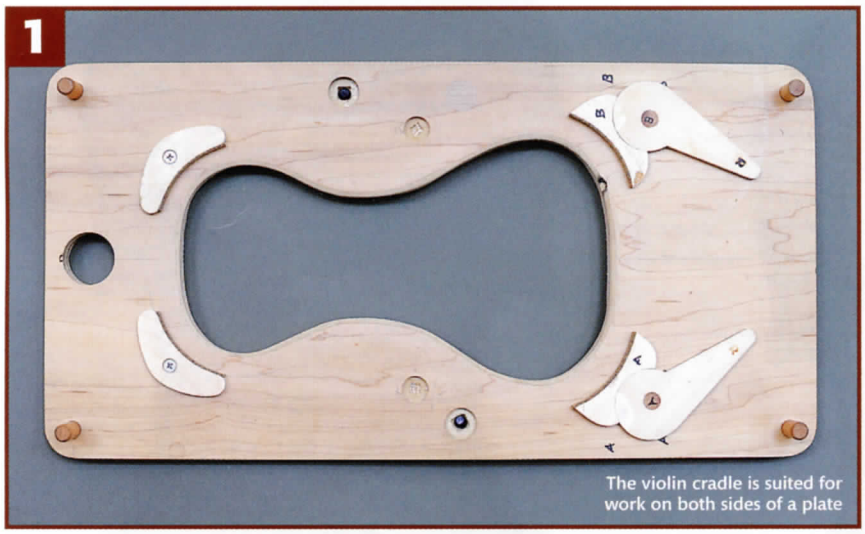
How to make a universal cam-action work cradle

A series of cradles that incorporate an easily operated lock-and-release mechanism enables you to work on almost any solid table

BY GUY RABUT
VIOLIN MAKER BASED IN NEW YORK, US

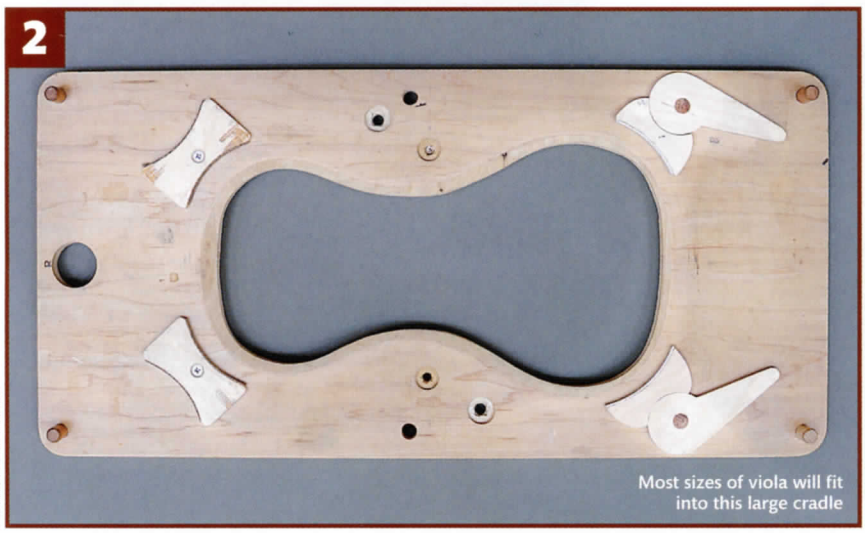
FOR MANY YEARS, I worked on my instruments with a series of makeshift cradles, using various bench dogs and clamps to hold the plates in place while I did the rough arching and the finish planing and scraping. After trying to think of a simple way to hold the work in place using an easily operated lock-and-release mechanism, I hit on the idea of incorporating a cam into the clamping system. I set out to integrate wooden cam clamps with a work cradle, and the result is what you see here.

A great feature of this system is that you can work on just about any solid table, even if you are away from your normal workbench, and it is ideal for 'working vacations' or violin making workshops. The cradles shown here are the latest in a series, as the design has evolved and improved. I hope that with the amazing amount of inventiveness and creativity in the violin making community worldwide, I will hear about some great additions and improvements to what I have presented here.



The violin cradle is suited for work on both sides of a plate

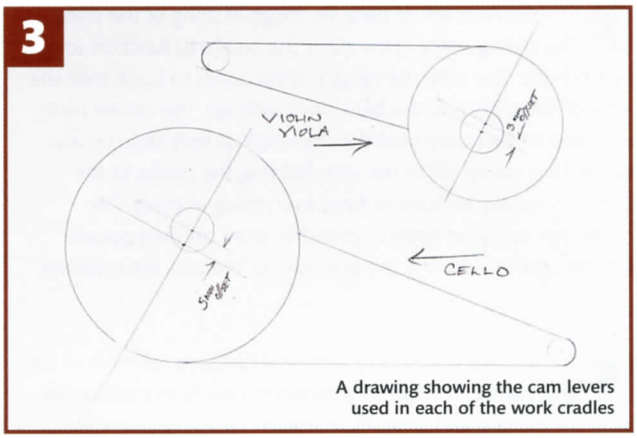
1 This is the violin cradle. Each cradle, whether for the violin, the viola or the cello, is constructed from a flat piece of 0.75 inch (19mm) plywood, cut out to accommodate the arching, with the inside edges rounded over slightly. (The cello cradle is made from two pieces of plywood measuring 1.5 inches, or 38mm, thick.) The flexibility of the open cradle design is equally suited for work on the inside and the outside of the plate. There are two swivel clips at the upper end and two cam-actuated clips at the lower end to lock and release the plate. A simple turn of the lever activates the cam, which pushes the curved 'shoe' against the edge of the plate, locking it securely into place.



Most sizes of viola will fit into this large cradle

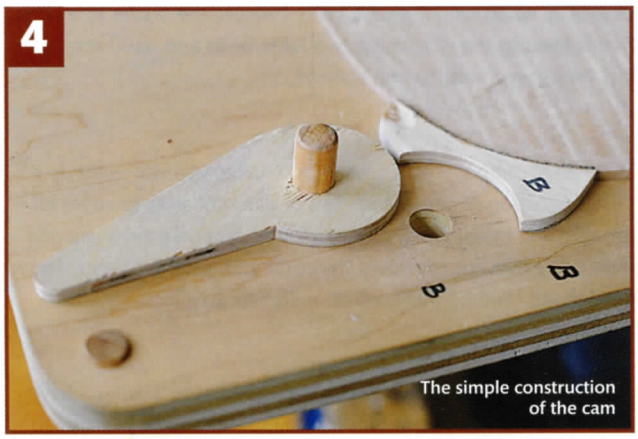
2 This image shows the viola cradle. One nice feature of this cradle is that it can accommodate most sizes of viola, from just under 15.75 inches (400mm) to about 16.6 inches (420mm). There is a two-sided upper clip that swivels to fit each of the two large sizes of viola. I replace this clip with a larger one to hold the smallest size of viola. All of the clips and shoes are lined with rubber or cork gasket material for a better grip.

ALL PHOTOS GUY RABUT



A drawing showing the cam levers used in each of the work cradles

3 Here is a drawing of the cam levers that I use. The diameter of the circular section is 2 inches (50mm) for the violin and 3 inches (75mm) for the cello. I found after some experimentation that a 3mm offset on the violin and viola cam and a 5mm offset on the cello cradle is just about right: it gives you plenty of clamping action and also releases easily. The 3mm offset provides a 6mm 'wedge' and the 5mm offset works out at a 10mm one. The levers and the shoes are made from birch plywood about 5–6mm thick.

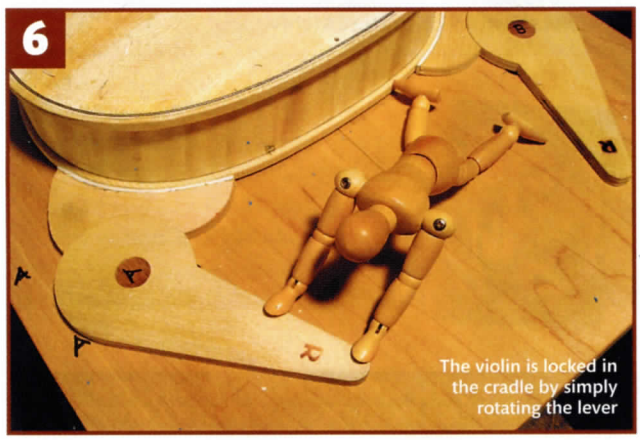


The simple construction of the cam

4 In this photo, the cam has been removed to show its simple construction. It is important that the cam post fits snugly in the hole because it is only held in place by friction, with no screws or metal parts. It is also helpful if the post is exactly perpendicular to the cam lever so that it lies flat on the cradle as it rotates.

The shoe clamps against the edge of the plate

5 Here is a detailed view of the cam and the shoe as it clamps against the edge of the instrument. One easy way to cut the circular shape in the shoes is to stack up a few blanks and drill out the curved section with a large Forstner bit. It works very well if you have designed your cams to match an even-sized drill, such as a 2 inch (50mm).



The violin is locked in the cradle by simply rotating the lever

6 My assistant is helping me to lock the violin in the cradle by simply rotating the lever. You will eventually find the right size for each shoe that you need, so that the clamping action of the cam is just right. If the lever is rotating too far to the outside, just make a slightly larger shoe to take up the difference. ▷


The sliding corner pins enable the cradle to function as a bench hook

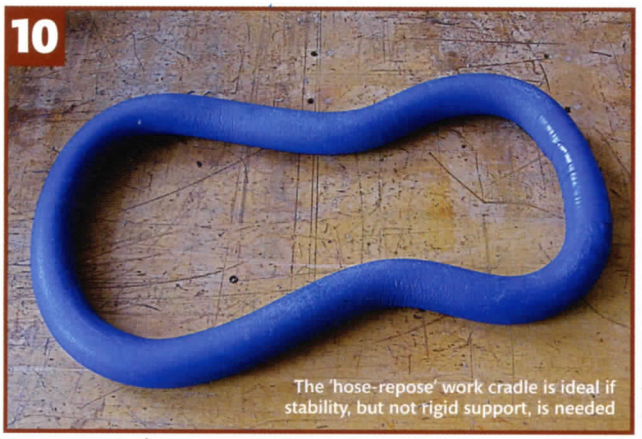
7 The cradle is set up here for rough arching of the plate. The sliding corner pins allow the cradle to function as a bench hook. The near corner pins drop down to hook over the edge of the table and the back ones slide up. The corner pins are fitted so that they hold their position as they slide up and down. One clamp off to the side, holding the cradle to the bench, is usually enough to keep everything in place. The cradle can easily be turned around to work on the opposite side. In order to do this, the positions of the pins are reversed.


The cradle is mounted on a universal ball vice to allow easy positioning of the plate

8 I mount my cradle on a universal ball vice for most of the finish work. The ball vice allows me easily to position the plate for planing and scraping. For even greater stability, this cradle could be mounted on a larger vice. This would be ideal, especially when working on a cello. I secure the cradle to a plate that is fixed to the vice, using two large bolts and hand screws. It is very easy to attach and remove.


The growing collection of shoes and clips

9 After using the cam cradle for a while, you will build up a collection of shoes and clips of different sizes to cover all the different instruments that you make. You may even use one shoe size as you rough down the plate and another slightly larger one for the finished plate, which is slightly smaller.


The 'hose-repose' work cradle is ideal if stability, but not rigid support, is needed

10 As an encore to this discussion about work cradles, I have included this photo of a cradle that I made called the 'hose-repose'. It works very well to stabilise an instrument when cutting a bridge or doing other tasks that require stability but not a rigid support. It is made from a foam rubber tube with a 6mm aluminium wire inside. The cradle can be bent into any shape. I use this when working on violins and violas and I have a larger one for cellos. ■