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# Rod Rack

Conducted by Dick Finlay

## Fly-Rod Action and Taper Design

EVERETT GARRISON WITH HOAGY B. CARMICHAEL

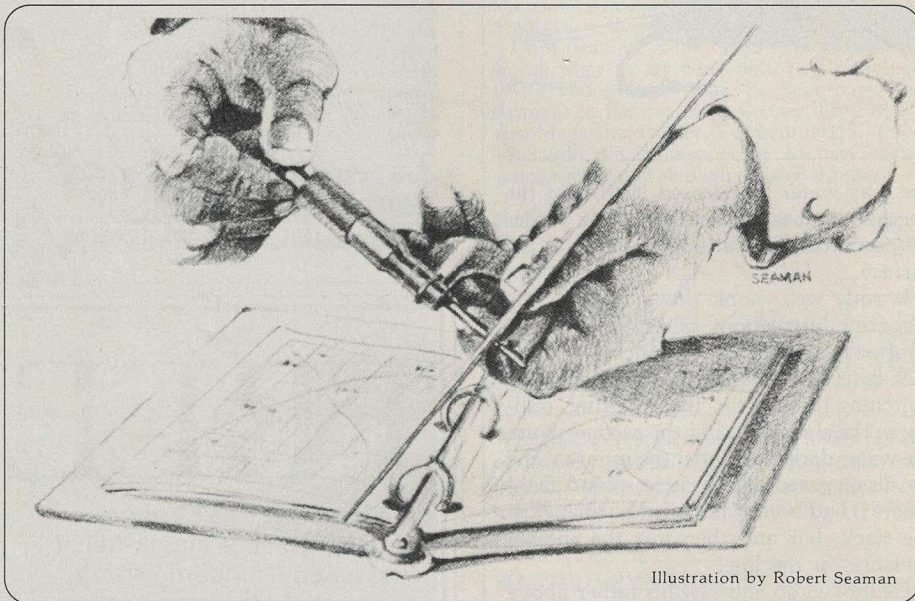


Illustration by Robert Seaman

[Everett Garrison has to have been the most generous of bamboo rod makers. Those of his generation, as well as those of the preceding one, as a rule kept their rod-making techniques and designs as secret as possible. Obviously, they could be imitated to some degree, but their superlative individual craftsmanship remains distinctive.

In *A Master's Guide to Building a Bamboo Fly Rod*, written with Hoagy B. Carmichael, Garrison not only describes all of the steps of practical bamboo rod building and repair, but also divulges most of his designs and rod tapers for anyone who wishes to use them. The 45 pages de-

voted to taper design contain, for the most part, graphs, charts, formulas and columns of figures, but along with the data are some valuable comments by both authors. And you don't need to be an engineer to understand and profit by them.  
DICK FINLAY]

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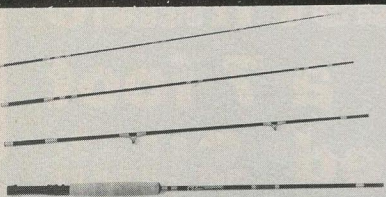
IT IS GENERALLY considered by most that the optimum cross-sectional design for a fly rod is that of the six-sided section. Garry used his engineering skills to compute relative comparisons on four-, five- and six-sided rods, and he concluded that structurally the hexagon has the best design features while at the same time having a practical number of sides with which the rod maker can work. A hexagon is an even- (six-) sided polygon which has the ability to bend equally in any direction. So, for the purposes of this text, we will



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## Rod Rack . . .

consider only the making of the six-sided fly rod.

A bamboo fly rod is made up of six pieces of bamboo, each beveled into equilateral triangles. When ultimately glued together, the result is a length of bamboo having the appearance and characteristics of a tapering hexagon.

If the hexagon is the ideal structural cross section, the major remaining question is: what rod taper will most effectively deliver the line, and ultimately the fly, to the intended target? Variances in the taper design cause one rod to feel different to a caster than another of similar length. The design characteristics and, therefore, the feel of the rod as it casts the line is known as the "action" of the rod.

The power delivered by a fly rod on the forward power stroke begins at the hand-grasp with the energy delivered by the caster's wrist. This energy moves up the rod into the stiffer midsection which, if the rod is properly designed, transmits this power into the tip section. In Garry's words, "If a rod feels like a single unit, the rod is well built for the purposes of casting a line. A rod should act in unison, to pass the energy you wish to impart to your line at an equal speed from one end of the rod to the other. A rod, while on the forward cast, loses quite a bit of energy as it attempts to overcome its own weight and internal friction. This action is achieved by the taper. Most rods in the past have been too light in the tip. They have not been strong enough to deliver to the line the full power that was in the butt section. The result is that you cast a line from the tip, not utilizing the full length of the rod. You should be able to control the rod's movement entirely from the handgrasp, be it either a slow or a fast rod. A tip wiggling at the end, not controllable from the butt, means that you have a weakness somewhere in the middle of the rod."

The transfer of energy that Garry refers to moving throughout the length of the fly rod is occasioned by something he called "wave linear action." Wave linear action was demonstrated to Garry in a lecture at Union College in 1913, by a Professor Esty. Garry recalls "He had a carriage whip there, and when he vibrated it you could see the same width of amplitude all the way down to the end. If you take a wire and pull it tight between two points of support and then you pluck that wire, you will see a wave go out to the far end and come back again. This is the energy of wave linear action. Similarly, the action of a rod must be so tapered that it will also produce a wave linear action. As it is held firm at the hand-grasp, the bending in the rod must go away from the hand. It travels the length of the rod and is reversing itself at given intervals depending upon the natural vi-

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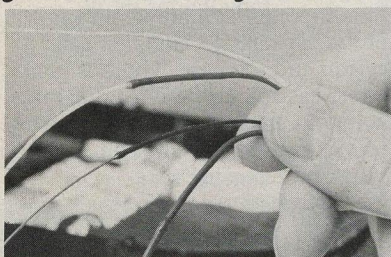
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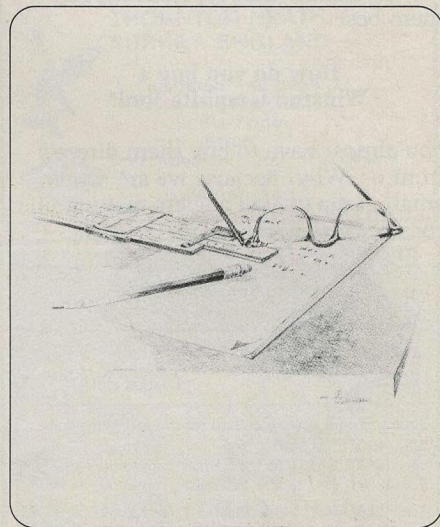
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## Rod Rack . . .

brations of the rod. When this energy meets the line under full tension against the top guide, the wave is transmitted to the line in the air which, in turn, carries the energy to the leader, which then rolls over presenting the fly. If the cast has been timed correctly, and just enough energy has been used, the fly will come to rest quietly . . . all energy expended."

Garry designed all of his tapers using his understanding of that lecture as the cornerstone. The action that developed, and the one he preferred, was called "progressive action." With progressive action, the power thrust of your hand causes a deflection at one point in the rod which travels outward along the rod in a meld of energy and velocity, causing the line to roll out at a speed that has been built up progressively by the wave linear action of the rod and the weight and therefore velocity of the line. "If you want a rod with progressive action, you have to design the rod so that you have an almost



uniform taper. The taper slows down somewhat at the ferrule in a two-piece rod and then continues on until it drops very rapidly near the tip of the rod. Although you will get some deflection from that point [ferrule] up to the top guide, the rod will deliver its last bit of energy in the fold of the line. You may get a little dip in the line, but the line will roll out and you will have control of the line at the tip of the rod. This allows you to shoot a double-tapered-line with a determinable amount of power and finesse."

Another kind of action, and one Garry did a considerable amount of experimenting with and then finally rejected, was what he called "simultaneous action." In short, rods with a simultaneous action assume the load of the line and discharge it instantly, much like a catapult. "Parabolic action is an example of simultaneous action, which you have in a rod with little taper. All of the bending is down at the handgrasp . . . stiff at the tip and losing

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## Rod Rack . . .

that relative stiffness as it comes down to the grip. These rods were useful for weight-forward lines . . . the old principle of an apple and a stick." All of which brings us to a story.

"In 1934, Sparse Grey Hackle asked me to come up to his office one time . . . he had something interesting to show me. I got up there and Charles Ritz and John Alden Knight were there. Charles Ritz had a rod . . . asked me what I thought of it. I said it looks like an Ogden Smith rod. Charlie said, 'It was.' Well, he'd taken a little bit off the top and a little bit off the bottom. Then the story came out later that it had been caught in the spokes of a delivery bicycle and in effect shortened. So, they put a handgrasp on what was left of the butt and put a top guide on the tip and that was the rod. And Charlie said it would hurl a line out to beat the band. I said, yes, it would hurl a line out if you had all the weight of the line up on the end of that line. That was before Marvin Hedge came out with his weight-forward lines. I said, you had quite a heavy line you were using on this rod? He said, yes. So, Jack Knight was so thoroughly impressed with this thing and the feel of it, he wanted to give it a name. I mentioned the fact that if you just took a plank of uniform thickness and stiffness through its entire length and anchored it into a brick wall so it couldn't move and put a weight on the end of it, its stress curve would be a true parabola. He said, 'That's it. This is the Parabolic Rod.'

While Garry's tapers are by no means parabolic, he often referred to them as "semiparabolic." The action of his rods can be felt down into a portion of the butt section just ahead of the handgrasp. He felt that most anglers like to feel the weight of the line as it is being cast, which can aid in directing the line accurately.

When fishing a fly rod, a person begins the backcast while the line is still on or in the water. The impact of that move (suddenly applied load) must be considered when designing a taper so the rod can effectively pull the line off the water. At the instant the fly line is changing directions between the backcast and forward power stroke, there is a split second when the fly and the line are inert. At that point there is no load on the rod. However, when you start to drive the line again, you impart a moving, or dynamic, load to the tip.

Garry felt that an important part of the design criteria left to the rod maker was the last five inches at the tip, because it is here that your taper should on the one hand be heavy enough to pass the energy on to the top guide, while at the same time be light enough so that you can softly set the hook without breaking the thinner tippets.



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