

## The Bickford Family Knitting Machine

By Fred Hauck

The Bickford Family Knitting machine is one of the earliest sock machines manufactured. While not considered rare, it is a machine that does not show up frequently in “for sale” ads. A Bickford in my possession shows a patent date of 1867.

A few years back, I was reprinting as many sock machine manuals as I could find. My hope was to make a couple dollars while providing a service to people in the sock machine hobby. Murray Clark from North Woodstock, NH, loaned me an original Bickford manual that got me familiar with the Bickford Knitting Machine. Later, I was informed that there was a Bickford machine at the Brattleboro Historical Society in Brattleboro, VT. During a visit to Brattleboro, I photographed the machine and borrowed another original manual. That enabled me to reprint two versions of Bickford Knitting Machine manuals.

After a long wait, I found a Bickford machine and bought it without hesitation. This article has photos of both machines, along with bits of information about the unusual features of the machine. The machine owned by the Brattleboro Historical Society is featured first, as it had all the original accessories. It was an exciting experience to have access to such a complete original machine in excellent condition.



This box is not likely to be an original container. It would not accommodate the machine and all accessories. Note screw driver, cylinder, weights, bobbins and pack of needles (red cap) The clamp inside the cylinder is a swift mounting clamp.



Brattleboro machine full view. Note **Set-up** basket, **Bobbin** and quality of stenciling.



Closer look at carrier and cam adjusting thumb screw. These features differ from the machine in my possession.

The **Bobbin Winder** did not use a belt. The knurled wheel contacted a rubber roller to spin the winding shaft. The condition of the **Set-up** basket indicates the machine had very little use, or the owner took good care of the accessories.

The **Crank Wheel** reduction was similar to the Gearhart machines. Three turns of the crank turned the **Cam Ring** two turns.



Bickford **Bobbin Winder**. The wheel contacted a rubber roller, not shown.

The Bickford machine I purchased had the vertical **Yarn Stand** and a few needles, but no other accessories. Still, it was well cared for. The metal is still very bright and the paint is not badly chipped. The needles indicated quite a few hours of use.

Fortunately, Pat Fly, of Angora Valley Fibers, had Bickford needles. They are specific to the Bickford machines. One hundred and fifty needles were bought from Pat.

When in action, the needles rise barely 1/8 inch. Usually, that leads to dropped stitches, but the very narrow wall between the needles and inside of cylinder help to pull the yarn loop down efficiently.

The serial number on the **Sliding Ring** is 9613. The latest patent date stamped on the ring is July, 1869, and the earliest, Sept 10, 1867. The cam controls are improved over the Brattleboro machine. It had to be manufactured after July, 1869, or it would not



A nice view of the handle side of the machine.



View of left side. Note a series of holes around the base. These hole were for pins that served to stop the carrier and shift the cams into reverse when turning a heel or knitting flat web.

have those dates shown. **Bold type in the text** applies to the names given to machine parts by the Bickford Company.

All the images on the following pages were taken of my machine in various states of disassembly.



Figure 1. Carrier on the right. Right end of **Automatic Lever** is up.



Figure 2. Carrier on the left. Left end of **Automatic Lever** is up.

Figures 1 and 2 show the carrier on the right, then on the left. As the **Yarn-Carrier** and **Slip Ring** are rotated back and forth, the “**Automatic Lever**” rocks like a rocking chair. One end goes down to the **Slip Ring**, and the other end rises to rest on the carrier pad. The **Automatic Lever** is shown again in Figure 3 for better understanding. This movement is required so as to place the carrier on the correct side of the needles in operation. The **Automatic Lever** is connected to a cam inside the **Revolving Cam Ring**. That inside cam determines when needles rise before going under the **Stitch cam**, not shown. Figure 4 shows the **Yarn-Carrier** and **Sliding Ring** assembly.

**Needle Cylinders** are secured to the **Bedplate** with two screws under the machine. The needles, **Revolving Cam Ring**, **Ring Clasp** and **Sliding Ring** must be removed from the machine before changing **Needle Cylinders**.

The **Ring Clasp** must be removed to remove needles. The **Ring Clasp** consists of two semi circular bands hinged on one side with a latch on the other. It removes and installs easily. See Figure 5.

Figures 5 and 6 show the parts removed from the machine. All remaining parts can be removed from the machine as seen in Figure 6, leaving only the **Needle Cylinder** which is secured by two screws.

Figure 7 is all about the space between the needles and carrier. The latches are 1/4 inch long, and if the



Figure 3. Here the **Automatic Lever** is shown resting on the **Sliding pad** with the right end elevated by the carrier pad.



Figure 4. The carrier is shown here mounted on the **Sliding Ring**. Note two short pegs on the **Sliding Ring**. They limit how far the carrier will move when changing direction of rotation.



Figure 5. The large ring here is the **Ring Clasp**. It holds needles in the **Needle Cylinder**, and also holds the **Revolving Cam Ring** down against the **Bedplate**.

carrier is closer than 1/4 inch, they can be broken by the carrier. Other machines require this spacing to be close. The Bickford machine has a built in delayed timing of the carrier that compensates for this wide spacing. When set up as in these images, my Bickford machine knitted tubes with no dropped stitches.

A complete evaluation of a sock machine requires a lot of testing before declaring it a “Great Machine”. That evaluation is about to begin. Meanwhile, this article can be published so hobbyists can get acquainted with the unusual characteristics of the Bickford knitting machine. It is a very fascinating piece of machinery. Some I-cord was knitted as a first project aimed at evaluation. The standard machine was sold with 72 and 100 slot **Needle Cylinders**.

A Bickford manual is published online at the following address.

<https://archive.org/stream/illustratedinstr00bic#page/n9/mode/2up>



Figure 6. This shows the **Revolving Cam Ring** striped of all screws and external parts. The **Yarn-Carrier and Sliding Ring** assembly can be lifted off the machine in this configuration, without removing the needles or **Revolving Cam Ring**.

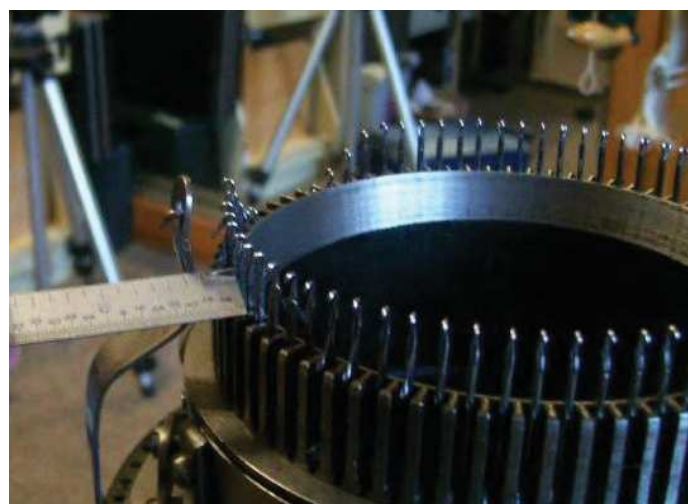


Figure 7. The carrier must be slightly more than a quarter inch from the needles to avoid breaking latches. The delayed timing of the carrier is just right for feeding yarn to the needles.



Figure 8. A short length of I-cord was knitted on four needles.

## Overview

The only “restoring” done to my Bickford was to polish the cams. The tolerances were so tight, there was a risk in making any alterations. The heel spring and brake were not functional, so an alternative heel spring and brake wire were installed

After knitting some I-cord on 4 needles, the machine was set up to knit tubing. Sixty inches of tubing was knitted with out a single dropped stitch. That will be finished as a scarf.

Several attempts were made to turn a heel. The first half went well, but the second half was a series of failures. I would like to claim it was operator error, but I can’t give the machine a passing mark until I figure out how to complete a heel.

The machine does a satisfactory job knitting I-cord and tubing. The good news is the machine is an example of very early sock machine design. While not a good choice for making socks, the machine can be regarded as a valuable collectors item. Not many Bickford machines show up for sale on eBay.

Figure 10 shows the unique design of the cams. Any modifications to the cams would spoil the originality of the machine.



Figure 11. View of cam controls. These controls adjust stitch length and reverse the cams. The **Automatic Lever** was also shown in Figure 3. The right end is resting on the carrier pad.



Figure 9. Setting up the Bickford for tubing.



Figure 10. Inside view of cam ring. The serial number on the **Sliding Ring** is 9613.

An interesting feature of the Bickford machine is the method of shifting from forward to reverse when turning heels. A pin is inserted in one of the many holes at the base of the machine, The pin stops rotation of the carrier, but allows the cam ring to rotate farther, thus repositioning the cams and carrier to reverse direction.

To learn more about Dana Bickford, simply write his name in a search engine. He was a very clever inventor.

I was disappointed in failing to make a sock. It can probably be done. The first half knitting the heel was encouraging, but after that, there was failure after failure. I suspect it is a matter of locating the reversing pins.

I will end up with a very nice dark green scarf.



Figure 12. Sixty inches of yarn tubing was done with no dropped stitches.