Continuing Developments in Braiding

by:
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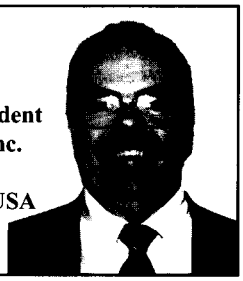

This company specializes in rebuilding all types of machinery for the wire and cable industry. As a result of extensive experience in rebuilding braiding machines it has developed a patented carrier version that braids very fine wire.

The braiding process, as we know it, had its origins in the late 1800's. The machines of that era were designed for production of candle wicks, shoe strings, venetian blind cord and other variations for textile use.

It is believed they were developed during the Civil War to manufacture shoe strings for the soldiers. In the early 1900's Simon Wardwell developed his design, patented the Rapid Braider, and established the **Wardwell Braiding Machine Co.**, Central Falls, RI, in 1911.

Although technology has changed and machine design has been improved, the braiding process has remained unchanged as has the weaving of the strands of the material. A typical Wardwell braider has payoff spools on a rotary table, **Figure 1**.

With the development of electrical cable, a need was created for braiding of the cable products, first with textile and then with copper, nickel, bronze, stainless and aluminum.

Many of the first high voltage applications were braided with textile yarns and then lacquered. Many of us veteran members of the industry will remember push-back wire which was the internal harness of tube-type televisions, radios and pin ball machines.

As there came the requirement for higher level cables, metal braids were added as a shield, to enhance the electrical performance and for grounding.

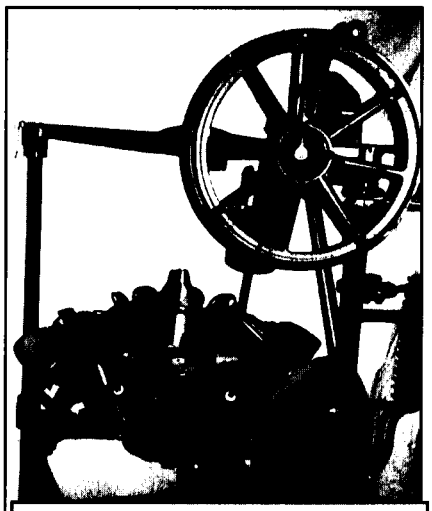

Fig. 1 — Wardwell braiders can be rebuilt to suit specific product needs.

Basic Construction

Shield constructions are determined in the design process of the product with considerations given to flexibility requirements and purpose. **Figure 2** shows a typical braid configuration.

One commonly asked question of us is how to calculate braid coverage, braid angle and number of ends.

Several factors are variable when determining amounts of coverage. The following formulas describe the relationships of the details shown in **Figure 2**.

$K = (2F - F^2) \times 100$ where
K = % coverage

$$F = \frac{NPd}{\sin a}$$

N = number of strands per carrier
P = picks per inch
d = diameter, carrier, single end, in.
a = angle of shield with axis of conductor, deg.

$$\tan a = \frac{2\pi(D+2d)P}{C}$$

C = number of carriers
$\pi = 3.1416$
D = diameter of core under shield

Examples of Braiding

The braid samples in **Figure 3** are various constructions, all fabricated on a 16 carrier Wardwell Braider.

The larger tube (A) is a transportation tube for liquid material. The open braid pattern serves to strengthen the tube and increase the burst strength.

(B) is a flat ground strap which can be found in such common places as automotive and computer applications.

(C) depicts a multi-colored textile serve for a guitar audio cable. In this instance, an overall clear jacket is applied to the cable and the serve is strictly for appearance reasons.

(D) is an open cable braid in which several carriers have been removed. This particular application is for a leaky cable which is intended to emit an electrical frequency which can be monitored for security applications.

(E), (F) and (G) illustrate the range of products which can be manufactured on the same style and size machine.

Company Expertise

Lloyd and Bouvier has been rebuilding Wardwell Braiders for over ten years. The standard Wardwell Braider is designed to braid products in a wide range of constructions both in diameter and braid material. Our forte has been to re-

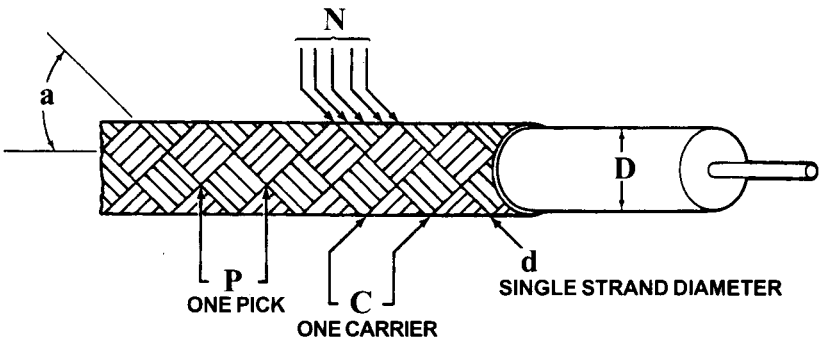

Fig. 2 — Typical configuration of braiding.

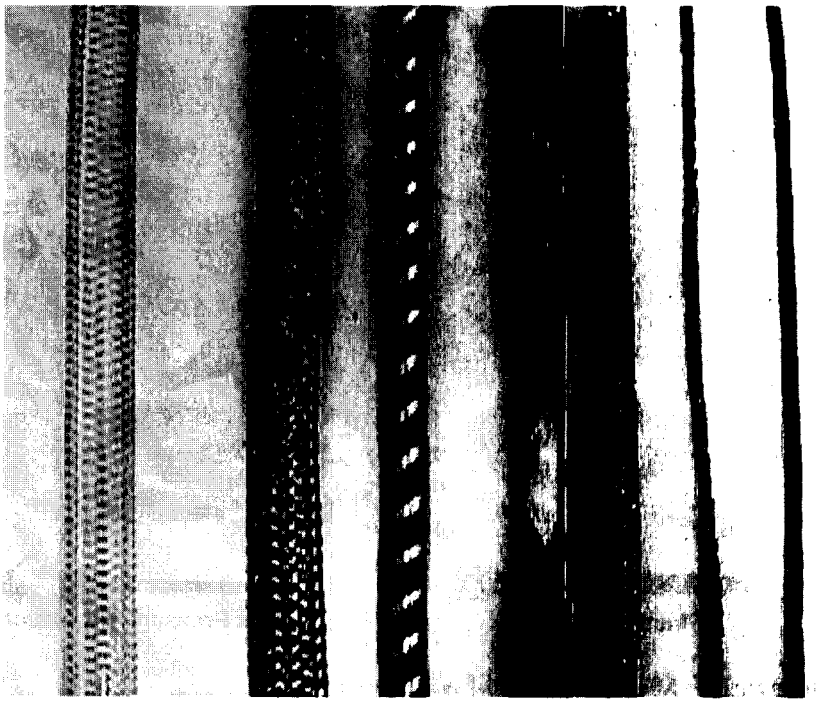

Fig. 3 — Braid sample board shows variety of products that can be made on a particular machine.

build braiding machines suited to the individual customer's specific product requirements.

This will produce a better cable and increase the efficiency and output of the braider. Our most significant accomplishment has been the introduction of our patented fine wire carrier. This particular feature has enabled a standard machine to produce product with a single end braid material of 0.0015" (0.038 mm). Not only is this used in miniature coax products, but also in medical catheters.

For more information contact the author or **Circle 221.** WCTI

Company Profile...

Lloyd and Bouvier, Inc, *Clinton, MA, USA is a privately owned company specializing in all types of used machinery for the wire & cable industry. It is located in a 300,000 ft² (27,869 m²) facility and offers equipment as is or fully rebuilt.* ***Carter Lloyd*** *and* ***Brian Bouvier*** *have a combined total of over 60 years in the industry manufacturing wire and building machinery.*