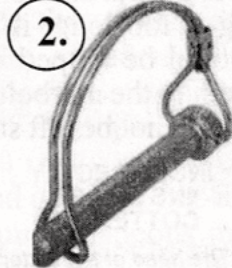
If properly installed, a cotter pin is readily removable. A special steel tool, pointed to fit through the head, and bent at a 90° angle grasps the head of the cotter pin and allows it to be pulled out. The legs will straighten as pulling force is applied.



Cotter/split pins, when used in certain aviation applications, are subject to special installation regulations as specified in FAA Advisory Circular - AC 43.13-1B (Section 6)

S.K.

Various other types of cotter pins and locking devices exist. Essentially their job is the same as the lowly cotter pin: to keep fasteners from coming loose. Here are a few illustrations of several types of pins:



1. Bowtie Cotter
2. Locking Lynchpin
3. Locking Cotter
4. Humpback Cotter
5. Locking Humpback
6. Self Locking Cotter

EVENTS:

California:

Arcadia, December 31 - Horseless Carriage Holiday Excursion tour. Santa Anita Park, Entrance through Gate 6 off Colorado Place. By Horseless Carriage Club of SoCal. Entry/parking fee \$10.

Turlock, Jan 28, 29 - Swap Meet, Stanislaus Cnty Fairgrounds, by Modesto Area As. Info 209-892-3301

Michigan:

Jackson, January 22, Swap Meet, Jackson County Fairgrounds, by Jackson Cascades VMCCA, Info 517-764-3135

Kalamazoo, Feb 4, 5, Swap Meet. Kalamazoo Cnty Expo Center, by Kalamazoo Antique Restorer's Club, Info 269-375-3669