

SUMMARY OF TECHNICAL TALK GIVEN NOVEMBER 8, 2002

BUILDING COPPER BOILERS

Our Boiler Series touched on steel boiler construction, but not too much on copper boilers. John Lisherness had a good suggestion on how to correct that. Rather than try to redo and present what has been written already, we should simply refer prospective copper boiler builders to the key writers in the field. The British view on the subject is exemplified by Martin Evans through his many articles in *Model Engineer* and by Alec Farmer in his book *Model Boilers and Boilermaking*. In the USA, Kozo Hiraoka's articles in *Live Steam* are the things to study.

Interestingly enough, the technique of copying the masters is not new. The October 2002 issue of *Smithsonian* magazine had an article on page 76 called Master Class. It describes how young artists copy existing paintings by noted artists as a way to develop their own skills. The impressionist painter Degas said, "--- and it's only after having proved yourself as a good copyist that you can reasonably try to do a still life of a radish." It should not be hard to extend that concept to the world of model engineering. Study the construction techniques of the authors noted above and try your hand at constructing a boiler from one of their designs.

INJECTORS

Operation

Chris Leggo's talk for the November meeting was about injectors. He started by showing a ten-to-one photographic blow-up of an injector cross-section. It was a startling photograph because Chris made it by actually sectioning a working injector to see how the various components were arranged. He did the sectioning by filling the injector with clear epoxy then sawing the injector apart lengthwise. That's enough to bring tears to one's eyes!

The first nozzle encountered in the injector converts the incoming steam pressure to a steam jet of very high velocity. The second cone, made in either one or two pieces, combines the steam jet from the steam cone with the incoming water. The water condenses the steam and the mixture exits the combining cone at a high velocity. Chris pointed out that a properly made and functioning steam and combining cone can shoot a stream of water 25 to 30 feet before hitting the ground. The third cone is where the "magic" is performed. The delivery cone is actually a reversed nozzle, called a diffuser. Here the incoming low pressure, high-speed jet of water is discharged at a higher pressure and lower speed. The outlet pressure can be many times the inlet steam pressure and therein is the injector's secret on how it delivers water at a pressure higher than its inlet steam pressure.

Testing

Although there is now quite a bit of literature on how to build an injector, Chris cautioned that there are enough uncertainties to warrant building a test bench. Besides, testing is