

## Description of one-hand-operated springlock cages and instructions for making them

Currently, systems allowing one-hand operation of springlocks are installed only on garments and operate only with elastic drawcords (jacket hoods, waists and hems, overmitts, etc.). These systems usually consist of ribbon or cord loop tethers threaded through the springlock's eye or through special slots at or near the bottom of the springlock's barrel. The springlock cage systems described here work significantly better than either of these systems, allowing the springlocks to release the cord more easily when pulling on it while letting the springlock apply its full holding force on the cord at rest (see the test report "Comparative evaluation of hold and release characteristics of various springlock tethering systems allowing one-handed operation" posted on the same website as the present document: <http://www.kiddiesgames.com/jacketinserts/>). Having to apply less tension to release the springlock also allows for more accurate and fast adjustments, especially with elastic drawcords.

Springlock cages can also be used in applications requiring static cord, such as the top skirt closures of backpacks, stuffsacks, etc. Finally, springlock cages do not trap the springlock permanently. In the commercial tether systems, if the springlock needs replacing, the ribbon must be cut or its seam ripped. In a cage, the springlock is held in only by the threaded cord and can easily be replaced. On the minus side, springlock cages are slightly more complicated to make than simple loop tethers but, as shown below, they are still fairly simple.

### 1. Description

A springlock cage is made of two lengths of ribbon. The first one (the "transversal cage", marked as T on the figures) has its two ends sewn to the edges of the second ribbon (the "longitudinal loop", marked as L on the figures), so as to wrap snugly around the barrel of the springlock and hold it aligned lengthwise with this second ribbon. The longitudinal loop wraps over the top and bottom of the springlock and its two ends are sewn to the garment, pack or other piece of gear as close as possible to and, if possible, on either side of the hole where the cord comes out of its sleeve. Each ribbon has a hole in it allowing the cord to pass through (Figure 1).

When the cord is pulled, the springlock is squeezed by the longitudinal loop, releasing its hold on the cord (Figure 2).

The main parameter affecting the function of the cage is the angle made by the two ends of the longitudinal loop. A wider angle (shorter loop) yields a stronger "squeeze" from a relatively light "pull" on the cord (i.e. it has better release characteristics), whereas a shallower angle (longer loop) will be the opposite (Figure 3).

Metal grommets used to protect the hole in the fabric where the cord comes out prevent sewing the two ends of the longitudinal loop close enough to the hole and thus reduce the loop angle and the performance of the ribbon cage. An alternative cage configuration may be used in these cases where the two ends of the longitudinal loop are sewn together next to the eyelet (Figure 4). As shown in the test paper, this configuration releases as easily as the one shown in Figure 3 but requires piercing an additional hole in the longitudinal loop.

When a grommet-protected cord hole is accessible from the back, it is also possible to thread the ends of the longitudinal loop through the grommet and sew them on the inside, on either side of the grommet as shown on Figure 5.

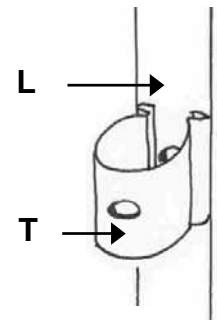


Figure 1

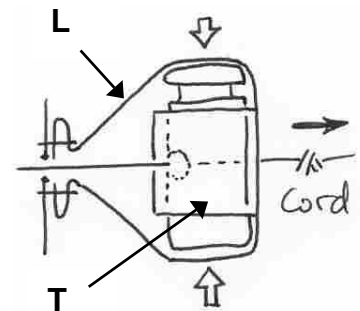


Figure 2

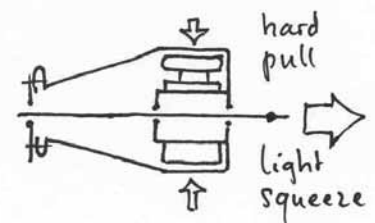
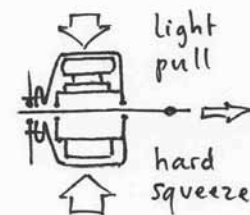


Figure 3

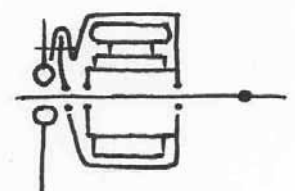


Figure 4

For a backpack drawcord closure, the term “one-hand operation” must be qualified. With no springlock tether or cage (i.e. with a loose springlock, as currently used on most backpacks) you must close the top with two hands and one motion (provided you don't have to fumble around first to find the cordlock dangling at the end of its cord): one hand pulling on the cord and the other squeezing and sliding the springlock. To open this system, you need two motions: first you must release the cordlock, sliding it down the cord, then you need both hands to reach into the opening and pull it open.

With a springlock cage you can close the opening with one hand and one motion (i.e. just pulling on the cord(s)). To open it again, you need two hands but still only one motion: one hand releasing the springlock and pulling on it, the other reaching inside the pack opening at the opposite end and pulling it open at the same time. A springlock cage makes opening and closing a backpack drawcord significantly faster and easier, especially with bulky mitts or gloves on, in bad weather, etc..

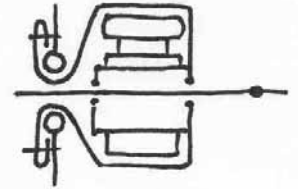


Figure 5

## 2. Instructions for making springlock cages

### 2.1. Springlock considerations

There are many different kinds of springlocks. For garment applications with one or two strands of elastic cord, Ellipse-type cordlocks (<http://www.itwnexus.com/cord-locks.html>) are popular and work well in the cage system. Other types of springlocks also working well are rectangular ones, cylindrical barrel-locks, etc. However, springlock cages will not work with small spherical springlocks nor with the tiny ones sometimes found on jacket hood drawcords.

### 2.2. Materials

Other than the regular sewing equipment (machine, thread, needles, etc.) all that is needed is grosgrain ribbon. Thin webbing or fabric tabs may be used instead but grosgrain works best and is easier to handle. Typically a width of 13 mm or 1/2 in. is adequate although long barrel-locks may require a wider ribbon for the transversal cage. The width of the transversal ribbon should be about 2/3 of the height of the springlock (measured with the cord threaded through the eye), possibly more if a narrow ribbon is used for the longitudinal loop (e.g. when sewn behind a grommet as described in Section 2.7)

### 2.3. Sewing the transversal cage to the longitudinal loop

- A. Start by cutting a length of grosgrain ribbon for the longitudinal loop that will be longer than required (e.g. one that will wrap lengthwise around the springlock and overlap itself by about 4 cm (1-1/2 in.))
- B. The transversal cage can be cut to fit snugly around the barrel of the springlock by wrapping a length of ribbon around the barrel and cutting it so its edges overlap by just 2 mm (or 1/16 in.). If you are likely to need to make more cages at a later date, using the same springlocks, you may want to take note of this measurement.
- C. Lightly sear or melt the cut edges
- D. Sew the ends of the transversal cage to the edges of the longitudinal loop, approximately in the middle of it, as shown in Figure 1 and 6

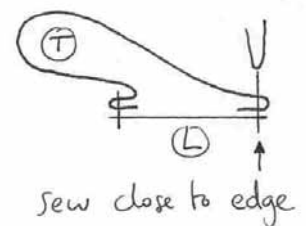


Figure 6

### 2.4. Burning a hole for the cord

A hole aligned with the springlock hole needs to be made in each ribbon to let the cord through.

- A. insert a short piece of cord inside the springlock to make it adopt a realistic length
- B. Insert the springlock in the cage, wrap the longitudinal loop over the top and bottom of it
- C. Mark the spot lining up with the springlock's eye on both loops and use a hot nail to burn/melt a hole through the two marks at once. For springlocks that will take two cords (e.g. backpack closures), the nail may be moved slightly from side to side to make wider holes.

## 2.5. Sizing the ribbon for the longitudinal loop

While you need the shortest possible longitudinal loop, too short a loop and you will either not be able to insert the springlock after the cage has been installed or the loop will permanently squeeze the springlock, thereby decreasing its holding capacity.

The longitudinal loop therefore needs to be a compromise specific to the springlock model/dimensions and to the type of material used for the ribbons: the shortest possible loop that still allows insertion of the springlock and does not squeeze it at rest. It is recommended that you experiment with your own materials before deciding on the final length of the longitudinal ribbon.

## 2.6. Installing the cage

Once the hole is made, the two ends of the longitudinal loop are sewn to the garment, pack, etc. on either side of and as close as possible to the hole from which the cord will come out, as shown in Figure 7.

The cage will tend to maintain the springlock in a fixed orientation. Therefore, some thought should be given to which orientation is best for the use. For example, for jacket hood and waist cords, it is probably best to sew the cage so the springlock will stay vertical; for backpack closures, it may be preferable to sew the cage to the drawcord sleeve horizontally so the cage does not get twisted when the pack lid presses the springlock flat, etc. However, retrofitting an existing pack with a springlock cage may not allow this option.

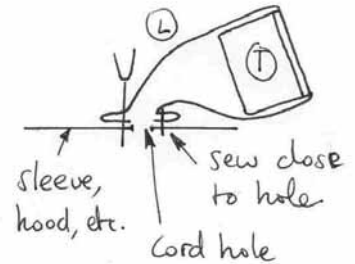


Figure 7

## 2.7. Springlock cage for a grommet-protected cord hole

As mentioned above, a grommet will prevent sewing the ends of the longitudinal loop close enough to the hole. In this situation, the designs shown in Figures 4 and 5 are preferable.

If the grommet is installed in a way that both sides are accessible, you may use a narrower ribbon for the longitudinal loop (9 mm or 3/8 in. grosgrain appears to work well for this), feed the ends of the loop through the grommet and sew them at the back and on either side of it, as shown on Figure 5. Done properly, this actually provides a very sharp longitudinal loop angle and, therefore, very good release characteristics. The ribbon for the longitudinal loop will need to be longer than in the previous system by about 2 cm (3/4 in.) and should be threaded through the grommet in a way that will not impede the sliding of the cord. In this set-up, it is essential to maintain and if possible, increase the width of the transversal loop and to make this loop as snug as possible around the springlock's barrel in order to keep the springlock aligned with the longitudinal one and prevent this loop from slipping off the top and bottom of the springlock.

If the grommet is not accessible from behind, the option shown in Figure 4 may be used. Sizing and construction instructions for this type of cordlock are the same as described in 2.3 and 2.5 except:

- 1) The transversal loop should be installed about 6 mm (1/4 in.) off the middle of the longitudinal loop
- 2) An additional hole must be burned in the longer side of the longitudinal loop as shown on Figure 4 to let the cord through
- 3) The cage is installed by sewing the two ends of the longitudinal loop together about 6 mm or 1/4 in. to the side of (or above) the grommet

## 2.8. Finish the springlock's installation

Once the cage is sewn, the springlock is inserted and the cord is threaded through the various holes and eyes, trapping the springlock inside the cage.

Enjoy your new and improved one-handed cordlock system!