A SUGGESTED LIGHT SIGNAL SYSTEM

A novel light signal system has suggested itself to Gaylord Thompson, chief engineer of the Ohio Electric Railway. As Mr. Thompson has no idea of patenting this system, he is anxious to obtain criticisms and suggestions from different engineers interested in it, and a description is presented herewith.

If two trolley wires were arranged as shown in the diagram and insulated by means of line section insulators, one wire being fed through a tap containing a solenoid and the other containing a broken circuit which is closed by the de-energized solenoid, it will be seen that when current is being taken from trolley *A*, shown in the diagram, the solenoid will open the feeder tap of trolley *B*, and consequently *B* will be dead. If a series of lights was "floated" between trolley *A* and trolley *B*, the instant that the two cars came into the block these lamps would light, thus warning each car of the approach of the other.

APPLICATION

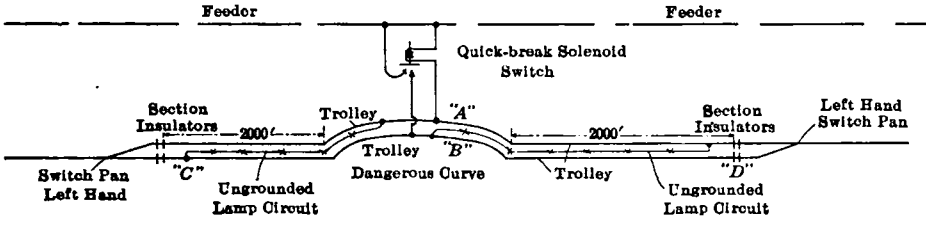
While the system could be made continuous over any mileage, its special use would be in the prevention of head-on collisions at dangerous curves. With such protection, the device would, in effect, make the operating division where it will be employed the equivalent of a straight line from one end to the other.

Cars overrunning their orders, or for any reason trespassing on this section of track, would be advised of the approach of other cars in time to stop. The circuit-breakers should be installed, each at a distance of about 2000 ft. from the curve to be protected. This would make 2000 ft. the minimum distance apart at which the approaching cars could see each other. Ordinarily *C* and *D* should be placed about 1 mile apart, or the system could be made to embrace a 3-mile section between passing points in which the view is obstructed. In either case the feeder tap should be located at about the middle of the protected section so as to reduce the drop in voltage to a minimum.

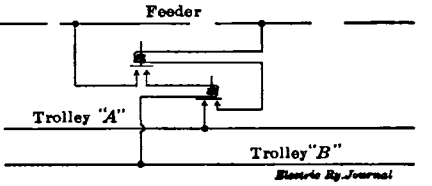
It is obvious that to make the system effective, both cars must draw current or have their controllers on at the same time. To insure this result on a continuous block system the live wire should be placed for the car ascending the grade and for isolated installations. In addition special instructions should be issued to the motormen. In actual practice, however, with points *C* and *D* 1 mile or 1½ miles apart, the condition of the controllers that could give the warning flash of the lights would be certain to occur before a dangerous condition was reached by the two cars in their approach toward each other.

As the light circuit is not a grounded circuit it would not be subject to derangement or the troubles of ordinary grounded light wires. The maintenance cost would be practically nothing, and the cost of installation for two No. 000 trolley wires and fixtures would be between $1,200 and $1,500 per mile.

One question which arises is whether the energy should be taken from one trolley wire only, or whether a double switch should be used. This would take the current away from the transgressing car at the entrance to a protected section. A sketch showing the arrangement of the feeder taps and solenoids with a double switch is also included.



Proposed Method of Protecting Dangerous Curve



Double Switch Scheme

GREAT NORTHERN RAILWAY ELECTRIFICATION IN MONTANA

BY EDWARD P. BURCH, MINNEAPOLIS

The recent news item in Eastern papers that the Great Northern Railway is to electrify its proposed Montana Eastern Railway, a prairie road between New Rockford, N. D., and Lewistown, Mont., a distance of 530 miles, is not based, so far as known, on any real decision of the railroad directors. The roadbed, tunnel and other construction contracts have been awarded, but it may be two years before the road is completed. The reasons why this new competitive road could be electrified to its financial advantage are not apparent, but it is surmised by those in touch with the general situation that some definite and controlling situation or opportunity may be involved.

In the case of the Denver, Rio Grande & Western Railroad, which has recently decided to electrify two complete engine divisions, one 115 miles long and one 85 miles long, the reasons were clear. A mountain range had to be crossed, grades were severe, traffic was heavy, capacity was limited and fuel was expensive. The directors appropriated funds for the electrification, and Vice-president Brown has stated: "Our plans are in the interest of economy in operating expenses." It is evident that capacity would be increased, and the use of water power for electric traction would provide a cheaper motive power.

These reasons do not seem to apply to the case of the proposed Great Northern electrification of the Montana Eastern. There are, however, at least two economic reasons why the proposed electrification might prove advantageous:

The fuel which is now used in Dakota and Montana has increased greatly in price during recent years. However, vast beds of brown lignite are found in Dakota and Montana, and the development of this great natural resource now requires a greater demand for the fuel as well as the backing of a strong corporation. Brown lignite crops out at many points along the proposed right-of-way. This lignite cannot be burned in locomotive boilers, but it is easily handled in stationary boiler plants equipped with mechanical stokers. This lignite can be used also by gas producers and gas engines with great economy. The energy from lignite heat can be converted into electrical energy and sent 100 miles east and west from many central power stations without great loss and in a most reliable manner.

The railroads which operate the most extensive electric systems in America claim that in the electrical operation of main-line traffic 50 per cent of the fuel bill is saved, and in switching operations or for classification yards 60 per cent is saved. Based on the relative cost of the steam fuel now used and brown Dakota lignite, the use of electric power on the Great Northern might reduce the fuel expense even more than 50 per cent.

In Europe it was the matter of economy of fuel which stimulated the great interest in railroad electrification, especially in Prussia, France, Switzerland and Italy.

One of the heaviest railroad operating expenses in the Dakotas and in Montana is that incident to the high cost

of boiler flue repairs. These repairs are occasioned by the water, which is detrimental. The alkali and also acid waters, and combinations of the two, found within a single engine stage cause a great amount of pitting and also incrustation of fire boxes and flues. The efficiency of the boilers is lowered, and the cost of fuel is thus considerably increased. Then, in the boiler repair shops the maintenance and repair account is excessive because of the deterioration of the boiler from the bad water and also because of the high wages paid to locomotive repair men.

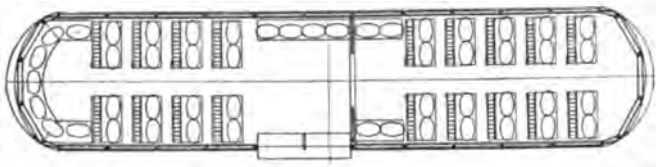
With electric power water for boilers can be obtained at the best sites or can be treated at a single point and then used over and over again in the condensing operation of steam turbines or as cooling water for gas engines.

The Great Northern Railway at the present time owns or controls many important electric railroads, including the Spokane & Inland Empire Railroad, which uses electric power on 248 miles of track; the Oregon Electric Railway, from Portland to Eugene, 121 miles; the United Railway system at Portland and other electric railways. The Cascade Tunnel track, which was electrified several years ago, handles heavy traffic under severe conditions. Electrification of main lines for heavy freight and passenger service is not a new matter with the directors.

It is surmised that the proposed road from Lewistown, Mont., to Rockford, N. D., is but the beginning of electrical operations, and that when the traffic density has increased the road from Lewistown to Great Falls, Mont., may be electrified to utilize the water powers already developed along the Missouri River.

NEW DENVER TRAIL CAR

The Denver City Tramway, one of the pioneer operators of side-entrance cars, has placed in service a new type of one-way trailer which follows closely the design of the company's standard side-entrance car. As shown in the accompanying plan, a partition now incloses the forward section of the trailer, leaving the rear compartment open for the passengers who prefer fresh air, with the usual reservations for smokers. On former trailers the opening



Seating Plan of Denver Side-Entrance Trailer

was 100 in. wide. On the new type, however, the opening for entrance and exit has been reduced to 67 in., which distance has proved ample. The lower step is only 13½ in. above the rail without allowing a further ½ in. for settlement. The double sliding doors which open into the closed compartment afford a passage of 36 in. in the clear.

The seating capacity has been increased from forty-six to fifty-one, partly by the addition of a circular seat at the rear. Greater riding comfort has been assured by using as many transverse seats as practicable and by furnishing the closed compartment with thermostat-controlled electric heaters.

With the exception of Brazilian government roads, the principal railway enterprises in Brazil have been built with English money and are controlled and operated by English companies and managers. However, many railways recently constructed and now under construction by companies controlled by American and Canadian syndicates are being financed in France, where $100,000,000 was invested during the past three years in Brazilian railways. Most of the equipment, rolling stock and rails for these roads has been purchased in Great Britain, Germany, the United States and Belgium.

COMPARATIVE EARNINGS OF PUBLIC UTILITIES

White, Weld & Company, New York, have recently compiled and issued a chart comparing the increase of gross and net earnings during the past ten years of ten steam railroads, ten gas companies, ten electric light and power companies and ten electric railway companies which might be considered as fairly representative of the industry and, with the possible exception of the gas companies, fairly well distributed throughout the country. In the gas group of public utilities, owing to the lack of generally published statistics covering the ten-year term, a larger number of companies had to be selected from Massachusetts, where these figures are available, than would otherwise have been the case. The chart is reproduced herewith. The names of the companies selected for this comparison follow:

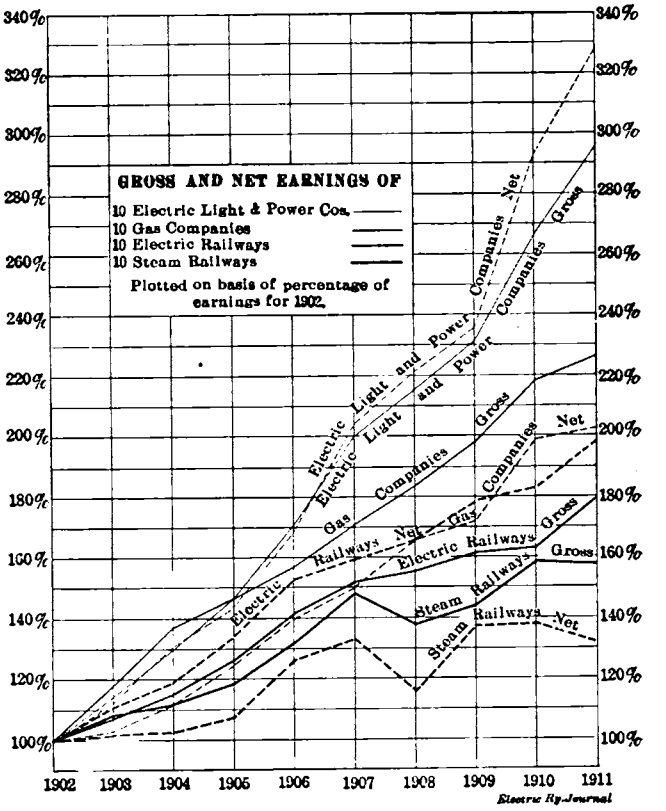


Chart Showing Statistics of Forty Public Utility Companies

Steam railroads: Atchison, Topeka & Santa Fé; Chicago, Milwaukee & St. Paul; Chicago & Northwestern; Erie; Northern Pacific; Pennsylvania; Union Pacific; Southern Pacific; Norfolk & Western; New York Central & Hudson River.

Gas companies: Consumers' Gas, Toronto; Hartford City Gas, Hartford, Conn.; Portland Gas & Coke, Portland, Ore.; Laclede Gas, St. Louis, Mo.; Aberdeen (S. D.) Gas; Worcester (Mass.) Gas; Springfield (Mass.) Gas; Haverhill (Mass.) Gas; Cambridge (Mass.) Gas; Peekskill Lighting & Railway (gas department).

Electric light and power companies: Cleveland Electric Illuminating; Washington Water Power, Spokane, Wash.; Minneapolis General Electric; Lowell Electric Light; Edison Electric Illuminating, Brockton, Mass.; Kings County & Edison Companies, Brooklyn; United Electric Light, Springfield, Mass.; Edison Electric, Los Angeles; Duluth Edison Electric; Edison Electric Illuminating, Boston.

Electric railway companies: Brooklyn Rapid Transit; Twin City Rapid Transit; Denver City Tramway; Capital Traction, Washington, D. C.; Indiana Union Traction; Louisville Railway; Detroit United Railway; Lake Shore Electric Railway; Memphis Street Railway; Boston Elevated Railway.