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hibited until proper authorization has been received from the one in charge of the men for whose protection they were placed.

Standard grounding devices are used on lines and apparatus. The ground wire is attached to a ground connection before placing the other end in contact with the conductor upon which work is to be done. When the ground wire is removed, it must be disconnected from the circuit before it is removed from the ground connection. Employees must keep as far as practicable from the circuits; if possible, below and to the side from which the wind is blowing, so that any resulting arc will not blow toward them. They are not allowed to apply any local ground before the grounding switch is closed in at least one adjoining substation on 132 kw. lines. The employee receiving a "clearance" for work in substations must see that all employees in the gang know which circuits and apparatus are covered by the clearance, and must obtain signatures on the form to that effect. Before the clearance is released, the employee who has clearance must see that all employees in the gang know that the circuits and apparatus must be considered energized and must obtain their signatures to that effect.

Before working on broken conductors or on catenary section breaks, grounds must be placed on both sides of the break. Grounds must be placed on wires or messengers being strung or handled near high-voltage circuits. Before working on insulated power cables, the circuit must be deenergized and then grounded by switches or other approved methods at the nearest terminal on each side of the work. Except in emergency, switches must not be operated under load. Employees must not operate hook-stick type high-tension disconnecting switches without the use of rubber gloves and treated wooden switch poles provided for the purpose, held so that the maximum length of pole is between the line circuits and operator's hand. They must not work on transformers without first removing the primary fuse and opening the secondary circuit.

Except in extreme emergency, employees must not work on line wire, messenger or aerial cable during an electrical storm. They must not work on any circuit or appara-

tus in a substation except between grounds. They are not allowed to work on any deenergized and grounded open wire circuits more than 500 ft. from where a ground is applied. Before working on any electrically-operated apparatus, the control cutout switch must be opened. If it does not have any such switch, then the magnet switch must be blocked.

Before working on power transformers separated from the bus by a horn-gap switch, the control cutout switch at the horn-gap switch mechanism must be open. Before working on signal power apparatus, it is necessary to open all necessary circuit breakers, block relays and open the control cutout switches to prevent automatic starting of signal generator sets or operation of circuit breakers. Employees must not work on static condensers and lightning arresters before they are discharged; also before applying grounding sticks, they must close the gap of electrolytic lightning arresters to check that the circuit has been deenergized.

Letter to Editor

Varied Light Intensity

BALTIMORE, MD.

TO THE EDITOR:

The Baltimore & Ohio has its color-position-light signal which gives the enginemen a double check on the signal aspects. The indications can be read instantly and accurately by color as well as position. A large number of railroads, however, rely solely on color to display their signal indications. In many instances one of the colors alone is relied upon to give an important aspect without other checking means.

This objection to the color-light signal may be overcome by a simple expedient. Instead of projecting constant, steady illumination, the color-light aspects would, when illuminated, undulate continuously, each color having a predetermined and separate code of undulations. The light would not flash on and completely off, but would undulate between full operating intensity and say, one-half of full operating intensity, in a series of dots and dashes in a different sequence of each color.

At no time when a particular aspect is showing, would it be completely dark.

As an example, the red aspect would make a series of dashes of full light intensity separated by a brief intervals of lower light intensity, and forming the Morse letter "L". The yellow indication could continuously make the Morse letter "B", a dash followed by three dots. The dash and dots would be made by high intensity light and separated by short intervals of low intensity light. The green light could form the Morse letter "G", two dashes and a dot in a similar manner.

Only one piece of equipment would be needed for each signal location to carry out this plan—an "undulating coder-relay". Each of these relays would have three independent sets of separate and different contact-sequences, one for each aspect. In the case of the search-light signal the single lamp would undulate in a different code of each position of the color-roundels; and in the case of the three-lens signal, each lamp would have its own program of undulation. In the event of failure of the relay, a steady light would result. The ambiguity of phantom indications would be eliminated, because unless the light were undulating, any other indication would not be a normal one. Comments on this plan are respectfully requested.

CHARLES ADLER, Jr.
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KINK

Protecting Cables

By D. F. MORRISON
Melrose, Mass.

WHILE digging in locations where existing smaller-sized signal cables are buried, workmen often unintentionally scar and break the insulation on these cables. To guard against failures and damage to such lines, neoprene insulation from other large cables may be placed over them in the same manner as a line-man uses a rubber "snake" on a hot line wire. Since it is good practice to strip a cable by cutting the sheath lengthwise, the discarded insulation may be easily slipped on, and will fit snugly while the work is being done in its vicinity.