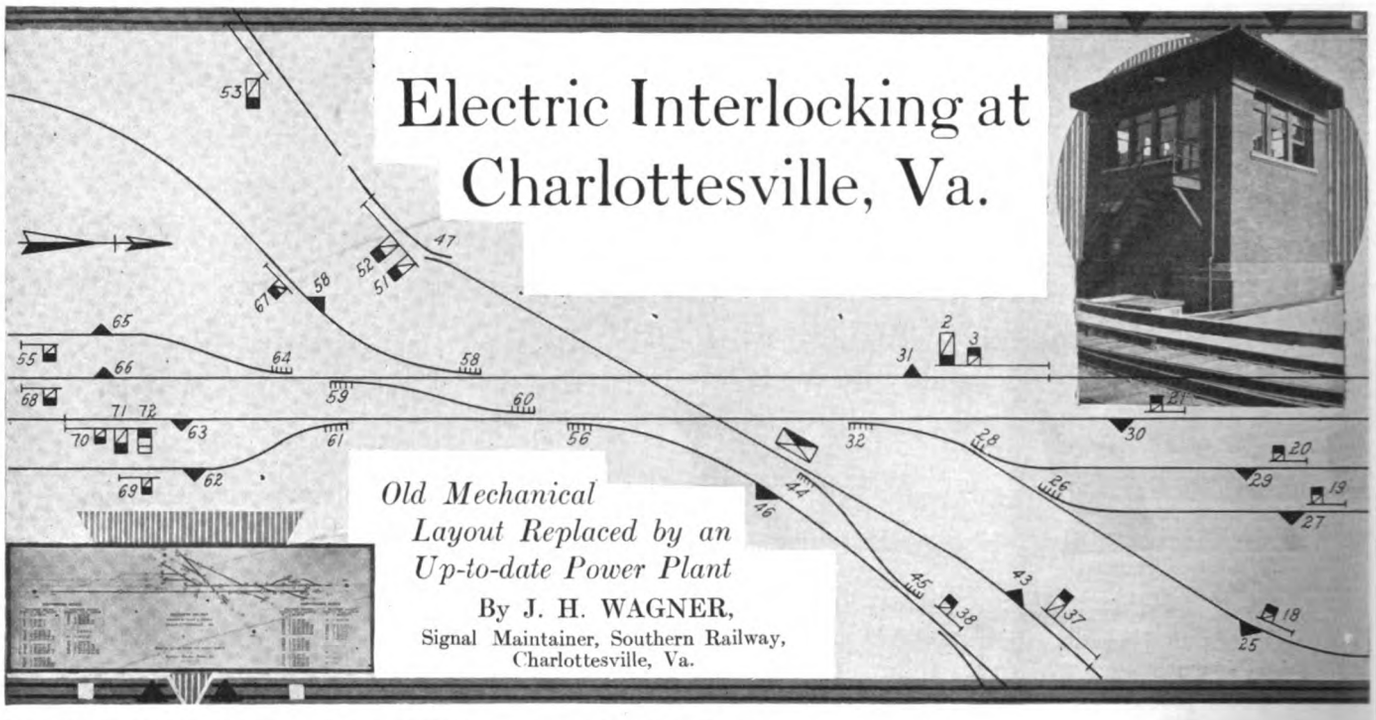


The Illuminated Track Diagram, the Track Layout and the New Tower

THE old mechanical interlocking layout at the crossing of the Southern with the Chesapeake & Ohio at Charlottesville, Va., has been replaced by an all-electric machine for controlling the enlarged track and signal facilities at that point. The old plant consisted of a Johnson type machine having a 16-lever locking frame controlling 16 functions and 2 order boards with a crank leadout housed in a two-story frame structure. The new plant was installed by the General Railway Signal Company and was placed in service on February 27.

The Tower and Its Construction

The new tower, which replaces an old two-story wooden structure, consists of a two-story building built of brick and concrete. The foundation and floors are of the last-named type of construction, but the second floor, which contains the interlocking machine, is covered with wood. The roof of the tower is of tile, so that in general the entire structure is fireproof. A hot water heating plant and modern sanitary appliances also are provided. The second floor is occupied by the interlocking machine and telegraph operator's instrument tables, etc.; the lower floor contains the charging plant, heating plant and sanitary appliances. Entrance to the second floor is by means of an iron stairway on the outside of the building.

Interlocking Switch and Signal Layout

The track diagram shows the general arrangement of switches, signals and derails for the movement and protection of trains over the crossing and to and from the switch and lead tracks. All switches and derails are operated by Model 2, 110-volt, d. c. switch machines of the G. R. S. type. The operating and indication circuits consist of the standard arrangement for that type of machine and the main common is connected to the circuit at each switch location.

All high and calling-on arm signals are d. c. motor-driven semaphore type working in the upper quadrant. On the Southern Railway the northbound traffic is governed by three arms; the top arm is semi-automatic, working from 0 to 90 degrees, the second and third arms are non-automatic, both of which operate from 0 to 45 degrees. The movements for southbound traffic are governed by two arms; the top arm is semi-automatic, working from 0 to 90 degrees, and the bottom or calling on arm is non-automatic, working from 0 to 45 degrees. On the Chesapeake & Ohio the westbound traffic is governed by a non-automatic signal operating from 0 to 90 degrees, while eastbound movements are governed by a two-arm non-automatic signal, both arms working from 0 to 90 degrees. The top arm is used for movements into the Union station and the bottom arm for movements into the freight yard. It will be seen from the track diagram that eastbound trains on the Chesapeake & Ohio are governed also by an approach or distant signal. All other movements on the plant are governed by dwarf signals of the Model 3 solenoid type working from 0 to 45 degrees.

Interlocking Machine and Route Locking

The interlocking machine consists of a G. R. S. Model 2 unit-lever type, equipped with individual polarized relays, which are mounted on the terminal board at the back of the machine. The interlocking machine is provided with a 72-lever frame having a distribution of levers and spaces as shown in the following table:

Electrical Machine	Levers	Spaces	Functions
High signals	7	7	9
Dwarf signals	9	9	9
Call-on-arms	2	2	2
Switches	4	6	6
Derails	8	8	8
Switches and derails	5	10	10
Spares	10	20	..
Total	45	72	44

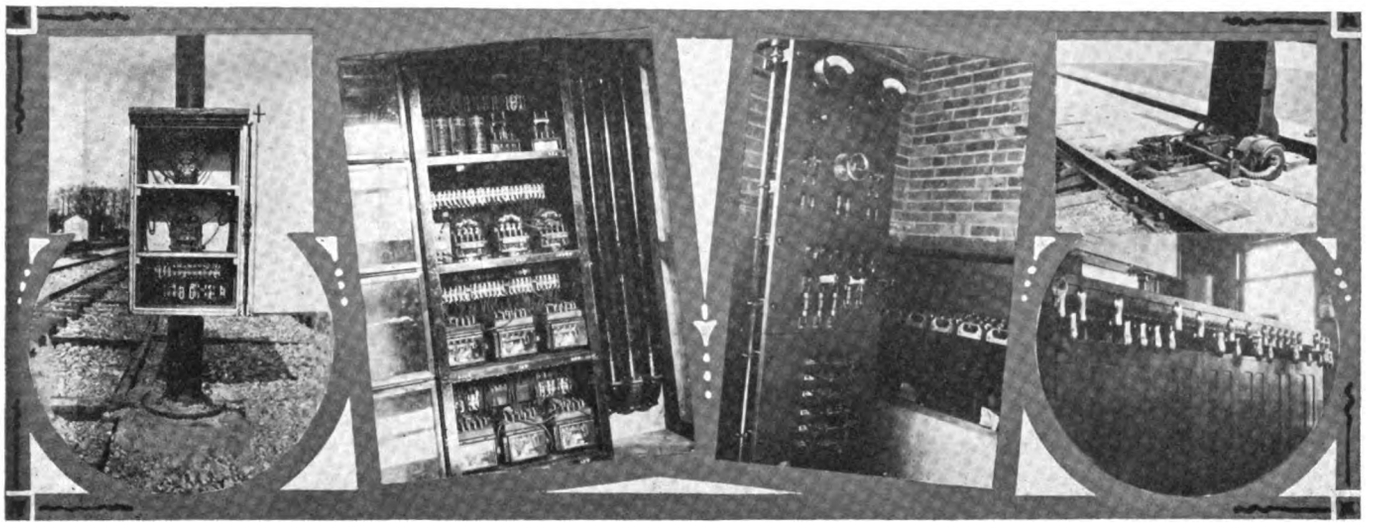
Electric locking is used in connection with high speed routes, together with a hand mechanical time release for releasing a route in case of emergency, and this is accomplished by turning the release to its full reverse position. which requires about 1½ minutes. When in the reverse position the release circuit is closed, permitting energy to act on the indication magnet of the particular signal lever being released, after which the remaining levers in that route may be restored to their normal position. It

is necessary, however, to return the mechanical time release to its normal position, which also requires about 1½ min., before a conflicting route can be set up.

Track Circuits, Track Model, Relays and Housings

There are six track sections on the plant, requiring alternating current for the operation of Model 2 Form A, a. c. track relays. All of the track circuits are within home signal limits and are supplied with energy at 110-volt 60-cycle single-phase through type K transformers, which are regulated by means of resistance units having variable taps. All transformers are located as nearly as possible to the track sections. Track repeater and annunciator relays are housed in an all-steel cabinet located in the first story of the tower. This cabinet is divided into compartments, each to accommodate three Model 2 Form A relays, as shown in one of the illustrations.

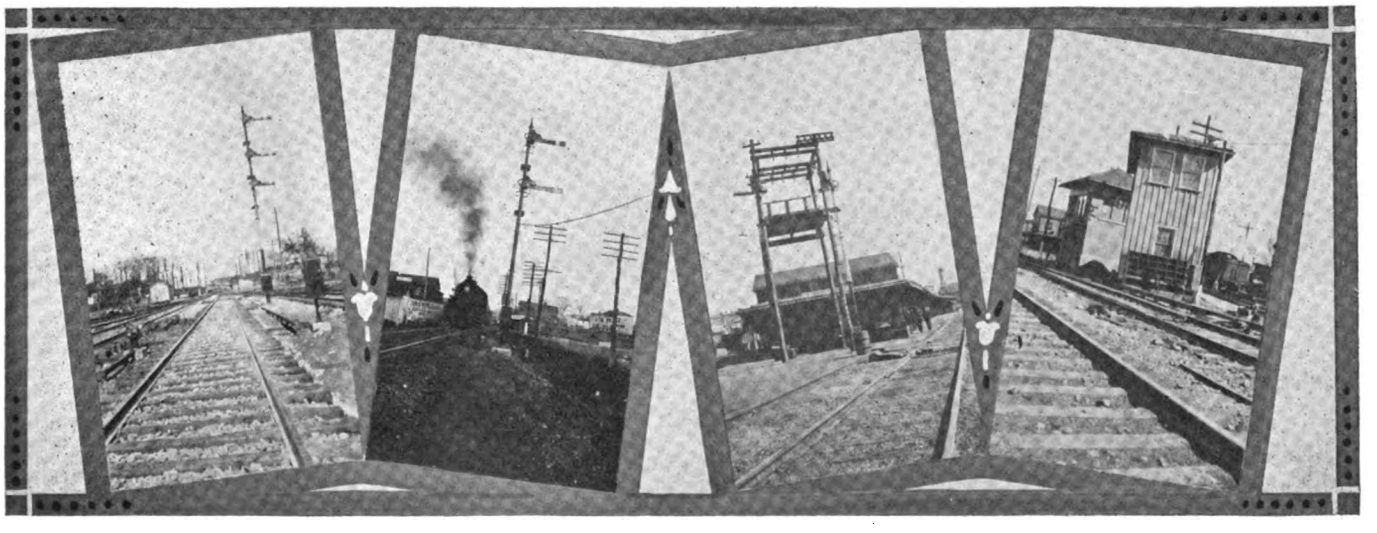
For the purpose of giving information to the levermen a track model or diagram of the spotlight type in the form of a rectangular box 5 ft. 9 in. long, 2 ft. high and 5 in. deep, is supported on top of the interlocking machine on 2-in. pipes 2 ft. high. The pipes which support this track model also serve as conduit for wiring the lights in the board. The diagram shows the tracks, switches, derails and signals and their respective numbers. Each track section is shown by a distinctive color against a white background. In the middle of each track section appears on opal lamp cap through a ½-in. hole, back of which is mounted a miniature lamp receptacle which will take a 12-volt 1¼-watt lamp. Energy is supplied to these lamps through a type K transformer located in the relay cabinet in the lower story of the tower. Annunciators for announcing the approach of trains from either direction on the Southern and the Chesapeake & Ohio are mounted on each end of the track model.



Instrument Case with Relay and Transformer — Relay Case in Tower — Charging Panel and Batteries — Switch Machine and Interlocking Machine

Lighting and Power

For the operation of the electric interlocking functions, current is supplied by the local power company at a pressure of 4,400 volts and is stepped down by means of transformers at the high tension switching tower, located about 100 ft. from the interlocking tower, to 110 volts,



Southern N. B. Home Signal — C. & O. Home Signal — High Tension Switch Tower — The Old Tower

which is used for lighting the tower, the signals and also for operating the motor-generator set for charging a set of Edison storage cells, which in turn supply direct current for the interlocking functions. In case of emergency, such as shutting off of the power from the local power supply, current can be obtained from either Lynchburg, Va., or Alexandria, by means of appropriate switching appliances located on the switching tower mentioned above.

TRAIN ACCIDENTS IN APRIL*

THE following is a list of the most notable train accidents that occurred on the railways of the United States in the month of April, 1919:

Collisions

Date	Road	Place	Kind of accident	Kind of train	Kil'd	Inj'd
10.	Phila. & Reading....	Locust Summit	xc	F.	3	0
26.	Ill. Central.....	Memphis	bc	F. & F.	5	6
29.	C. B. & Q.....	Walshville	bc	F. & F.	0	3
29.	Del. L. & W.....	Taylor	xc	F. & F.	4	1

Derailments

Date	Road	Place	Cause of derailment	Kind of train	Kil'd	Inj'd
8.	Chicago R. I. & P...	White, S. D.	b. rail	P.	1	0
10.	Union Pacific.....	Halford	snow	P.	2	1
11.	Pennsylvania	Emsworth	.....	F.	0	0
11.	Pennsylvania	Emsworth	.....	P.	0	0
13.	Cleve. C. C. & St. L..	Gillespie, Ill.	.....	P.	0	2
14.	Missouri, K. & T.....	Hunter	b. wheel	F.	0	0
*22.	St. Louis-S. F.....	Lawton, Okla.	unx	F.	0	3
27.	Denver & R. G.....	Cimarron	d. car	P.	0	34
29.	Lehigh V.....	Newport	b. journal	P.	0	23
*30.	Pennsylvania	Sabula	unx	F.	0	0

The train involved in the collision near Locust Summit, Pa., on the 10th of April was a through freight, consisting of locomotive 1050 and 35 loaded cars. Because of the breaking of a drawhead the engine and eight cars were moved forward to Gordon, where the eight cars were set off; and the engine, returning to its train, collided with the rear portion, which had been left standing on a grade, but had started down the grade because of the leakage of the air cylinders. The train had been standing about 45 minutes, and none of the hand brakes had been set. Eighteen cars were badly damaged, and the conductor, one of the brakemen and the fireman were killed.

The trains in collision near Memphis, Tenn., on the 26th, were an employees' train, carrying men to work, about 7 a. m., and a locomotive without train; a butting collision in a dense fog. Both engines were damaged. This collision was not on the main track. Five employees were killed, and six were injured.

The trains in collision at Walshville, Ill., on the 29th (at 2:40 a. m.) were southbound freight No. 6102 and northbound freight No. 6122. Both engines and several cars were badly damaged. The southbound train had run past the appointed meeting place, train orders having been overlooked. The road was blocked twelve hours. Two trainmen were injured.

The trains in collision at Taylor, Pa., on the night of the 29th of April were a yard freight of ten cars, standing motionless on a yard running track, and a train of three locomotives and one caboose, the engines moving backward and pushing the caboose. Of the five trainmen on the caboose, four were killed and one was injured. A switch tender had been directed to forbid the entrance of the train of locomotives on the track occupied by the standing cars, but neglected to do so, and is held responsible; also the man in charge of the standing freight is held responsible for failing to protect his train, either by a red light on the end car or by hand lantern as required by the rules.

The train derailed near White, S. D., on the 8th was westbound passenger No. 417. The engine was overturned, and the engineman fatally injured. The cause of the derailment is believed to have been due to a broken rail.

The train derailed near Halford, Kan., on the 10th was eastbound No. 186, a mixed train with two engines and a snowplow. Moving at about 20 miles an hour, the plow was overturned in a drift and both engines were derailed. One engineman and one fireman were killed and the other fireman was injured.

The passenger train derailed at Emsworth, Pa., on the 11th of April was westbound express No. 1007. The line of road at this point is four-track. A westbound freight had been derailed by the automatic application of the brakes, and several cars were thrown afoul of an eastbound track. These cars caused the derailment of an eastbound freight which came along within a few minutes. The path of the passenger train was also blocked, and this was the cause of the derailment of that train, only the engine and the baggage car being thrown off the rails.

The train derailed near Gillespie, Ill., on the 13th was westbound passenger No. 5. The engine and first three cars were thrown off the track and partly overturned. Two mail clerks were injured.

The train derailed near Hunter, Tex., on the 14th was a northbound stock train. Fourteen cars were ditched and about 300 animals were killed, part of them steers and part sheep. The derailment was caused by a broken wheel.

The train derailed on the St. Louis-San Francisco near Lawton, Okla., on the 22d of April was extra freight No. 734, consisting of one locomotive and 21 cars, including 19 cars of oil. Fire broke out in the wreck and 9 cars of oil, the caboose and a pile bridge, about 300 ft. long, were burnt up. Estimated loss $27,000. One drover and two trainmen were slightly injured. The cause of the derailment was not determined.

The train derailed near Cimarron, Colo., on the 27th was westbound passenger No. 315. Three coaches were overturned. Thirty-four passengers were injured, most of them not seriously. This section of the road is narrow gage. The baggage car, heavily loaded, was thrown off the track on a ten degree curve by the body side-bearings fouling bolts on the front truck.

The train derailed at Newport, Pa., on the 29th was an eastbound passenger ascending a steep grade at low speed. The second of the two locomotives hauling the train ran off the track, and with its tender, the first two cars and the tender of the leading locomotive, fell into the ditch. Twenty-three passengers were slightly injured in this accident. The cause of the derailment was a broken journal.

The train derailed at Sabula, Pa., on the 30th was an extra freight consisting of 44 cars. One or more cars in this train were derailed in Sabula tunnel, presumably by the fall of a brake beam, and the derailment was followed by a fire which destroyed 13 cars and contents, and damaged much other freight. Estimated loss $125,000. The fire raged 42 hours, and it is expected that the road through the tunnel will not be ready for operation before July 1.

Electric Car Accidents.—At Muncie, Ind., on the 9th, a street car was struck by a freight train of the Lake Erie & Western, and three passengers in the car were killed and four injured.

*Abbreviations and marks used in Accident List:
rc, Rear collision——bc, Butting collision——xc, Other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, Unexplained——derail, Open derailing switch—ms, Misplaced switch——acc-obst., Accidental obstruction——malice, Malicious obstruction of track, etc.——boiler, Explosion of locomotive on road——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft., Freight train (including empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.