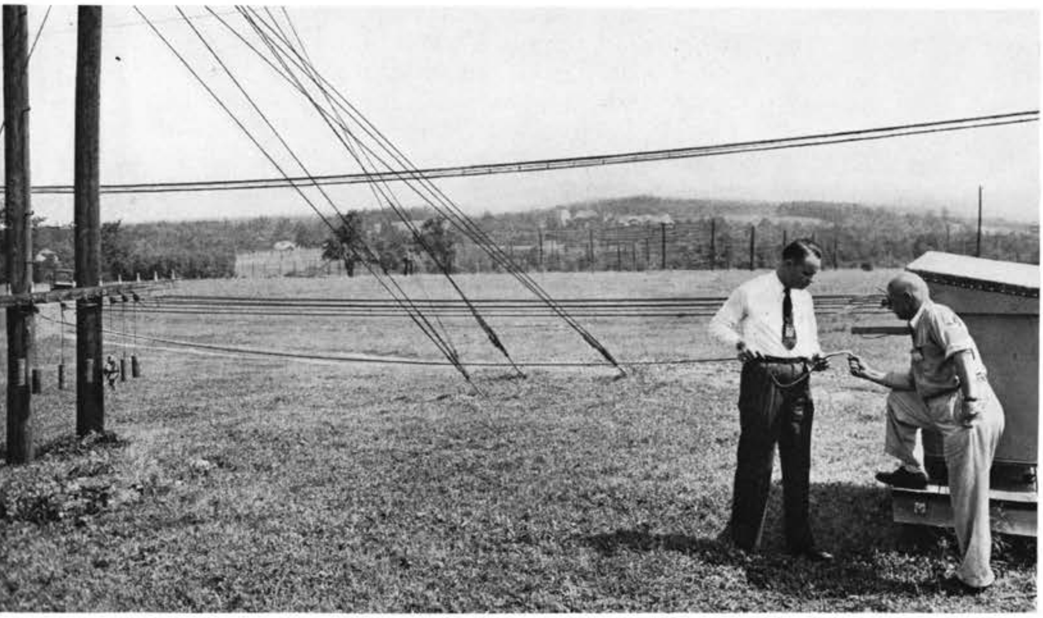

*H. A. Wells (left) and W. C. Sturzenegger inspecting a drop wire clamp after test at the Chester Laboratory.*

# *Drop Wire Clamp Testing Machine*

More than fifteen million drop wire clamps are used each year to support the familiar drop wire running from the telephone pole to the customer's house. Two types of clamp are standard in the Bell System. One is made of copper and brass with a copper tail wire. The other, essentially similar in design except for materials employed, is made of aluminum with a stainless steel tail wire. The aluminum clamp is somewhat cheaper, but its use is limited to areas where corrosion is not severe. This clamp, shown in Figure 1, consists of three parts which are assembled on the wire as follows: The drop wire is placed in the shell at the middle left of Figure 1. The shim at the middle right is placed against the wire, and when the narrow end of the wedge (bottom of Figure 1) is pulled into the shell, the wire is tightly grasped. The tail wire attached to the wedge can then be dropped over a hook on the telephone pole. The drop wire is suspended between this and a similar attachment on the customer's premises.

*Fig. 1 — Drop wire clamp gripping the wire. The disassembled parts are seen in the lower part of the photograph.*

From a mechanical standpoint the tail wire is the most vulnerable part of the drop wire clamp. It must be relatively resistant to corrosion, able to withstand abrasion and fatigue stresses caused by swaying of the drop wire, must be strong enough to hold the drop wire to its breaking point, and must be soft enough to form around various attachment fittings. It was to test materials for this use that the machine shown in Figure 2 was designed.

This testing machine has ten testing positions, to each of which may be strung a drop wire held by a clamp at one end, and dead loaded by means of weights at the other end, to obtain the desired tension. Extra clamps, attached to the drop wire as seen at the left in Figure 2, are threaded with a wire completing the electrical circuit to the motor.

Failure of any test clamp pulls this wire loose and shuts off the machine so that readings may be readily taken.

This machine attempts to duplicate the effect on the drop wire clamp of the gentle swaying of a drop wire span under the influence of wind. Instead of the line swaying, however, the supporting fixtures, onto which the tail wires are hooked, swing back and forth through an angular amplitude of 45° at a frequency of 25 cycles per minute. The attachment chosen for testing the clamps is a galvanized steel hook such as is used in regular service. Under load, the friction between tail wire and hook causes high-frequency vibrations to be set up as the wire changes its position around the hook, resulting in fatigue stresses in the tail wire. This simulation of sway friction is accomplished with a minimum of other effects. The rubbing on the tail wire is continuous in the machine testing, whereas in actual service, wear occurs only when the wind sways the drop wire. At the normal machine rate of about a million cycles per month, the machine will duplicate in a month or two the amount of wear a tail wire will receive in several years of service under the worst of field conditions.

Tests made in this machine showed 100-fold variation in durability of different kinds of tail wires. Aluminum wires, for example, failed between 50,000 and 150,000 cycles, copper wires failed at about 1,500,000 cycles, and the stainless steel wires reached 3,000,000 to 4,500,000 cycles before failure. These tests were a major factor in the choice of a copper tail wire for the copper clamp and of a stainless steel wire for the aluminum clamp.

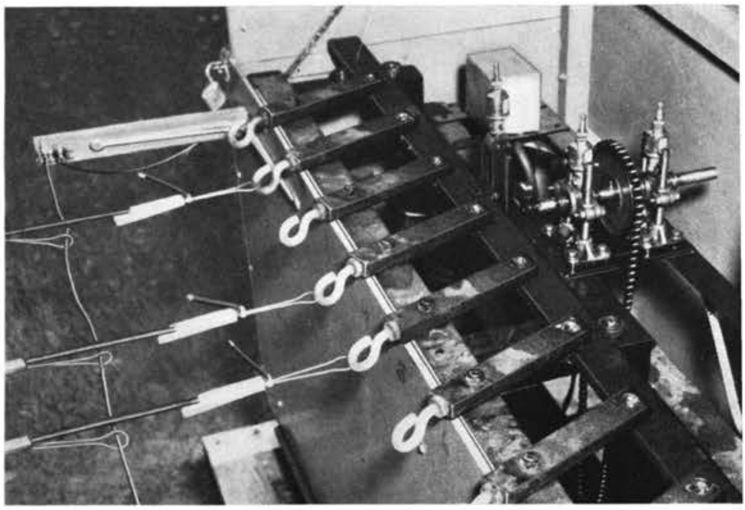

*Fig. 2 — Mechanism causes hooks to swing back and forth, thus simulating wind action on drop wire clamps.*

H. A. Wells, *Outside Plant Development*

# *Papers Published by Members of the Laboratories*

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