speed at once and proceed with caution." It is apparent that where signals are spaced with due regard to braking distance, the interpretation of the caution signal, "reduce speed at once and proceed with caution," brings into real agreement the language of the caution signal and the normal action of the engineer in making a safe and accurate stop, and insures that the designed factor of safety for each block will become an actual factor of safety in the handling of the train.

WIG WAG SIGNALS HELP SELL LIBERTY BONDS

A WIG WAG signal and crossing alarm is naturally associated with the thought of protecting highway crossings at grade with railways, and the majority would say that when the mechanism has performed this duty it has performed what it was primarily designed to do. It

A New Use for the Wigwag Signal

remained for C. F. Shadle, signal and efficiency engineer of the Cincinnati, Indianapolis & Western, to demonstrate that the wig wag could be used to serve in other useful ways. At Indianapolis, Ind., two wig wags with locomotive type bells have been furnished by the C. I. & W. R. R. to act as an audible and visual reminder that the people should liberally support the Third Liberty Loan. The city of Indianapolis furnishes the current for the operation of these wig wags. One wig wag is located at the intersections of Kentucky avenue, Illinois and Washington streets, one of the busiest crossings in the business district. The location of the other wig wag is on Market street just east of Pennsylvania street and in front of the Liberty Loan headquarters. These wig wags are illuminated at night by 200 watt National X-Ray Reflector Co. flood lights.

ELECTRO-PNEUMATIC INTERLOCKING ON ELEVATED RAILWAYS

BELOW is given an abstract of the address delivered by J. W. Stevenson, signal engineer of the Chicago Elevated Railways before the American Electric Railway Association, elevated company section No. 6, on March 19, 1918:

In order to arrive at a basis for considering electro-pneumatic interlocking, it might be well to look for a moment at the general subject. The layout of tracks at a given point may be simple, consisting of one single track crossing another, with a siding connected to a main; or it may be complicated, comprising four tracks and a system of crossovers, with a double track turnout and movable point frogs, as at Clark street junction on the Northwestern Elevated.

It is evident that if several train movements are to occur at the same time, the switches should be so interconnected as to prevent interference of one train with another. At the same time it is desirable to get the greatest number of trains through in the least possible time. For instance, at Lake and Wells street tower on the Union Loop, 912 cars pass through in one hour, and the lever movements per day average 7,700. To thrust these functions upon one man would put a heavy load upon him, so, to reduce the factor of error to a minimum, we provide an interlocker, which does not eliminate the human element entirely, but guides the hand so it cannot go wrong.

An interlocker is a collection of levers in a machine, so interconnected that the movement of functions can occur only in a predetermined way, in order to prevent the setting up of conflicting routes. Movements in the machine take place in the following sequence: The signals and trips on all opposing routes are set in the "stop" position. The switches, movable point frogs and trips in the route to be given are placed in the proper position and locked. The signal for the route given is then set at "clear." After such a signal has been accepted by the motorman it is important that the route should not be changed while the train is passing over it. This is prevented by means of detector bars. A detector bar is a bar of steel lying close against the outside of the head of rail, long enough to reach from truck center to truck center of the wheels. It is connected to the switch and locking device, and supported by clips which raise it above the top of the rail. Should the wheels of a car be standing on or passing over it, the tread of the wheel which overhangs the head of the rail would prevent the complete movement of the bar, thus preventing the operation of the switch and lock movement.

The different methods used in operating interlocked functions are: Mechanical, where pipe connections to switches and signals are used; electric, using motor-driven apparatus; electro-mechanical, using pipe connected switches and electric-operated signals; electro-pneumatic, using compressed air for operation and low voltage electricity for control and indication. When simplicity of design, reliability of service, or speed in action is desired, we fall back on compressed air. So in the design of the electro-pneumatic system of interlocking, the designer saw the limitations of electric operation and planned well. Aside from the fact that electro-pneumatic interlocking is especially suited to our needs on the Elevated, I am a firm believer in its economy as compared to other power interlocking; that is, where we use cut-