MODERN ARCHERY

The third of these articles is really a continuation of the second one, Composite Bows. The bow I will be describing this time is technically, a Composite bow, (although we will make a slight deviation into a non-composite version; unless you wish to consider high grade steel a "composite"), but it has been moved on so far that it needs to be considered as a type on its own. It is the Recurve Bow (at one time called the "Olympic Bow", but since the IOC have claimed the copyright on the name, we have had to revert to its earlier description)

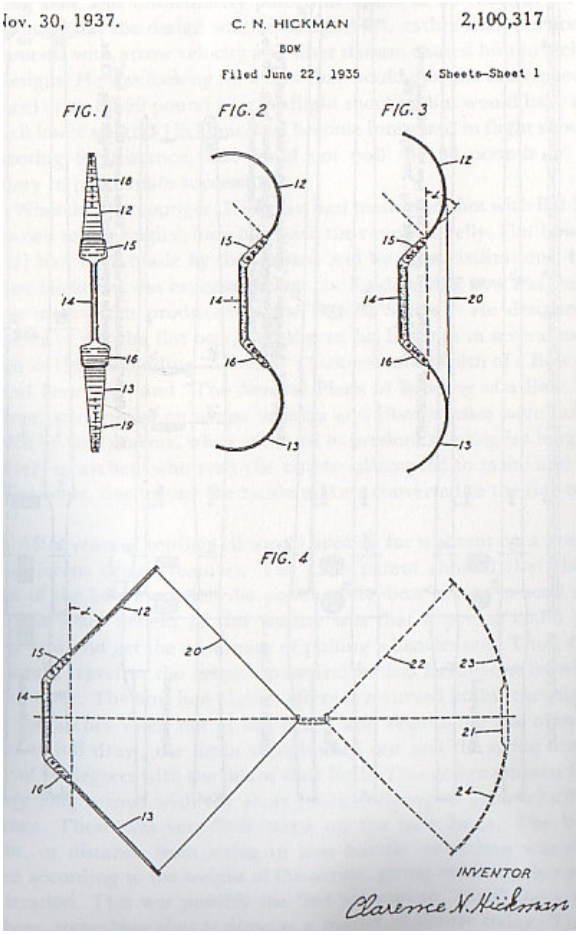
The **Recurve Bow** as we know it is really of quite recent origins, the 20th Century CE in fact. However, activities and events both in the New World and the Old during the 19th Century probably led to its development.

Archery as an organised sport began, as use of the bow for the military purposes declined. In Britain, a number of organisations kept archery alive after its decline in the 17th Century. These included the Honorary Artillery Company, the Royal Company of Archers and the Royal Toxopholite Society. Each of these had Royal support but, there were also a number of other privately supported clubs, such as Skorton and Finsbury, which were also refreshed in the early 19th Century. The Grand National Archery Society was formed in 1861 as a body for the smaller and generally newer private clubs. These clubs all supported the use of the Longbow for shooting, although in a much lightened form for the new gentlemen archers and their ladies. It did however, set a pattern for competitive archery, of the target variety.

In the USA, much more dramatic events occurred, namely the Civil War, 1861 – 1865. what, you may ask, has this to do with archery, did either side use bows and arrows during hostilities? Certainly not as a major weapon, but at the end of hostilities, members of the Confederacy were banned from using firearms. Therefore, the Southern hunting fraternity had to fall back on bows and arrows. Two of these were the Thompson brothers, Maurice and Will. As they had lost all their wealth in the war, they initially hunted to stay alive, but they then started writing about their activities. Eventually, in 1878, the articles came out as a book which also included details of target archery. This was so well received that a revival in target archery was initiated. The American bows at the time were not suitable for target shooting, so bows were imported from Britain. The Americans soon started producing copies of the British bows and even improving on them. So, by the turn of the century, Britain had a strong competitor in the growing sport of target archery.

People might think that the Americans would have capitalised on the Native American Indians history in bow hunting, but this was not so. Their bows had not been developed in the same way as Asian composite bows and Longbows. They developed a wide range of designs, both self bows and composites, but only for stalking and hunting, so were only suitable for short range shots. This was confirmed when, in 1911 a lone Native American Indian came out of the woods in Northern California, from a tribe which everyone thought was extinct. Very fortunately he was taken in by California University, more as an object for observation, where he came under the care of a physician and archer by the name of Dr Saxton Pope. They went hunting together, with "Ishi" as he became known, using a bow of his own design and construction. This was what we now call a "flat bow", and while it was effective at short range, it was inferior to European bows at longer ranges.

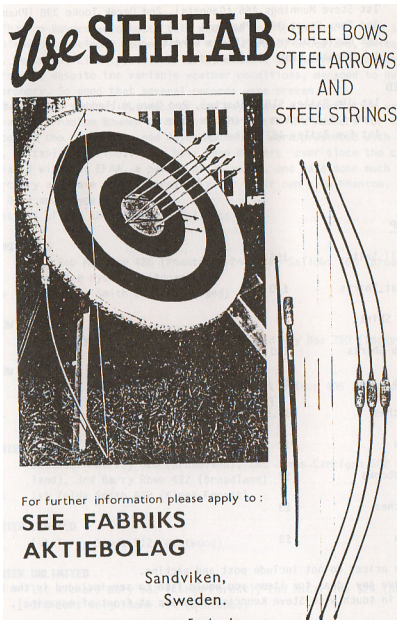
The work of Saxton Pope led to other scientists becoming involved in bow technology. One of these was Dr Paul Klopsteg, mentioned earlier as investigating the Turkish flight bow. He picked up on the work of a Dr Clarence Hickman who was designing bows from first principles. Hickman had worked for the US Government, developing missile systems, during WW1. He was an experimental scientist and had developed high speed photography for projectile tests. When he started to examine arrow flight he was able to show the "Archers Paradox", or how an arrow bends around the handle of the bow as it is released. Working on the energy storage of bows, compared to the stresses in the limbs, he believed flat bows would be superior to "D" section ones like the Longbow. He first of all curved ends of the limbs of an existing flat bow, then developed his own bow "of Radical Design", for flight shooting. This was a short bow, with very wide but thin recurved limbs, and with a short, stiff and narrow hand grip. By making the handle narrower than on contemporary long/flat bows brought the arrow closer to the centre of the bow, reducing "paradox" effects. This is immediately recognisable as the forerunner of the modern Recurve bow. (See illustration below)



This is a copy of illustrations from Clarence Hickman's patent application of 1935. This shows the un-strung and strung bow in the top pictures and then in the lower illustration, the shape it takes up when brought to full draw. As can be seen, this has a narrow hand grip and low brace height, because it was intended initially to be used for Flight Shooting. It therefore adopted characteristics from the Turkish flight bows.

Pope, Hickman and a development engineer called Forrest Nagler, working together produced a book called "Archery: the Technical Side". This came out in the 1930s and caused a great deal of interest amongst the archery fraternity, who soon took up many of the ideas. These included, besides the Recurve principle, the "centre shot" handle, and silk fibre matrix backing for the limbs.

These ideas were quickly taken up by archers, but WW2 intervened and delayed large scale manufacture. However, developments in materials during the war meant that on the cessation of hostilities, much better glues and fibres were available, even if some basic raw materials were still in short supply. In general terms, the American archers were more concerned with bowhunting, rather than target shooting, so development concentrated on fairly short bows, with large amounts of recurve in the limbs to keep the stresses low, but the arrow speed high.



Meanwhile, Europe, or at least Scandinavia, had not been entirely idle. In Sweden an archer by the name of Kjellson, had designed an all steel bow and in 1935 this was put into production by the Swedish steel company, Seefab. Mind you, they didn't stop there, because they also produced steel strings and steel arrows to go with the bow (see copy of advert. at side).

After the war a British firm of tube makers, Accles and Pollocks of Oldbury (Mr Editor, please ensure the spelling of this name does not become corrupted), produced their own take apart version, with distinctive Recurve limbs (see illustration below). I say after the war, but strong rumours suggest they were made during the war to be used by Commandos, hence the reason for them to easily come apart. The version shown has a synthetic (Dacron) string and tubular aluminium arrows, but earlier versions did I understand copy Seefab and use steel for the strings and arrows.

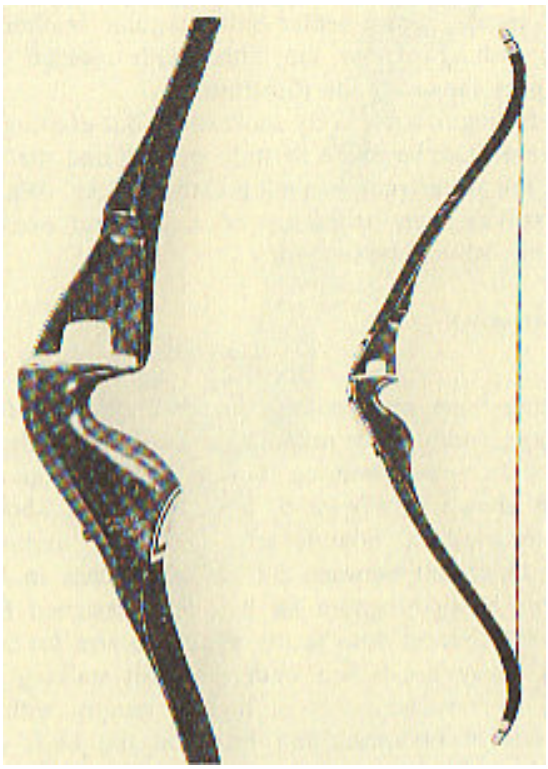
This is an Accles & Pollock, "Merlin" take-down steel bow. Below, it is shown in its storage box and on the left hand side, it is shown assembled and ready for stringing. I didn't risk stringing it up, even for a photograph, because of the chance of it breaking.

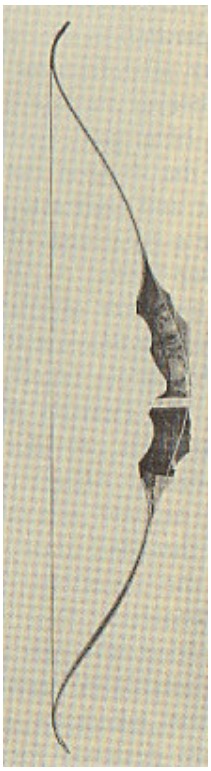
These were superior to the longbows and flat bows of the time, but did have a tendency to catastrophic failure, so archers were recommended to wear a cap with a steel reinforced peak for protection. Whilst I have given credit to the Swedes for this invention, literary sources suggest they may have been tried out in Britain even earlier. I have seen a quotation from a book on archery written in 1792, that steel bows had been tried, but they did not have the “projectile effect”, of wooden bows of the time; there you have it in a nut shell.

However, these developments, maybe a blind alley, were soon overtaken by the introduction of one-piece wooden cored composite bows in the late 50’s and early 60’s in the USA. They had fibreglass backing and facing to the limbs, a cut-away sight “window”, an arrow shelf and a “pistol grip” for hand placement.

The similarity to pistol design was highlighted by giving the bows names such as the Bear’s, “Super-Magnum”. These designs were quickly taken up by other bowyers, who initially copied the hunting designs, but then developed variations for target shooting. The complex shape of these bows became known as “deflex-reflex”, as in side view the hand position is well forward, blending into the limbs running backwards, then the ends of the limbs reflexed back away from the archer.

Two hunting bows of the period are shown below, a 48 inch Bear Super Magnum on the left, with a detail of its pistol grip, and a Pearson Mercury Marauder Takedown on the right (the “Mercury” in the description is because it had a chamber filled with mercury metal in the lower part of the riser, for balance and shock absorption). Notice on both of these bows, the short bow window, characteristic of hunting Bows



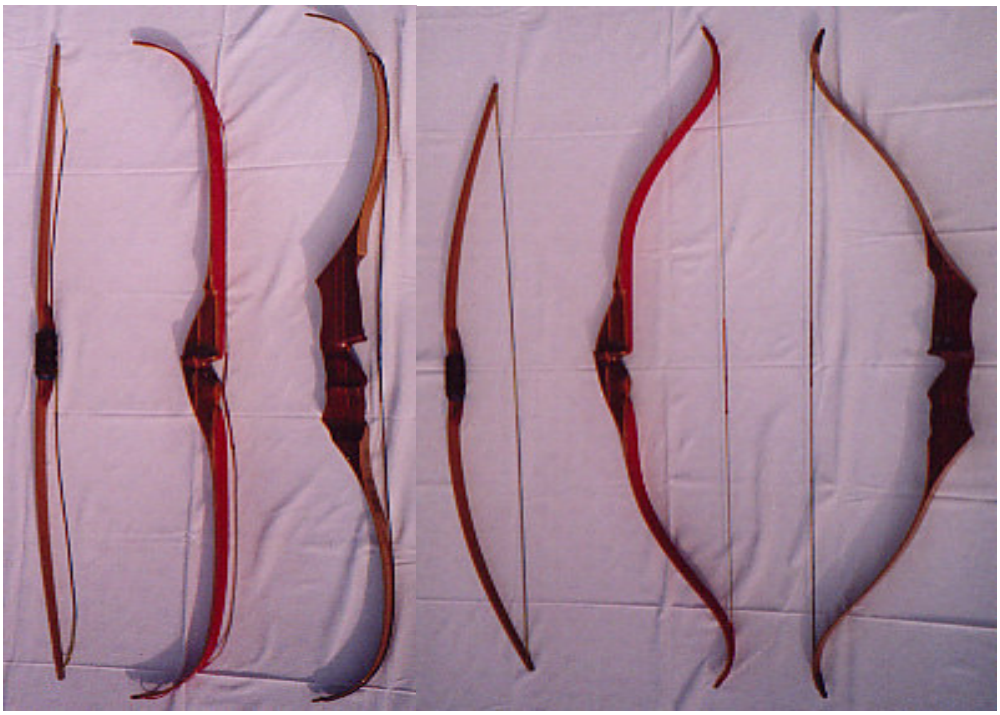


At about the same time, developments in composites allowed the development of another branch or dead end, solid fibre glass bows. The first of these were copies of the wooden flat bows, but experimenters soon found that adding recurves to the limbs improved the cast and reduced the recoil effects on the archer. These bows were cheap to make and proved popular as training bows for beginners. They are still used today for this purpose by many clubs, although as late as the mid 90’s I came across an archer using one of these very effectively in Field Archery, shooting in the Hunting Style, or Traditional, division.

Returning to the wood cored Recurve bows; as mentioned earlier, these were designed initially for the American bowhunters and were about 50ins long and with draw weights around 50

to 80 lbs. As they were using heavy arrows with broadheads and being shot instinctively, at relatively short distances, the sight window was made quite small. This design was not ideal for target use, so bowyers started making them longer, 62 to 66 ins, and reducing draw weights to 30 or 40 lbs. As was the custom of the time, these were still usually shot without sights, using “point of aim”, (FITA prohibited sights until after WW2) and without stabilisers, “V” bars and such. Therefore, bows of this period did not include bushings for these add-ons.

Technology of the time was also influencing other developments in archery, particularly arrows. They were now available made from fibre glass or aluminium tubes, as well as the traditional wood, so were much lighter and more accurate. This, together with raised expectations of the archers, caused them to put more weight into the handles to absorb the shock from the lighter arrows and reduce torque effects. The illustrations below show this change in handle design. Some bows also included a chamber filled with mercury, with the same objective in mind. Grip design of the time was patterned on that of target hand guns, hence use of the term, “pistol-grip”, as opposed to the vertical, rather featureless design of longbows and flat bows. The essence of this design was that it was rather thick and forced the hand into a high wrist position. Initially this feels very comfortable and suited the shooting style of the time, which was to grip the bow on release of the arrow. If this was not done, the bow would twist, causing the string to slap the archer’s wrist. Also, having a high wrist position forced the bow downwards during the release, countering the natural tendency for the top limb to fall backwards, towards the archer’s head. This style of shooting required the muscles of the bow hand to be under tension during the shot, which is very tiring. This became worse as more weight was added to the riser to counter the use of lighter arrows. Many people still shoot with this high wrist position and with heavily sculptured grips to keep the bow aligned during the shot. The illustrations below show: A 60 ins Flat Bow; an early 62 ins Recurve and a later development 64ins Recurve. On the LHS they are shown unstrung and on the RHS, strung.

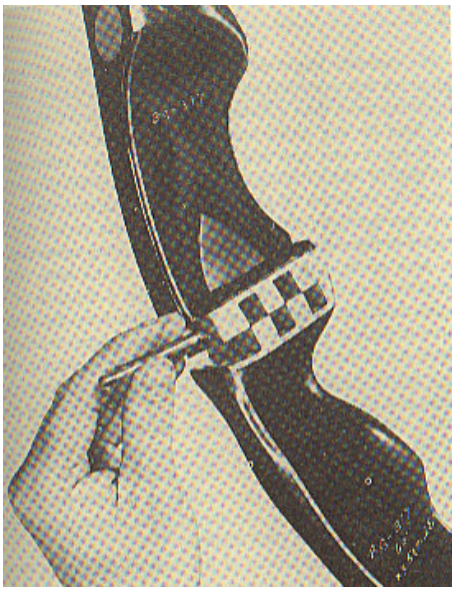


In the early 60’s the concept of “stabilisers” came about. These were initially pieces of wood stuck on to the top and bottom of the riser to keep the bow stable during the shot. When the bowyers discovered this, they built more weight into the bow by widening out top and bottom of the riser portion. Later short rods or tubes, with weights attached, were developed for this purpose. Three bows of this period are shown below, the “beefing up” of the riser portion is clear.

These are target bows and should not be confused with true hunting bows, although all of these particular bows have been used for Field Archery in their later life. This not so surprising as

these are some of the most aesthetically pleasing bows to look at and handle. Even some of the cheaper models use exotic hardwood laminates and look like works of art (not the Modern “Conceptual” stuff I might add, real Leonardo or Michelangelo classical style)

. About this time also, as the bows were becoming longer, the idea of taking them apart for transportation and storage also appealed. Initially a split into two parts was considered, see illustration below:



This is a detail of a Pearson Mercury Marauder Takedown Hunting Bow, This design just split the bow apart in the middle, using a locking pin to keep the bow together whilst shooting. This was not altogether successful, as wear in the joint was not good for accuracy and handle strength was reduced

The concept of making a three part bow then emerged, with the limbs bolted or clipped into the handle or riser, portion. This worked much better and hollow limb retaining bolts could be used as mounting points for the new stabilisers.

It now became obvious that the handle no longer needed to be made in wood, but could be a light alloy casting (aluminium or magnesium). This development is shown below, with three Take-down bows from the late 1980s, two with wooden risers and one with a cast aluminium riser.

Notice, that the grip portion is more vertical than those shown above, but that the owner of the third bow has modified the grip to give a high wrist position.

This all happened in time for the re-introduction of archery into the Olympic Games, in Munich, 1972. Although the three part take-down Recurve bow was available from this time, the one-piece bow remained very popular for target archery, well into the 1980s. The “take-down” bow has now become the basic target archery bow and been adopted in a lesser way, for bow hunting and field archery.

Refinements to the 1970s design have been in the incorporation of advanced materials for the riser, limbs and string, constant additions to “Add-ons”” in the way of sights, rests, stabilisers and vibration absorbing gizmos. Materials, such as aluminium, magnesium and carbon fibre have been used for the handles. The limbs have been improved by use of carbon fibre and ceramic foam, to improve stability in changing atmospheric conditions. String materials have included advanced polymers to resist unwanted stretch and creep, again improving stability and also improving speed, or cast of the arrows.

The widespread adoption of stabiliser systems has meant that the bow can be set up to match the archer and control the way the bow reacts when being shot. This has tended to moderate the way the bow is shot, now the archer does not have to control the bow on release, so the grip tends to be slimmer and more vertical. This way, the archer can use a low wrist position when shooting, to reduce long term stress. Also a relaxed or open hand position for the bow hand can be used, thus reducing bow torque effects.

This illustration shows a typical mid-range target bow from the 1990s, set up with sight, long rod and “V” bars, together with lightweight aluminium arrows of the time.

This just about brings us up to-date as 21st Century bows have not yet progressed far from this design. Just look along any shooting line today.

If anyone wants to find out more about the history of Recurve bows, the following books should make a good start:

The Grey Goose Wing, by E.G. Heath

Archery: the Technical Side, by Pope, Hickman and Forrest Nagler,
(Both of these are out of print, so try your local Library, personal copies are much sought after and rather valuable)

Bowmanship, by Frank Bilson The New Archery, by David F. Butler
(Again, old books and probably only available through the library or a second-hand bookshop)

Clarence N. Hickman the Father of Scientific Archery, by Maryanne M. Schumm

Any Hoyt Catalogue or Owners manual

Mitch Vaughan June 2005