ready some strikingly beautiful lighting effects have been produced and though the use of the gas is not widespread, it has met with much favorable comment among advertising and display experts.

Neon for Signal Lights and Lightning Arresters

For signal purposes there is no doubt that the neon light has unique possibilities when its method of use has been suitably worked out. The neon light is not one that can be overlooked, its color and general characteristics being of a peculiarly distinctive nature. It has high visibility in daylight, and in fog, as well as having special brillance at night.

In like manner neon is coming into use as the current carrying agent in safety devices designed to protect electrical instruments and buildings from high voltages. These devices because of the peculiarities of neon will allow hardly any current to pass below what is known as their break-down voltages. In fact, below this point the current flowing through the gas is almost infinitesimal. When once the break-down voltage is reached, however, and it may be somewhat under 200 volts, depending on the design of the device, the current begins to flow. As soon as this occurs the neon is ionized; its resistacne greatly decreases with a corresponding increase in carrying capacity. As the result of the lowered resistance, very high currents can be conducted by a trace of the neon, while in the case of other gases only moderate currents can pass. Unless subjected for a long period to the action of the current these devices are able to function many times, a small tube with gas at very low pressure, conducting as much as 10 amp.

Exhaustive tests in the laboratory have invariably tended to demonstrate that the accuracy and dependability of the neon type of lightning arrester is very much greater than that of any other arrester now known. If the results of experience in field tests parallel experience in the laboratory, there can be no question that an extensive commercial application of neon is assured for use in lightning arresters alone.

Three Train Control Contracts Let

G. R. S. Continuous System for C. & N. W. While Intermittent Inductive Is Chosen by A. C. L. and Southern

THE Chicago & North Western, the Atlantic Coast Line and the Southern have all decided to use train control of the General Railway Signal Company manufacture. However, the Chicago & North Western is to use the continuous inductive system, while the Atlantic Coast Line and the Southern are to use the intermittent inductive apparatus. The territory included in these installations and a description of the operating characteristics of these two systems are explained below.

Characteristics of Continuous System

The Chicago & North Western will install continuous inductive automatic train control on 149 miles of double track between Boone, Ia., and Council Bluffs. Control is to be of the "Two Position Continuous Type," i. e., alternating current, controlled by an existing signal system, is fed into the running rails, and is picked up by receivers on the locomotive and amplified to operate a two position control relay. Interposed between the control relay and the brake applying apparatus is a governor-cam mechanism which functions on the speed distance principle to decrease the speed limit of a train gradually in passing through a caution zone, giving automatic brake applications a distance from the danger point for high speed and closer to the danger point as the speed decreases. This mechanism is also utilized in providing a maximum speed limit and in giving audible signals, etc.

The brake applying apparatus is to be of the actuator type, in which a device known as an actuator is attached to the engineer's brake valve and operates it to give a full service automatic application in practically the same manner as the engineer does it manually.

The principal results to be secured in this installation of automatic train control are as follows:

(1) To compel the engineman to acknowledge a Caution signal and to force the speed of a train to be reduced to a predetermined low rate before reaching a stop signal; to compel acknowledgment in order to pass a Stop signal and thereafter enforce a low speed restriction until this restriction is removed by the removal of conditions which caused it to be put into effect; to enforce a maximum speed limit for all trains operating under normal conditions.

(2) Brakes to apply automatically and remain applied until the train comes to a complete stop in case the engineer fails to acknowledge a Caution or Stop signal.

(3) Brakes to apply automatically at any time in a Clear block when the maximum speed limit is exceeded and may be released as soon as the speed is below the maximum. The maximum speed for passenger trains is 70 m.p.h. and for freight trains, 50 m.p.h.

(4) Brakes to apply automatically at any time in a Caution block when the speed exceeds that prescribed by the speed-distance mechanism and may be released when the speed is brought under the limit prescribed by this mechanism.

(5) The brakes to apply automatically at any time in a Stop block when the speed exceeds 20 m.p.h. and may be released as soon as the speed is brought under this amount.

(6) An audible signal in the cab begins to sound as soon as the speed increases to within three miles of the limit imposed and continues to sound until the speed is reduced. This permits the engineman to operate his train very close to the maximum speed limit in a Clear block, or the tapered speed limit in a Caution block or the low speed limit in a Stop block by the usual method of braking.

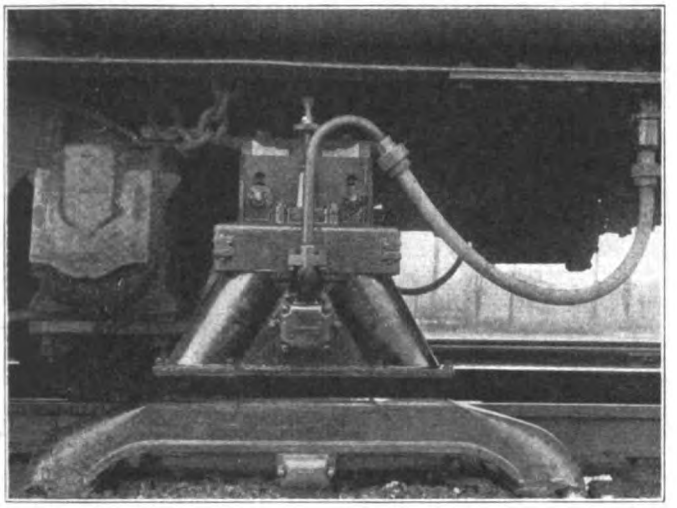
The Intermittent System as Designed for the Southern

The Southern Railway is to install the G. R. S. intermittent inductive type of automatic train control on two locomotive divisions. One is located on the lines west between Cincinnati, Ohio, and Somerset, Ky., and consists of 80 miles of double track and 77 miles of single track. The other is located on the lines east between Spencer, N. C., and Greenville, S. C., and consists of 153 miles of double track. Both of these divisions are partly equipped with automatic block signals which are operated by direct current on the lines west and by alternating current on the lines east.

In this intermittent system one restrictive inductor and one releasing inductor is located at each signal and the locomotive carries a receiver for picking up restrictive control and another receiver for picking up releasing control. Between the receiving equipment on the locomotive and the brake applying apparatus is a speed

distance mechanism which might be called a braking distance control meter, in that it measures both speed and distance and controls the brake valve actuator in such a manner as to apply the brakes automatically in a caution zone at a point far distant from the danger point when the speed is high and closer to the danger point as the speed decreases. The system will accomplish principally the following:

(1) Compel the engineman to acknowledge a Caution signal and force the speed of a train to be reduced to 20 m.p.h. before reaching a stop signal, compel acknowledgment in order to pass a Stop signal and thereafter enforce a



Receiver on Locomotive Over Track Inductor

speed restriction of 20 m.p.h. until a signal giving a clear indication is passed.

(2) Brakes apply automatically and remain applied until the train comes to a complete stop in case the engineer fails to acknowledge a Caution or Stop signal.

(3) Brakes apply automatically at any time in a clear block when the speed exceeds 68 m.p.h. for passenger trains and 38 m.p.h. for freight trains and may be released when the speed is brought under these amounts.

(4) Brakes apply automatically at any time in a Caution block when the speed exceeds the gradually decreasing limit imposed by the speed control mechanism and may be released when the speed is brought under this tapered limit.

(5) Brakes to apply at any time in a Stop block when the speed exceeds 20 m.p.h. and may be released when the speed is reduced under 20 m.p.h.

(6) An audible signal begins to sound in a Clear, Caution, or Stop block when the speed is increased to within about 3 m.p.h. of the limit imposed and continues to sound until the speed is brought 3 m.p.h. under the limit imposed. The purpose of the audible signal is to enable the engineer to operate his train very close to speed limits imposed by the usual method of braking without running into an automatic application.

(7) The set-up, in passing out of automatic train control territory, is brought about by the operation of the acknowledging contactor and the set-up when the train returns to automatic control territory is entirely automatic.

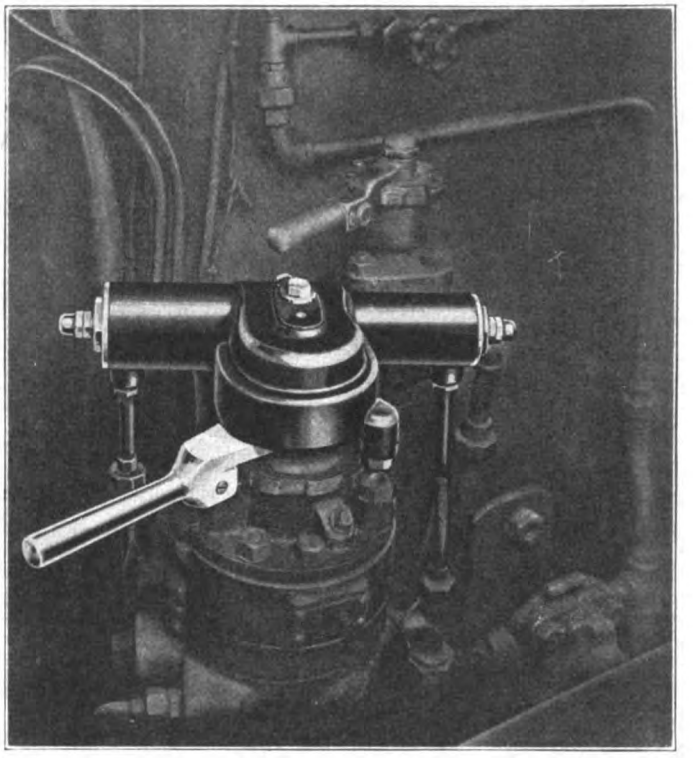
(8) Fixed speed restrictions are enforced on bad curves and the like, by simply installing a restrictive inductor which has no choke coil nor connection with a signal system.

Intermittent Inductive Cam-Type for the A. C. L.

The Atlantic Coast Line has decided to install the G. R. S. intermittent inductive, governor cam-type of automatic train control between Richmond, Va., and Rocky Mount, N. C., a distance of 124 miles, principally double track. The A. C. L. had formerly awarded a contract to the General Railway Signal Company for the installation of the intermittent electrical contract or ramp type of control on this section of track, but decided to change as soon as the Interstate Commerce Commission gave sufficient encouragement to the intermittent inductive system to warrant its installation.

Briefly stated, the system as it will be applied to the Atlantic Coast Line consists of a means of transmitting control from the roadway to the train by the use of devices known as inductors which are of two kinds, namely, restrictive and releasing. One restrictive inductor is located on the right side of the track, with reference to the direction of traffic and one releasing inductor is located on the left side at each signal location. The locomotive carries two receivers, one on the right-hand side for picking up restrictive control and one on the left-hand side for picking up releasing control.

Between the receiving equipment on the locomotive and the brake applying apparatus is a governor cam mechanism which functions on the speed distance principle to decrease the speed limit of a train gradually in passing through a caution zone, giving automatic brake



Actuator Applied to Engineman's Brake Valve

applications far distant from the danger point for high speed and closer to the danger point as the speed decreases.

The inductors are to be controlled by an existing d. c. automatic block signal system and the automatic train control is to accomplish the following:

(1) Compel the engineman to acknowledge a Caution signal, and force the speed of a train to be reduced to a predetermined low rate before reaching a stop signal; compel acknowledgment in order to pass a Stop signal and thereafter enforce a low speed restriction until a signal giving a clear indication is passed.

(2) Brakes to apply automatically and remain applied until the train comes to a complete stop in case the engineer fails to acknowledge a Caution or Stop signal.

(3) Brakes to apply automatically at any time in a Caution block when the train speed exceeds that permitted by the tapered speed control mechanism.

(4) Brakes apply automatically at any time in a Stop block when the train speed exceeds the predetermined low speed limit.

(5) Brakes may be released in a Caution or Stop block when the speed is brought under the limits imposed.