

# polio network news

## Crutches Anyone?

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Walking sticks have aided bi-pedal man since the dawn of our evolution as an assist to climbing, an aid to steadying ourselves, a probe, a reaching tool, a weapon, an artistic expression, and, for some, a weight-bearing device to facilitate ambulating.

As we became more sophisticated, our walking sticks developed specialized functions for specific needs such as a hook-shaped top to herd sheep or a T-shaped top to nestle in the pit of the underarm for a rudimentary crutch. Form was driven by its need to function and was shaped for the individual's needs often by the individuals themselves.

The mid-19th century brought this country two things that changed the humble walking stick forever: the Industrial Revolution and the battlefields of the Civil War and World Wars. The whole-sale demand for crutches spurred by a sea of casualties disallowed the luxury of hand-whittled, custom-designed, walking devices. Crutch mills were born in the abundant hardwood forests of New England to meet the demand.

A major design change from the T-shaped underarm crutch took place as the bow underarm crutch was developed. Called splits, they are made from a single long piece of hardwood cut down  $\frac{3}{4}$  of its length with the top spread apart in a "V" shape, into which a wooden, cradle-shaped underarm piece is fixed to the top, and a handle is added lower down.

This underarm bow crutch was useful to the many soldiers who

had leg amputations because they could tuck their upper arm tightly between the bows and walk without a hand on the handle, freeing an arm. Though underarm crutches are less energy efficient and more cumbersome than forearm crutches, they are still preferred today by many long-term users for this carrying ability.

For those who could afford the cost, a deluxe sling top, leather-wrapped crutch was designed. The bows above the handle are steam-bent to form subtle opposing "S" curves that function like leaf springs as they are drawn together when body-weight is applied. The soft sling top is still the most comfortable and least deleterious underarm crutch available today.

Although the vulcanization process patented by Charles Goodyear in 1844 allowed for the creation of a metal device that held a rubber pad to be affixed permanently to the wooden crutch end, rubber tips did not become common until the turn of the century, when hard, smooth, man-made surfaces became dominant.

World War I brought the need for more advances in crutch-tip technology. In 1919, George Hippwood patented a sophisticated crutch tip with an air bladder inside. His patent also shows one of the first height-adjustable underarm supports that later evolved into the adjustable underarm crutch issued by hospitals today to the short-term user.

The early polio epidemics brought a variety of problems. When a person's legs and arms were

weakened, both the biceps and the triceps had to be supported. With Franklin D. Roosevelt's help, the Warm Springs Crutch was designed with a metal cuff above and below the elbow.

Others, like me who had paralyzed legs but unaffected arm strength, were issued the Kenny arm-band crutch. Named after Sister Kenny, it is a wooden bow crutch similar to the sling-top, wooden-bow crutch; but instead of the sling top, it has a wide circular leather band attached to the top of the crutch that fits loosely around the forearm.

Issued to many polio survivors, this crutch was particularly good for children. The soft leather cuffs were very forgiving during falls because they did not entrap the arms. Kenny crutches are usually associated with polio poster children.

World War II and the Korean War, along with another polio epidemic, provided customers for the next major change in crutch design. The forearm crutch, often referred to as the Loftstrand crutch, the brand name of one of the early manufacturers, was a boon to its users. Made out of aluminum tubing, it now dominates the world's long-term crutch user

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market. Because they have adjustment holes above and below the handgrip, one size fits all.

As an active teenager, I destroyed these aluminum forearm crutches at the rate of three or four pairs a year. Before they failed completely, they clicked and clacked with every step: I sounded like the "Tin Man" echoing down the halls of my school. Everyone would see me coming, but I was always more annoyed that they could hear me coming as well.

My parents bought the available rubber crutch tips by the case. But the hollow end of the crutch tube would cut through the bottom. I fell regularly.

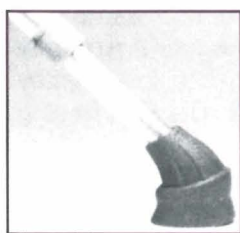
During the hours that I spent repairing my crutches, I developed a large stock of broken crutch parts and some passable mechanical skills. Many years later, when I had shaken off the paternalistic pressure to accept these fragile, noisy, callous-causing, institutional gray crutches as my lot in life, I set out to change things.

In the late 1980s, after 30 years of crutch walking, my shoulders ached more and more when I was active. My doctor told me to slow down and take aspirin. Instead, I decided to design a shock-absorbing system for crutches.

An engineer told me that my shoulders support approximately three times my body weight with each step. And because, like many active people, I walk between 6,000-8,000 steps a day, literally tons of negative ground impact strike my hands, arms, and shoulders. No wonder they ache!

After considerable experimenting, I developed and patented a crutch tip design that has a built-in shock-absorbing gel polymer pad called *Absorbalite™*. An oversized steel disk is chemically bonded

above the gel pad. The crutch shaft becomes a piston rod as it pushes against the disk and gel pad. The pad and side walls of the tip balloon out as the gel distorts and transforms the impact forces into heat instead of passing the energy up the crutch shaft to be absorbed by the body.



This design has resulted in relief from the "crutch pain" for me and many others (more than 30,000

pairs sold). Because they are hand assembled and use expensive materials, *Performance™* tips and the smaller *Tornado™* tips seem pricey at first. However, they wear three to five times longer than ordinary tips, so they are a good value.

The more I spoke with my crutch-tip customers, the more I realized that we shared the same complaints about manufactured forearm crutches. In 1991, I joined with Enabling Technologies who design and build excellent quality *Superlite™* custom-made crutches. In these crutches without

adjustment holes, the strength and durability are substantially increased, and they are forever silent because they have no moving parts. Much lighter than manufactured crutches, they will even float on water.

We now offer a wide selection of bright dipped anodized colors. And, to protect the bottom six inches of the crutch used to hold a door open, we install black PVC door guard sleeves.

Our high-tech, high-style crutches have not gone unnoticed. Last year when President Clinton injured his knee and was questioned about his snazzy black *Superlites*, he replied, "I call them my Stealth crutches ... I think they were developed as an offshoot of B-2 technology. I like them quite a lot."

We now hand make many different styles of crutches to order as in the old days, often making them from tracings of existing crutches. We also create new designs to meet specific needs.

As we move into the next century, our goal is to preserve the best of the past while using the materials and technology of the future.



For more information, contact Thomas Fetterman, Inc., P.O. Box 174, Southampton, PA (Pennsylvania) 18966 (215/355-6941 or 888/355-6941). ■

The next issue of *Polio Network News* (Vol. 14, No. 4), will feature recent advances in crutches. Readers are invited to send information (description, advantages, and source) about their favorite crutches.