



Conceived and Developed Wig-Wags

By S. R. FLORENCE, Signal Engineer

“PACIFIC Electric Railway’s first highway crossing signal was placed in service today.”

This statement is one that might have appeared, and, in substance at least probably did, in newspapers of Southern California on October 15, 1907, that being the date this Company took the first step publicly toward the developing of a device to efficiently augment the, even then familiar cross-arm railroad sign.

From this first endeavor in the field of railroad crossing protection has followed a steady development of new devices to meet the ever increasing and perplexing problems. In marked contrast with the initial installation, are the automatic flagmen placed in service a short time ago on the San Pedro via Dominguez Line at Watson crossing. The layout of the Watson crossing protection was made to meet a condition where extremely heavy traffic was encountered and where trains operated at great frequency. It is an innovation insofar as the layout is concerned and is proving very satisfactory in actual operation

The fact that this Company was the first to use wig-wag crossing protection, and because the idea of such protection originated in the mind of a Pacific Electric employee and has been developed largely by this Company, makes its evolution from the first inefficient gong to the highly efficient present day automatic flagmen of interest to us all.

The first signal, a type of automatic bell, was installed at El Nogal, now known as Michelinda, on the Monrovia Line. The mechanism consisted of a vibrating gong controlled by a walking beam on which two silver wires were suspended, each dipping into glass cup containing mercury. The walking beam was actuated by a pendulum, which started to swing by contact of car wheels with an insulated section of rail, momentarily closing an electric circuit to coils of walking beam, causing pendulum to swing and silver wires to make contact with the mercury, every contact meaning a stroke of the gong.

The Last word in modern crossing protection, the installation shown being located at Watson on the San Pedro via Dominguez Line.

Advent of Automobile

Though crude in the extreme and consequently causing considerable trouble for those responsible for its operation, the gong signal at crossings was gradually developed to the extent that it worked with reasonably good results. Even though the augmenting of the cross

arms with a gong was a big improvement over the cross arm alone, with the advent in 1909 of the "gas buggies." the ancestors of our present day motor vehicles, it became apparent that something more efficient than the old type of crossing signal was needed to protect the occupants of the faster moving vehicles. Before the first generation of automobiles were more than in their infancy it became apparent that something more than should was needed.
Just what would it be?

Having appeared on the scene as if by divine province, an inventive genius by the name of Albert C. Hunt (now deceased) entered the employ of the Pacific Electric Railway early in the year 1909. Mr. Hunt conceived the idea of a swinging banner and a sounding gong, and placed his plan before J. McMillan, our General Manager at that time, and A. E. Roome, then Superintendent of Telephone, Telegraph and Signals. These executives immediately saw the value of the idea and arrangements were made for Mr. Hunt to develop it.

First Flagman

After some intensive study and no small amount of work, the first automatic flagman was tested out at Albia crossing on the Long Beach Line. Crude though it was, this first automatic flagman was the beginning of a development in crossing signal protection destined for the following years, it having been the first automatic flagman in the world to be placed in service.

This flagman consisted of a banner actuated by a crank arrangement driven by a small motor with a separate electric gong ringing device. The banner, or moving part, was equipped with small flange wheels and a curve track provided to guide it when in motion.

Experimentation continued in search of a more satisfactory mechanism and shortly after the Albia flagman was tested, the type of automatic flagman known as the motor driven made its appearance. The first unit of this type of equipment was installed at 8th and Tennessee Streets, now known as 8th and Hooper, Los Angeles, in August, 1910. Proving considerably more satisfactory and working with a fair degree of success, decision was reached that this type should be installed at the crossings of the system where heaviest travel was encountered.

The Company undertook the construction of these motor driven automatic flagmen in its own signal shops and between August, 1909, and November, 1914, 117 had been built and installed.

Although being a big improvement over any type of a crossing signal that had preceded it, the motor driven crossing flagman was not all that was desired due to the expense of maintaining them, this being the result of a large number of moving parts and its delicate motor requiring constant inspection and repairs.

Magnetic Flagman

As a result of close observation of the motor driven flagmen and further experimentation toward the elimination of difficulties encountered, the first magnetic type of flagman made its appearance the latter part of the year 1914.

The magnetic type of flagman had no motor, but in its place two sets of coils, each set being energized in turn by an ingeniously designed pile changer, causing the banner to swing and the gong to ring. Immediately the advantage of the magnetic flagman was seen, there being a lesser number of moving parts and consequently it reduced operating cost, and it soon began to replace the motor driven type. As fast as the magnetic flagmen were available they replaced the motor driven type and in a period of three years saved their cost in maintenance alone.

Since August, 1909, the Pacific Electric Railway has installed 600 automatic flagmen, which are now all of the magnetic type, at an average cost of \$500.00 each, or a total investment of \$360,000.00 for highway signal protection. This does not include the cost of developing the apparatus, which would no doubt reach an additional \$25,000.00.

The maintenance costs of the magnetic type of flagman averages approximately \$7.50 per month for each unit, or a total monthly expense of \$4500.00. Regular inspections are made of all flagmen so as to insure their performance being as near perfect as is mechanically possible.

The wisdom of such a practice is shown by the fact that there was only one failure to every 70,000 train movements during the last twelve months.

As to the number of accidents that have been avoided because of the warning given of approaching trains by automatic flagmen, or perhaps better known as wigwags, is incapable of calculation, however, the wisdom of their use is shown by the fact that the Interstate Commerce Commission and the California Railroad Commission have been for several years past and are now directing that they be placed at railroad crossings at grade where heaviest traffic is encountered. The wig-wag is truly a sentinel of safety.

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