

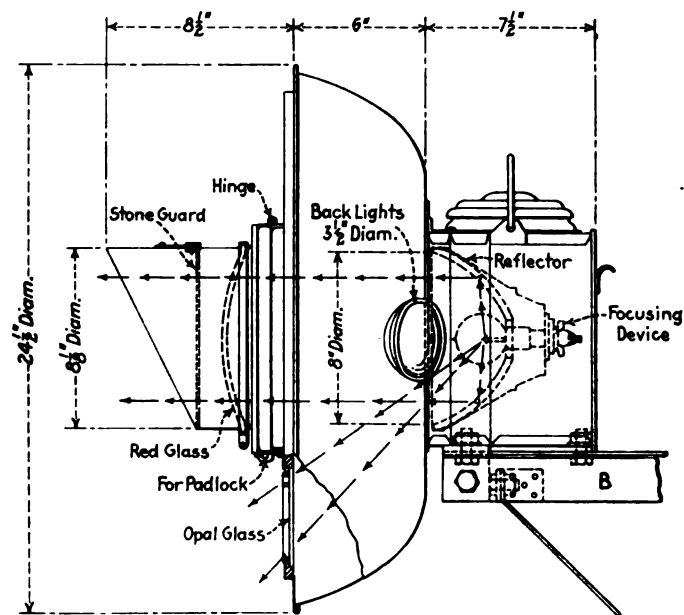
sage between pipe T and the atmosphere. Pm opens a passageway between the pipes S only when Qm is open.

The lower valve is entirely independent of all the other valves and has for its sole function the prevention of excessive speed. The upper valve is entirely independent of all other valves and when operated produces an absolute stop. The co-operating action of the other two valves permits a train to proceed, but at restricted speed.

Valves Pa-Pm and Ka-Km having been opened, there are no mechanical means for restoring them to their normal position. This is accomplished through the energization of the electromagnets M and O. Magnet M restores to its normal position the valve which has brought the train to a stop, but such a full stop will not occur if the engineer has been alert; and the key for closing this circuit is placed where he must descend to the ground to operate it. In the solenoid controlling the other valve, conditions are different; O may be energized from the inside of the cab. In addition, this latter magnet is always operated automatically whenever relay I is energized from the roadway.

Flashlight Crossing Signal

THE New York, New Haven & Hartford has recently installed at a number of highway grade crossings in Massachusetts, Rhode Island and Connecticut a new style of light signal (with no bell) to give indications both day and night. The new signal is attached to the post of the ordinary crossing sign and the light is controlled electrically by approaching trains by means of track circuits actuated by the moving trains, as in the ordinary audible crossing signal. The red roundel, eight inches in diameter, is surrounded by an illuminated disk which, to the wayfarer, says "WHEN RED, STOP." The letters (white) stand out prominently, especially at night. The light is of the same general design as that used in the automatic



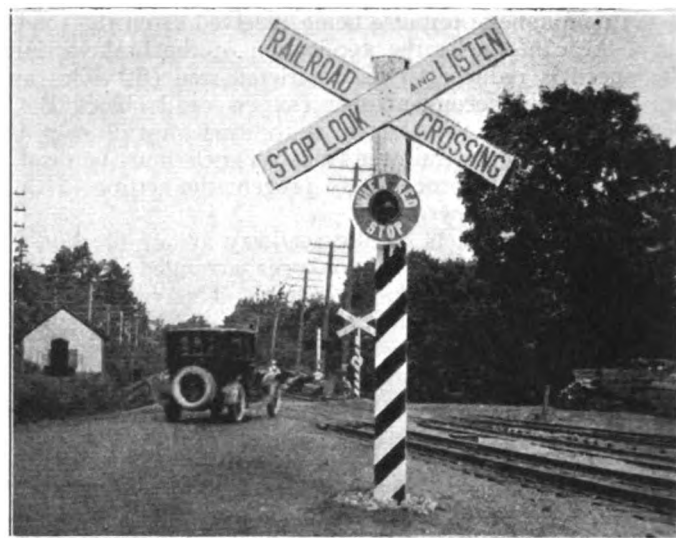
Detail Construction of the Crossing Signal

block signals on the New York division of the road. The reflector is 24 in. in diameter and the drum carrying the lens is 8 in. in diameter. The socket of the lamp is held in place by an adjusting device so arranged that, within certain limits, it can be centered at any point in both the horizontal and the vertical planes. The parabolic reflector is of mirrored glass, and it is fastened to the lantern.

The electric light bulb is a G-18½, 40-watt, 8-volt. The filament is a horizontal spiral with a focal distance of

1½ in. with an allowance for variation of not more than ⅜ in. The lamp has a standard Edison medium screw base. The filament is of such shape that it gives a spread of 12 degrees of high intensity light, that is, six degrees on either side of the axis of the beam. The lamp is rated at 1,000 hour at normal voltage, but is operated at about 15 per cent below normal, thus increasing the life of the lamp 100 to 200 per cent.. It is calculated that, thus operated, the bulbs will last at least a year; and by renewing the bulbs at regular periods, well within the time limit, a high factor of safety will be obtained.

Photometer readings indicate that when the lamp is



Red Light Crossing Signals at Andover, Connecticut

properly focused in the reflector, the projected beam through the red roundel is about 6,000 c. p. at one degree from the axis of the beam.

The bracket, B, by which the lamp is fixed to the post, is fitted with set screws by which the lamp may be adjusted in both the horizontal and the vertical planes. A double slow-releasing relay, so designed that one member reacts upon the other, automatically opens and closes the contacts for flashing the light. This relay is so adjusted that the time between the pick-up and release of one pair of magnets is different from that of the other; this provides the proper time element for the energizing and de-energizing of the lamp filament. The apparatus is adjusted to give 30 flashes a minute, which is believed to be the most suitable arrangement. The relay is so adjusted that in each cycle the lamp is alive 75 per cent of the time and 25 per cent of the time it is dark.

The circuit arrangement is such that practically all abnormal conditions will produce a constant red light, except failure of the track circuit, in which case a flashing red light will be displayed.

Energy is provided from an eight-volt storage battery having a capacity of 56 ampere hours, under intermittent service. The storage battery is slowly charged by floating across a primary battery. It is proposed to use the storage battery for all installations; but at certain points where commercial current is available the accumulator is charged direct from the commercial source rather than by the primary battery. As shown in the illustration, a light signal is provided on each side of the railroad.

These signals have proved so satisfactory that the railroad has been allowed to install them, in some cases, in place of watchmen, resulting in a substantial saving in operating expenses. Signals are in service at Titicut, Mass.; Norton, Mass.; Cranston, R. I.; Andover, Conn.; New Britain, Conn.; Hamden, Conn., and Derby, Conn.