

One cable painting trough will cover about eight times the distance that one man will cover by brushing cable preservative on the cable.

ing 80 per cent or more of the authorized slow freight engine rating or having in excess of 90 cars, including cabin car.

"Before entering territory where grade signals are in use, the conductor must notify the engineman of author-

ized slow freight engine rating for that trip, exact tonnage or number of cars in train and changes due to setting off or picking up cars."

(For other answers on this subject see the November, 1938, issue, page 649.)

Grade Signal Markers

"At permissive automatic block signals on your road equipped with 'grade-signal' markers, permitting trains to pass such signals at restricted speed without stopping when the signal displays its most restrictive aspect, does this rule concerning the elimination of the stop apply to passenger trains as well as to freight trains?"

Only Freight

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Permissive automatic signals equipped with grade markers on the Baltimore & Ohio permit tonnage freight trains only to pass a stop-and-proceed signal having a circular disk bearing the letter "P" attached, at a speed not exceeding 15 m.p.h., expecting to find a train in the block, broken rail, obstruction or a switch not properly set. The letter "P" has no significance except in combination with a stop-and-proceed indication. The tonnage freight train is defined as one having 80 per cent or more of the authorized slow freight engine rating, or having in excess of 90 cars including the caboose.

Grade Signals for Freight Trains

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Grade signals on the Pennsylvania are used in automatic block systems on grades only when approved by the general manager. The signals are marked by a letter "G" on a yellow circular disk.

The indication for a grade signal is Rule 277—"For tonnage freight trains, proceed not exceeding 15 m. p. h., expecting to find a train in the block, a broken rail, an obstruction or a switch not properly set. For other trains, stop then proceed in accordance with Rule 509 or 559."

Tonnage trains are defined in the time table instructions as follows:

"A tonnage freight train as referred to in Rule 277, is a train hav-



Note: Answers to these questions are not solicited. If you have questions, please submit them to the What's the Answer department.

108-Q: *What characteristic distinguishes an "alternating-current" track circuit from a "direct-current" track circuit?* A: A direct-current track circuit is designed to be operated by direct current flowing in the rails forming a part of that circuit, while an alternating-current track circuit is designed to be operated by alternating current.

109-Q: *How is an alternating-current track circuit constructed?* A: The construction of an alternating-

the track is shunted; and a track relay, designed to function on alternating current, is attached to the rails at the other end of the circuit, this relay controlling secondary circuits in the same manner as the secondary circuits are controlled by the direct-current track relays used with direct-current track circuits.

110-Q: *Are alternating-current track circuits used on steam roads?* A: Yes. They may be used on steam roads, where a reliable source of a-c. power is available, to obtain protection against stray direct currents, or as a matter of economy in maintenance; a-c. track circuits, due to the fact that the a-c. track relays are oper-



Typical double impedance bond layout on an a-c. electrified road

current track circuit is similar to that of a direct-current track circuit: The limits of a particular track circuit are established by the use of insulating joints; intermediate rails are connected together by splice plates and bond wires; with end-fed circuits, alternating current is fed to the rails at one end of the circuit by the secondary of a transformer; a resistor or a reactor is used in series with the transformer secondary at the feed end to limit the flow of current when

ated on the induction principle, are practically immune to stray direct currents.

111-Q: *Why are single-rail alternating-current track circuits, rather than single-rail direct-current track circuits, used on electric roads employing d-c. propulsion?* A: Where the rails are used as a return path for propulsion current, special track circuit equipment, which will not be affected by the propulsion current, must be provided. Where one rail only