A Look at the First Web Weavers

The Last Fishing Gear Masters

How Handcrafts Were Replaced By Machine

A Demonstration of Early Net Making

Timothy C. Visel, Aquaculture Center Coordinator
Text by Susan Weber and Alex Disla
Diagrams by Alicia Cook
May 2007, Adult Education Program

The Sound School Regional Vocational Aquaculture School
17 Sea Street
New Haven CT 06519

A look at the first web weavers

It's an old argument - which came first, baskets or cloth. We will most likely never know for certain. The answer is probably lost for all time. What we do know is that fishing baskets were used thousands of years B.C., so baskets and the process of making twine from natural fibers also enabled the first basket sacks, (which today we call burlap). They also involved the basic techniques for cloth making with looms and the making of mesh or a pliable collapsible basket.

The early fishing baskets constructed from shaped wood or split wood had the first concepts of rows, and openings. This was necessary to let some of the water pass through them so as to reduce resistance and of course, let some fish enter also. This is opposite most of the early baskets that were designed to hold all contents and sought to reduce spaces between the weaves. The materials were also different, baskets had finer materials, split fibers or reeds/grasses while those used to catch fish used larger, and more stable materials. Over time, the fishing basket evolved into fishing mesh or a combination of both. It is better to think of the first fishing mesh as a type of basket, with rows and spaces, the space now being defined by a pliable twine that lacked a definite shape, which today is called a ‘‘mesh’’. This type of basket certainly was more easily carried and deployed. We refer to them as ‘‘bags’’ today. Early fishing methods often had a combination of both a wood frame and mesh around it or in it. Some of the early eel pots (circular creels) and Native American fish traps utilized this approach. Until just a few decades ago, New England lobster traps resembled more of a basket like device than a trap.

Key to this new type of fishing method depended upon two basic things - skill (labor) to make the twine and the skill (labor) to make the mesh. The twine was made by twisting natural fibers - much the same as yarn created from a spinning wheel forming a continuous small diameter rope.

The twine

It had to be stable enough to remain flexible and yet when tension released it held

together. When hand twisting natural fibers tension and length became a problem. Also creating knots in twine is a problem for as soon as tension is released, the tendency is for handmade knots to become undone. Hours of making mesh can be lost by picking up a piece of mesh webbing, dropping it and watching all the knots loosen into a hopeless tangle. The ability of the knot to set is a direct relation to twist --the looser the twist, the tighter the knots. In some cultures twine was treated with animal fat to provide stability, which continues in the form of wax or petroleum products.

Therefore, early mesh (webbing) construction is most easily done under tension both from a practical materials point of view and a processed one. Features of this construction process can be found in hand knitting lobster trap funnels (heads) today in northern New England, one of the last true hand crafts associated with "net" making. We know about that Native Americans used natural fiber webbing to make "nets" as records of their fisheries for traps, seines and even gill nets exist in Colonial reports. What it seems to be lost is how these early nets were constructed? The basic process on how to make webbing has survived antiquity.

Making the Webbing

Once the natural fiber twine was created and we still use natural fiber twine such as jute and sisal, which due to their biological qualities of decay are today making a comeback. Decay was the problem with natural fiber twine and webbing and very few examples of early natural fiber webbing survive today. The technique, however, has been detailed in pottery and actual examples have been found in caves in southern France and in several Egyptian tombs. From these examples and techniques, still in use today, we can draw some conclusions about the early mesh or web making process.

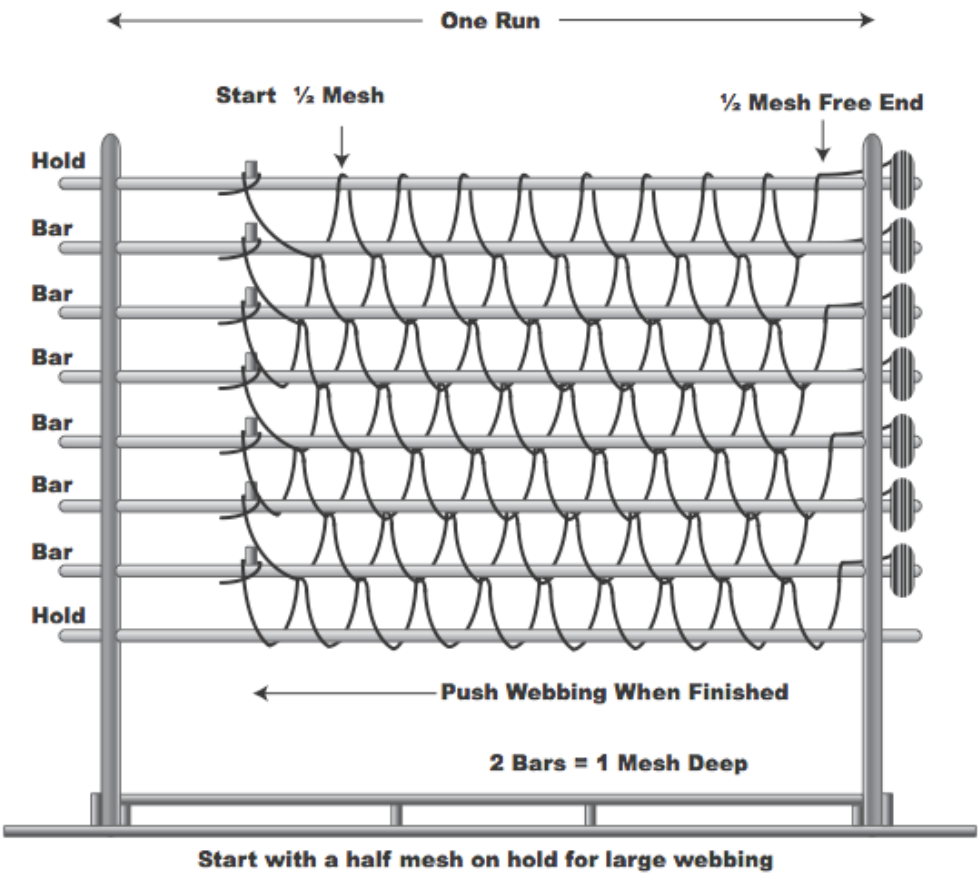
The process involves joining or knotting together twine to make mesh. The earlier versions consisted of rectangular webbing, like tennis nets and later, the more mesh like or diamond shape, we think of today, such as fish nets or even basketball nets. It

was labor intensive and repetitive, a process that involved making thousands of knots that would produce sufficient webbing from which to form or create a "net."

Although today, the terms webbing and netting are used to describe the same materials, technically you make a net from the mesh or webbing. Two procedures need to be in place, an amount of twine in a form that can easily be handled and a frame around which the webbing can be constructed. Only a small reminder remains of the earlier process, a net needle and mesh board or scale. But they provide a link to a larger and earlier industry that once occupied thousands of people world-wide -- the making of "webbing".

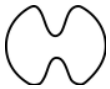
The limitations around hand making mesh remain today, how much a certain person could hold and what could be easily knotted. It proved to be much easier to make large mesh on a frame and small meshes by hand. Each involved similar processes.

Figure (1) Native American Fish Net Frame
From an Eskimo Sketch-University of Washington, 1984

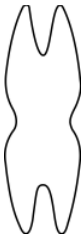


From the diagram this very early type of loom was constructed from wood shafts, which allowed the meshes to be created vertically. Tightly packed balls of twine when then laced over smooth horizontally spaced bars forming a half mesh row and left at the end of the run. A second ball of twine would then be laced over the first creating a flat knot. The twine is held inside pointing out around both, inside and down to create a loose flat knot. When the wood shaft is removed the knots will tighten. One of the advantages of the flat knot was that it could expand or contract with little chance of slipping as compared with the sheet bend or weavers knot. This process would be repeated adding a half row each time – two balls to a whole mesh – when the desired depth is reached, the sheet of webbing is slid off the side and the process begins again. Most Native American webbing has a very tight flat knot. The early process requires the ball of twine to pass around the standing twine to create the knots. This had two limiting movements, the size of the twine ball that could pass between the twine half meshes and the depth of the webbing that the wood frame could accommodate. This process would eventually be replaced by forming the balls with bobbins and the number of bobbins on a vertical loom could determine the number of meshes deep. To make hand/twine movement easier you see a tendency to elongate the twine ball, very similar to the weavers hook shuttle. This would make the knotting process quicker and make the twine longer between rows. We call this device the net needle today. Early examples of the net needle were made of bone, ivory, wood and even metal. The oldest needles were round with cut outs at the top and bottom. Twine wrapped around the internal grooves, later as the process evolved, the device elongated again and many bone/ivory examples look like this. Twine is still wrapped along the interior cutouts at the top and bottom, but about 2,000 years ago, the first closed net needle appears. It has a closed top, a tongue and more rounded base. It coincides when the process leaves the frame and becomes a more hand -operated procedure. The closed net needle is best suited to making mesh by hand. The rapid movement of the needle would catch twine on either side and the closed needle eliminated this problem. This change had two chief advantages: it eliminated the need of the wood frame to regulate mesh since while still using a very small piece, called today the "fid" or mesh board.

Figure (2) Evolution of the Net Needle



Early Ball Type Needle



Middle Age European Needle from the middle 1600's

Late European Needle with Tongue 1700's
(Similar types are found much earlier)

Chaining out – single needle

This procedure is totally hand-based with no extensive equipment. Copies of this net chain process have been found in Egyptian tombs. It uses one bar and needle to form a chain and then a chain is suspended on a back or peg board. Additional webbing is made from the support using a scale or gage (mesh board). Periodically hand made webbing needs to have the knots tightened and this was accomplished by stretching sections between two-fixed points. This process resembles the early fixed loom with one major difference. At the end of each row the next row is continuous, needing just one needle which is now the movable ball of twine. To make this happen, a much shorter mesh board is used to "pile" the meshes together. Once the end of the row is reached, the meshes are slid off and the next row is created opposite the previous direction. The total process is exactly the same as the fixed loom except the bar shafts are gone, replaced by hand held mesh board. The spacing of the bar shafts is now determined by size of the mesh scale or board.

This early loom still represents some of the technology/process terminology today the term "bar" still refers to the length of one half mesh, although the process no longer uses "bars". 'Balls of twine' is still an industry term although the spindle/bobbin machines replaced the actual "balls" hundreds of years ago. Modern webbing machines still use two balls per mesh but instead of the hand passing the balls to make knots, the machine does it adjusting mesh size and tension under which the knots are set. Twine is still sold by the ball, but really resembles tubes and is usually sold by weight. Many systems describe the diameter and weight which can be in tensile strength, number of meters to the gram or diameter.

Making the Flat and Weavers Knots

The reef or flat knot is made by passing the ball or net needle up through the half mesh going around both standing bars and exiting the same way. A general rule of thumb is the twine points towards the next knot. Cross knotting is a mistake that reverses the usually left to right directions (up through) with a down through motion as is required when moving from right to left. Cross knots can be seen in a finished sheet of webbing when tension is released on sheet bend knots (also called the weavers knot). This knot when working from let to right is very similar – ball or net needle is passed up through the mesh (the same way as the reef knot) but goes around both bars and passing underneath the needle end or hand "end." Cross knotting is most noticeable with the sheet bend --- the finished mesh now forms an X pattern. Each knot attempts to cross over the two strands.

The up through and down through process is used when repairing a torn or damaged sheet of webbing. At the end of a complete ½ mesh row, and a bar is made back to the opposite side, the needle is moved down through the mesh. The process can be easily seen by looking at knots in a sheet of webbing by examining the four bars that radiate from a single knot; the direction to the next adjoining knot can be easily seen.

In preparation for a Sound School Adult education workshop, it was suggested that I construct a small model of what I had seen at the University of Washington two decades ago. The idea was to reconstruct it and try to make mesh as it was suggested from the exhibit. I did do that and it worked. I was able to create a sheet of webbing by hand on this crude loom. Although the piece of webbing was small, it did hold and make even meshes with natural fiber twine.

Making Mesh Webbing by Hand

At some point, the making of webbing left a rigid frame and moved to a more flexible construction style. Instead of making the initial half mesh on a shaft of wood suspended in a frame a series of half meshes are made on a loop or a bight of twine with a series of half hitches passing the twine around the mesh scale. The width and height of the scale now determines the length of the mesh bar. The number of loops on the right determines the amount of meshes - now pickups. The depth is determined by the requirements of the project itself, but is sometimes described as the number of knots deep (two knots equals' one mesh deep) longer sheets of webbing could be made by siding sections together of similar depth. In this way, any dimension of webbing could be made by hand.

Native American Fish Nets

Only a few examples of Native American fishing nets or sections of webbing can be found from New England. The warm moist summers would act to quickly rot native twine fibers. Sections have been found – nearly all made with the reef or flat knot. However, many references cam be found in Colonial literature about their use. Some of the most complete descriptions can be found in the 1887 US Fish Commission Report Series (Fisheries and Fishing Industries of the United States, George Brown Goode). The Massachusetts sections have especially detailed accounts of Native American fisheries using seine nets, gill nets and tangle nets. These references provide a brief but critical look back at the final products of New England's first web weavers.

For additional information about Nets and Web Making please contact
The Sound School Adult Education Program:
Susan Weber, 203 946 6875 and ask for the bulletin,
"How to Knit a Lobster Pot Funnel & Make Net Webbing".

Printed By:
The Sound School Regional Vocational Aquaculture Center
60 South Water Street
New Haven, CT 06519