

THE EVANSVILLE, SUBURBAN & NEWBURGH RAILWAY

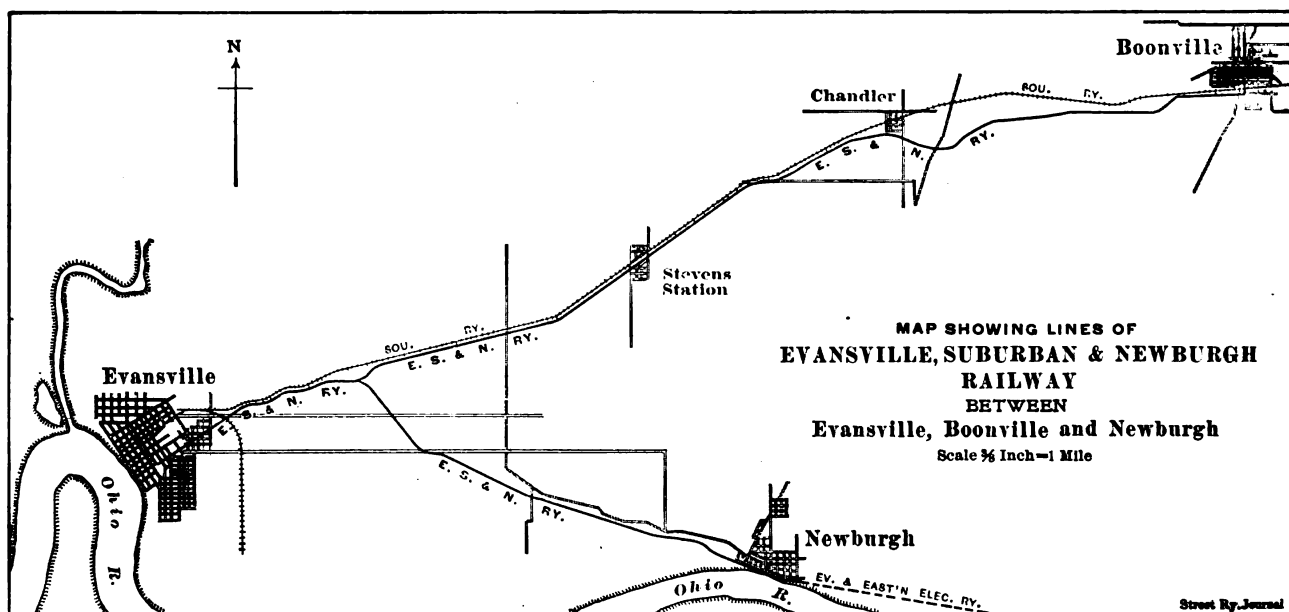
The Evansville, Suburban & Newburgh Railway, which operates separate electrically-equipped lines east out of Evansville, Ind., to Newburgh and to Boonville, has several features in its organization, operation and construction not often encountered in electric railway work. The road does not depend on passenger traffic alone. Steam freight service is now given on the Newburgh division, and within a short time similar service will be established on the Boonville branch.

The railway company was organized in 1888 when the Newburgh division of the road was built. This line was operated as a freight and passenger road with dummy steam engines until May, 1905, when electrical operation of passenger trains was begun. The change in the motive power of the road was made under an act of the Indiana State Legislature passed March 9, 1903, which permitted steam roads to be changed for electrical operation, and it has taken

ing about 700 patients, and the travel of the attendants and of visitors between Evansville and the hospital is such as would be occasioned by a town of about 700 people.

From Newburgh east to Rockport, 24 miles, the Evansville & Eastern Electric Railway is being constructed. The Evansville, Suburban & Newburgh system has a thirty-five-year contract with this company whereby the cars of the new company will be brought into Evansville over its tracks. The cars, both freight and passenger, will be turned over to the old company at Newburgh and will be handled by the old company's trainmen.

Boonville, at the terminus of the north division, is the county seat of Warwick County, and has a population of about 4500 people. It is surrounded by coal fields, and the development of these alone assures of a substantial future growth. Mining on an extensive scale, however, was only begun within the last six years, and previous to this time the town was supported largely by the farming community around it. The only other town on this division is Chand-



ROUTE OF THE EVANSVILLE, SUBURBAN & NEWBURGH RAILWAY, BETWEEN EVANSVILLE, BOONVILLE AND NEWBURGH

advantage of an act approved Feb. 25, 1905, which permitted roads changed under the previous act to continue to use steam as a motive power in addition to electricity. The system is the only one that could take advantage of the later law, and it is therefore the only line in the State that has the right to operate both with steam and electricity.

After the electrification of the Newburgh line, construction work on the Boonville division was begun, and this was opened for traffic July 3, 1906. The tracks of the system form a Y. The main line continues out of Evansville to a junction about 4 miles west of the city, where one branch takes off south of east to Newburgh, 10 miles from Evansville, and another continues north of east to Boonville, 18 miles from Evansville and 10 miles northeast of Newburgh. There is a total of 28 miles of main-line tracks. The region traversed by both lines is good farming country with an average density of population. Newburgh is an old river town which, after a lethargic period of a decade or more, due to the falling off of river traffic, has begun to build up again. At present it has a population of about 1500. About midway between Newburgh and Evansville is located the Southern Indiana Insane Hospital, a State institution hav-

ing about 700 people, and which lies 7 miles west of Boonville. Several large coal mines are located near the line in the vicinity of Chandler. These are worked both by miners living in Chandler and by others making their homes in Boonville, who use the electric line in going to and from their work.

TRACK AND ROADWAY

At the time the Newburgh line was electrified, the track and roadway was entirely rebuilt. The track was originally constructed with a 40-lb. T-rail. New ties and rails were laid and all the trestles and crossings were replaced with new work. All of this work was carried on without interfering with the regular schedule of trains, which consisted of five trains in each direction daily. In fact, during the whole work, with the exception of occasional trains being delayed a few minutes by ballast trains, no inconvenience whatever was caused.

As rebuilt, the Newburgh line now conforms with the best practice in interurban work, as does also the newly constructed Boonville line. The reconstruction of the Newburgh line, as well as the construction of the line to Boonville, was done by the railway company under the super-

vision of the Tennis Company, of Cincinnati, C. H. Battin, vice-president of the construction company, being in immediate charge of the work. Both lines are built on private right of way varying in width from 50 ft. to 100 ft. The Boonville line has a maximum grade of 0.1 of per cent, and the Newburgh line 0.7 of one per cent. The character of the country between Chandler and Boonville necessitated considerable grading. The heaviest cut is 14 ft. in depth, and fills 20 ft. high were made. Practically all the curves outside city limits can be taken at full speed. No large streams are crossed by either line, and only one steel bridge span was employed. The waterways are crossed over 14-ft. timber bridge spans having double lines of chords measuring 8 ins. x 16 ins. At the bottom of cuts the roadbed is 19 ft. wide and at top of fills 14 ft. Notwithstanding the fact that gravel could have been obtained at much less expense, broken limestone was used for ballast because of its superior qualities. About 2200 cu. yds. per mile were used. The rails are 70 lbs. and the ties are of white oak, laid 17 to a 33-ft. rail. Through style sidings 500 ft. long in the clear are located at intervals of about 4 miles, and are provided with switch stands of the low target type and automatic spring switches and frogs.

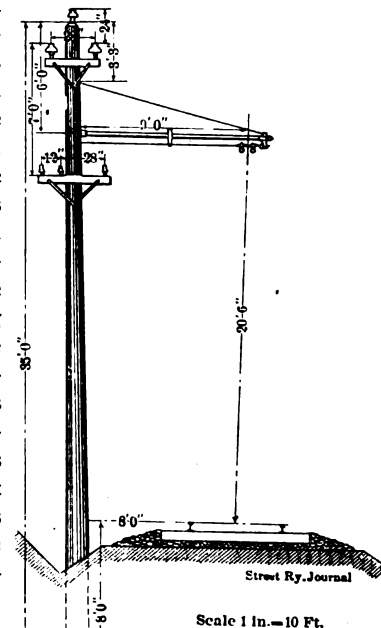
TROLLEY AND POLE LINE

Bracket overhead construction is employed except in the terminal cities. The poles are placed 100 ft. apart. They are of chestnut, are 35 ft. long and have 8-in. tops and 14-in. butts. Both the butts and tops were treated with a preservative compound consisting of a mixture of coal tar and crude oil. A cross-arm below the bracket carries telephone and feeder wires, while those poles between Evansville and the one sub-station on the line carry on a ridge pin and a single cross-arm a three-phase, high-tension line. The

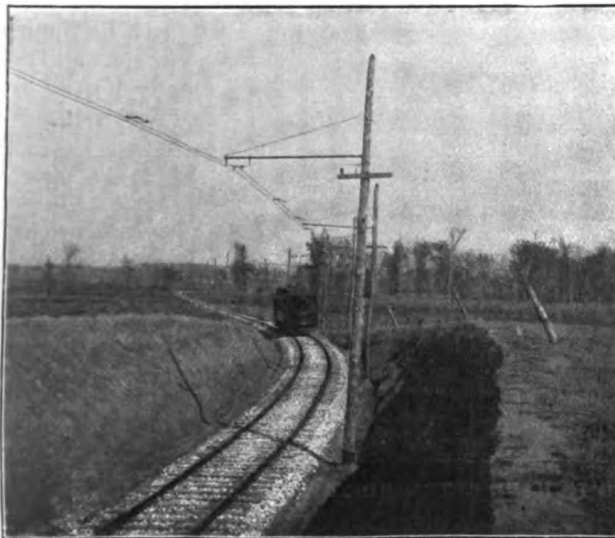
On the ground floor of the new station waiting rooms and ticket and freight offices will be located, while the second story will contain the offices of the company. The station will be built on Fifth Street, near Main Street, on the site of the present one.

At Boonville a large two-story building formerly used as a hotel and located one block south of the public square, which is the center of the business district, has been purchased and converted into a passenger station. The remodeled building contains separate ladies and gentlemen's waiting rooms and ticket and express offices. It is lighted with current from the city mains and is heated from the city central station heating system. An express station with a covered track between it and the main building has been built to the west of the passenger station.

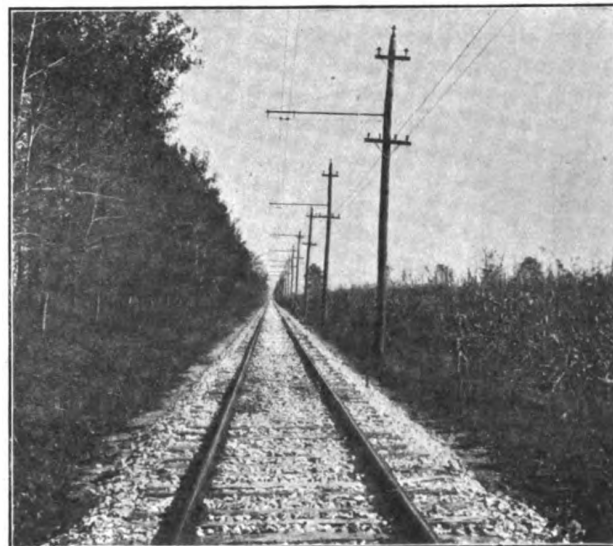
The station at Chandler is a neat structure with the en-



DETAILS OF OVERHEAD CONSTRUCTION AND SECTION OF TRACK



A HEAVY CUT NEAR BOONVILLE. NOTE ALSO THE SHORT POLES USED AS ANCHORS FOR THE GUY WIRES ON THIS CURVE



A TANGENT ON THE BOONVILLE BRANCH, SHOWING THE HEAVY BALLAST AND THE OVERHEAD CONSTRUCTION

brackets are of Ohio Brass Company manufacture and support two 000 grooved trolley wires. Lightning arresters are placed over the entire system at intervals of 1700 ft.

STATIONS

The present station in Evansville is inadequate, but plans have already been prepared for a thoroughly modern two-story structure, measuring 70 ft. x 150 ft., to replace it.

closed portion surrounded by a veranda. An unloading platform for freight is provided.

In Newburgh there are two stations, one in the lower and one in the upper part of town. Both are built with waiting rooms and offices for agents. All of the stations mentioned are provided with local and private telephones. Small shelters will be placed at all road crossings and at other points where stops are made.

POWER SUPPLY

The possibility of future extensions and the fact that power can be rented at a reasonable rate makes it inadvisable at the present time to erect a power house. However, should it be deemed advisable to build a station at any time the company has on hand a surplus of \$200,000 which can be used for this purpose. Power is rented on a meter basis from the Evansville Gas & Electric Light Company.

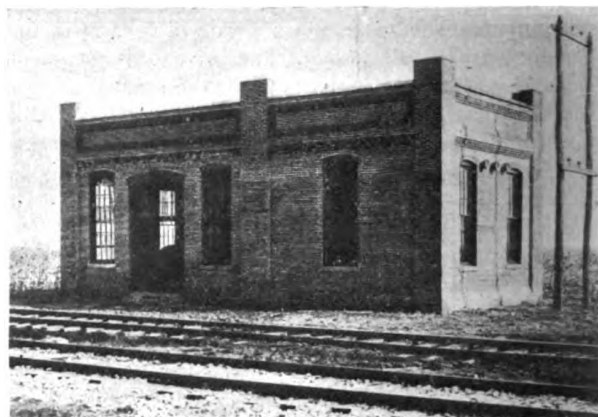


VIEW ON THE NEWBURGH BRANCH APPROACHING THE HOSPITAL FOR THE INSANE

Largely because of the demands made upon it by this railway and also by the Evansville & Mt. Vernon Electric Railway, the lighting company is now rebuilding its generating plant in Evansville. Two Curtis steam turbines of 1000-kw and 500-kw capacity respectively, together with more boilers, have been installed, and further generating capacity is contemplated. Three 100-kw oil-cooled Westinghouse transformers in the generating station raise the current generated at 2300 volts and 60 cycles to 13,200 volts.

A pole line through the city streets carries the high-tension line to a point about one mile from the station

300-kw Westinghouse rotary converters in the operating room are started by induction motors. They are each located near a side wall of the room, while a six-panel switchboard of Vermont marble occupies a position near the rear wall and midway between the converters. The switchboard is arranged in duplicate for each of the converters, there being two a. c. panels, two d. c. panels and two feeder panels. Bus-bars tie the d. c. panels together so that the machines may be operated in multiple and the two feed-

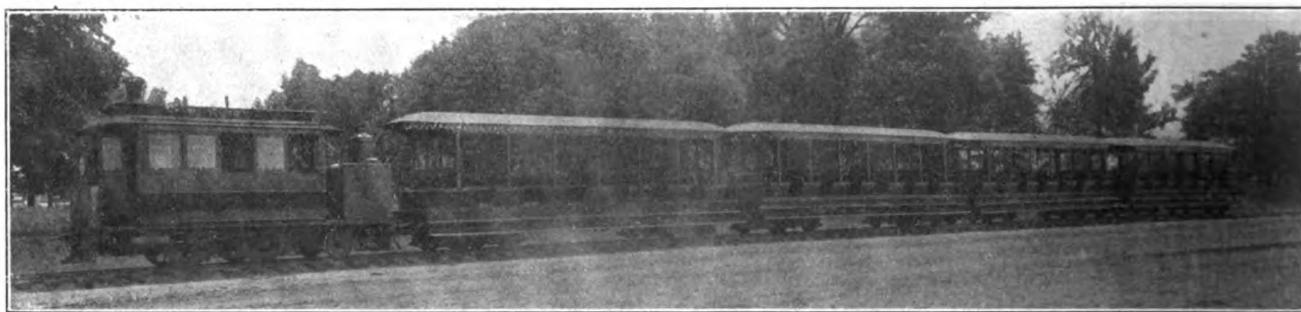


EXTERIOR OF THE BOONVILLE SUB-STATION

ers leaving the station are so connected that they may be thrown on either of the feeder panels.

ROLLING STOCK

The five electric passenger-cars operated on the line were built by the St. Louis Car Company. They are 45 ft. 11 ins. long over bumpers and 9 ft. wide over all. The bottom framing was made in accordance with plans furnished by the railway company and is of extra heavy construction. The center sills of 4½-in. x 6-in. yellow pine are reinforced by 6-in. I-beams running the full length of the car body. A

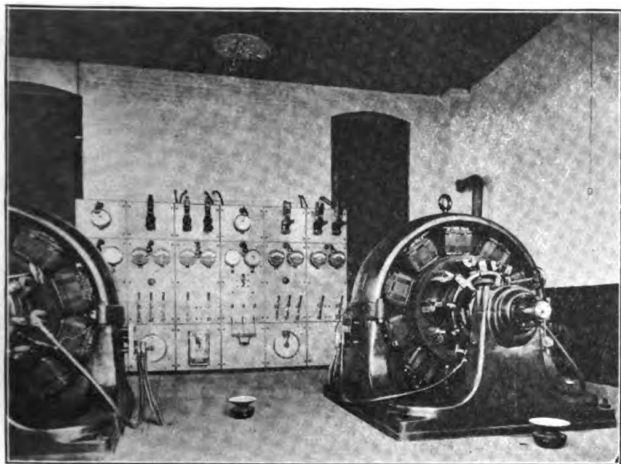


OLD STEAM PASSENGER EQUIPMENT NOW USED TO HAUL EXTRAORDINARY CROWDS

to the tracks of the railway company, where the wires are received on the trolley poles. The high-tension wires are of No. 6 copper and are arranged triangularly with 28 ins. as the minimum distance between wires. At the time of the electrification of the Newburgh line a sub-station was built at a point midway between Newburgh and Evansville. After the completion of the line to Booneville the apparatus in this station was removed to the present one, located about 8 miles out of Evansville on the Booneville division. The sub-station building is of brick. It contains two rooms. In one is installed all the high-tension apparatus, including three 13,200-volt to 265-volt oil-cooled transformers, lighting arresters and stick high-tension switches. The two

6-in. channel bar is bolted to the inside of the side sill, and at each end this bar is bent to extend alongside the end sill to which it is securely bolted. On the bottom side of the side sill is bolted a steel plate the edge of which projects ½ in. beyond the outside surface of the sheathing to prevent the bottom edges of the sheathing being damaged by collisions with vehicles. Each of the four platform timbers is reinforced by 1-in. x 6-in. steel plates which extend back beyond the bolsters. A feature somewhat out of the ordinary is the "barn door" type of construction of the vestibule doors. These consist of two parts, an upper and a lower, the division being made at the height of the belt rail. The two parts may be opened and closed inde-

pendently of each other, permitting the upper half to be opened in warm weather and the lower half closed for the protection of passengers. The floor of the car is double, being filled in between with felt paper. The interior is finished in mahogany ornamented with marquetry work. The ceiling is of the full empire design and the half oval deck sash are glazed with leaded art glass, Holophane globes enclosing clusters of five lights and located in the domes of the ceiling. Peter Smith hot-water heaters are installed.

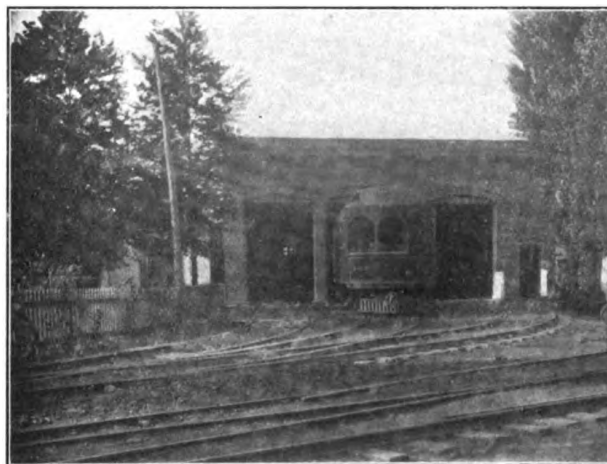


INTERIOR VIEW OF BOONVILLE SUB-STATION

Three of the cars are of the combination baggage and passenger type, while the others are for passengers alone. The car body, which is painted a Pullman green, is mounted on St. Louis Car Company trucks having wheel bases of 6 ft. 3 ins. and fitted with steel-tired wheels. The trucks

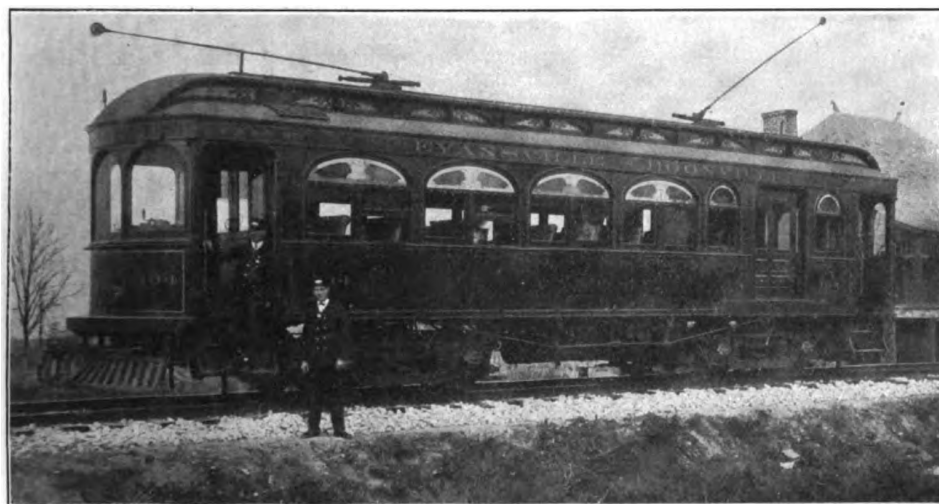
While this door gives the motorman access to his cab, which is partitioned off from the central portion of the car by a pipe rack, the chief reason for placing it in the end of the car was to permit the hauling of timbers, rails or other freight which, because of its length, could not have been loaded through one of the side doors.

In addition to the electrical equipment, the company still has the cars and engines used before the electrification of the road. This equipment, which is now used for passenger



CAR HOUSE OF THE EVANSVILLE-BOONVILLE LINE

service in emergencies only, consists of four closed and eight open passenger cars and three enclosed locomotives with 10-in. x 14-in. cylinders. The freight equipment consists of thirty-two standard gondolas and box cars, but it is the intention to increase this equipment by the purchase of additional gondolas to be used in coal shipments and by a locomotive of standard type.



ONE OF THE COMBINATION PASSENGER AND BAGGAGE CARS

carry four GE-56 motors. Three of the cars are provided with type-M control and two with K-14 controllers. The cars weigh complete 63,000 lbs. each.

The one express car operated on the Boonville division is shown in an accompanying illustration. The car is 45 ft. long and measures 8 ft. 9 ins. over the sills. To avoid overhang of the ends the trucks are placed as far apart as the clearance of the pilot permits. The arrangement of the end doors is somewhat out of the ordinary. In each end a door opening out onto the bumper occupies the space between the right end corner post and the adjacent front post.

REPAIR SHOPS

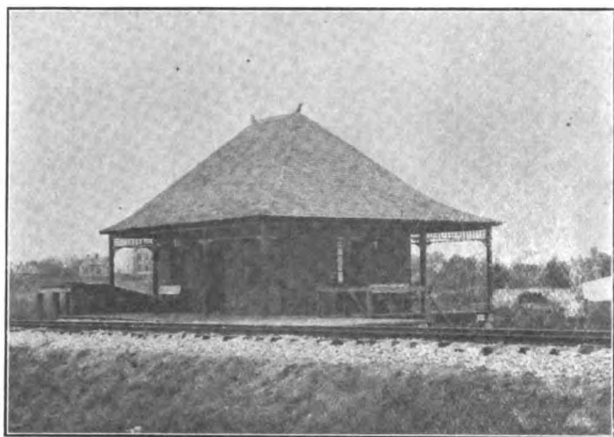
The electrical equipment is housed and repaired in a brick building in Evansville near the city limits. This building, which is 120 ft. long, is divided into two compartments by a fire wall extending lengthwise of the building. In one compartment are two storage tracks while the other, which contains one track with a pit underneath, is used as a repair shop. This room is provided with a concrete floor. An overhead runway facilitates the handling of arma-

tures and heavy parts. A full equipment of machine tools has not yet been installed, but it is the intention to fit the shop up with these within a short time.

OPERATING FEATURES

The road is operated on a very economical basis, and in fact the operating expenses exclusive of taxes and insurance, are only 44.6 per cent of the gross earnings. General Manager Gus Muhlhause operates the road on the "everybody busy" principle. Another fact tending to reduce the cost of operation is that practically no trouble whatever is

experienced with the electrical apparatus of the cars. During almost two years of operation of the system by electricity but one armature has been lost, and this is thought to have been grounded by lightning. The small amount of trouble is the result of the careful inspection and attention the cars receive in the shop, and partly of the treatment to which they are subjected on the road. Nearly all of the



THE CHANDLER STATION ON THE EVANSVILLE-BOONVILLE LINE

motormen are experienced engineers and, possessing a thorough understanding of machinery in general, they have proper respect for the electrical equipment and know how to observe care in handling it. They are instructed to watch the armature bearings and other parts of the car as closely as was their custom of watching for trouble in the equipment when driving the steam locomotives.

Regular fares are about 2 cents per mile, with a minimum fare, outside of Evansville, of 10 cents. For regular patrons of the road a book with \$12 worth of coupons is sold for \$9, which gives a 1½-cent per mile rate. With the exception of at 7 a. m. and 12 o'clock noon on the Boonville line, a one-hour schedule is maintained between 6 in the morning and 8 at night. The first car leaves Boonville at 6 o'clock and carries about 100 miners to the mines near Chandler, and the last one leaves Boonville at 11:15. The running time between Boonville and Evansville is about 45 minutes. On the Newburgh line cars are operated on a schedule of 1 hour and 20 minutes. Three cars are required to maintain the regular schedule of both divisions. When large excursions are to be handled the old steam locomotives and all of the twelve passenger cars may be pressed into service. By means of a train consisting of a locomotive and seven cars similar to those shown in an accompanying reproduction, together with the electrical equipment, on the occasion of the county fair at Boonville last fall, 3200 people were carried from Boonville to Evansville between 4 and 10 o'clock p. m.

FREIGHT TRAFFIC

The system will depend as much on freight receipts as on passenger earnings, and is one of the very few electric railways in existence belonging to steam railway associations. As a member of the American Association of Railways and of the Louisville Car Service Association, it is permitted to receive car-load lots from other roads and to

bill cars through from its own system to foreign points. The road has track connections in Evansville with the Southern and the Illinois Central Railways, and ground has been purchased in Evansville upon which freight yards of ample capacity will be built.

In winter when the Ohio River freezes over, and in the low-water seasons, Newburgh is entirely dependent on the railway for its commodities. But the greater portion of the freight business on this branch consists in the handling of



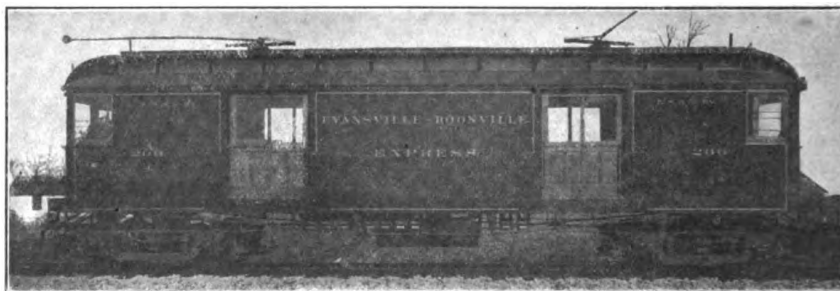
CONVERTED HOTEL IN BOONVILLE USED FOR A PASSENGER STATION

coal from several mines located on the line. Two steam freight trains handled by the dummy engines are run in each direction daily. Heavy freight traffic has not yet been established on the Boonville division. Package freight is cared for by the express car to which reference has already been made, which makes two round trips between Evansville and Boonville daily.

Several of the mines near Chandler will have track connections with the road, and as the capacity of some of these mines is as high as fifty cars per day, the steam locomotive of standard type to be purchased will handle the coal trains.

EFFECT OF ELECTRIFICATION

A forcible example of the effect of changing over to electrical operation on passenger traffic was shown by comparison of the passenger receipts on the Newburgh division for the last eight months of 1905, when passenger cars were



THE ONE EXPRESS CAR ON THE SYSTEM. AN UNUSUAL FEATURE IS THE NEARNESS OF THE TRUCKS TO THE ENDS OF THE CAR

operated by electricity, and for the eight months of the previous year. Without any cause other than the change in motive power and the increased number of trains the travel shows a 40 per cent increase. The receipts from passenger service during eight months of 1904 were \$9,440, against \$15,936 for the same period of the year following. The months of July and August of the latter year show an increase of 75 per cent in the passenger traffic. When operated by steam, 45 minutes were required to make the trip, as against 28 minutes under electrical operation, and

there were but five trains in each direction on week days, as against eleven when the motive power was changed.

FRANCHISES

All of the company's franchises are perpetual. Neither in Evansville nor in any of the towns is the company required to pay a revenue or franchise tax of any kind. The franchise in Evansville provides for a double track to Fifth and Main Streets and permits the hauling of freight in car-load lots by steam to Canal and Eighth Streets, which is but a few blocks from the wholesale and retail district of the city. The franchise in Boonville permits car-load lot freight to be handled by steam to a point three blocks from the public square, and in Newburg freight may be hauled through the town. The company also owns real estate in the terminal cities and at other points along the railway, exclusive of the right of way, valued at \$35,000 to \$40,000.

The officers and all of the stockholders of the company are Evansville and Newburgh business men who keep in touch with the management of the property and take considerable pride in it. F. W. Cook, as president of the company, is active in the management of the system. The thorough manner in which the construction work has been carried out and the absence of any appearance of cheap work in it is largely due to the efforts and ideas of General Manager Muhlhausen, whose experience as general manager of the former steam road has convinced him that the best of track and car construction will in the end result in most satisfaction to the company and its patrons.

IMPROVEMENTS IN SCRANTON

Plans are under way for a \$250,000 viaduct to be built jointly by the steam railroad companies and the Scranton Railway Company, in Scranton, Pa., to eliminate the grade crossings in that city. The viaduct, including approaches, will be 1300 ft. long, and will provide for a double-track electric road and for a 30-ft. highway. The plans are being prepared at the Philadelphia office of the American Railway Company for this structure. The Scranton Railway Company has also a new power station in contemplation.

NEW SOUTH WALES TRAMWAY REPORT

The report of the railway commissioners of New South Wales for the quarter ended Dec. 31 shows for the tramway lines as follows:

Tramways	Quarter Ended Dec. 31, 1906	Quarter Ended Dec. 31, 1905
Miles open	127	125¾
Revenue	£232,517	£212,456
Expenditure	£196,099	£182,355
Tram miles run.....	4,159,133	4,079,208
Earnings per tram mile...	1s. 1½d.	1s. 0½d.
Expenditure per tram mile..	11¼d.	10¾d.
Percentage—Expenditure to earnings	84.34	85.83
Number of passengers car- ried	39,745,605	30,320,934

The Chicago Union Traction Company is probably the only electric railway system having in its organization the office of "superintendent of sanitation." This office is held by Thomas J. Manning, who confines his work principally to the sanitation and cleaning of cars.

UNDERWRITERS' NATIONAL ELECTRIC ASSOCIATION

The annual meeting of the Electrical Committee of the Underwriters' National Electric Association to consider changes in the National Electrical Code will be held March 27-28 at the rooms of the New York Board of Fire Underwriters, No. 32 Nassau Street, New York. As is well known, it has already been the endeavor of the Electrical Committee to make only such changes in the Code as become necessary by progress in the art or such as have been shown by some field experience to safeguard hazard, as changes in the Code, even when desirable, cause more or less confusion and trouble. A number of suggestions have been received during the past year in regard to changes in the Code, and the committee feels that it may fairly expect that the parties who have sent in these suggestions will be present at the general meeting and ready to support their recommendations with such arguments as they may have in their favor.

The sub-committee on wiring and equipment of street railway property, including rolling stock, has made the following report in regard to the two matters which were referred to them at the last meeting of the association:

1. Rewording of section submitted permitting of a less distance than 4 ins. between woodwork and the current carrying parts of resistances in panel heaters, as required under Rule 32. Under direction of the Laboratories a series of tests on both panel and cross-seat type of heaters were conducted early last year; the conclusions drawn from these tests were that it was not advisable to change the requirements, and your committee so recommends.

2. In regard to wiring of street railway property the following changes are recommended:

Rule 21: Section *d*.—Add fine print note to read as follows:

The above requirement does not apply to the grounded circuits of street railway systems.

Rule 28: Section *b*.—Amend to read as follows:

Must not be used when the difference of potential between the two wires under normal conditions is over 300 volts.

Rule 33: Section *c*.—Amend to read as follows:

Must have a cut-out switch located at a proper place outside of the building so that the trolley wire in the building can be cut out at one point, and section insulators must be installed so that when this cut-out switch is open the trolley wire will be dead at all points within 100 ft. of the building. The current must be cut out of the building whenever the latter is not in use or the road is not in operation.

Rule 33: Section *d*.—Amend to read as follows:

All lamps and stationary motors must be installed in such a way that one main switch can control the whole of each installation, lighting and power, independently of the main cut-out switch called for in section *c*.

Rule 33: Section *e*.—Amend to read as follows:

Where current for lighting and stationary motors is from a grounded trolley circuit the following special rules to apply:

1. Cut-outs must be placed between non-grounded side and lights or motors they are to protect.

2. Cut-outs must be so placed that no group of incandescent lamps requiring more than 2000 watts will be dependent upon one cut-out.

3. Switches must be placed between non-grounded side and lights and motors they are to protect.

4. Must have all rails bonded at each joint with a conductor having a carrying capacity at least equivalent to No. 00 B. & S. gage annealed copper wire. All rails and all lighting and stationary motor circuits must be connected to the outside ground return circuit by a No. 00 B. & S. gage copper wire, or by equivalent bonding through the track.

Rule 33.—Add new sections to read as follows:

All pendant cords and portable conductors will be considered as subject to hard usage (see 45 *f*).

Must, except as provided in section *e*, have all wiring and apparatus installed in accordance with rules for constant potential systems.