Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Volume 57 New York, Saturday, June 11, 1921 *Number* 24

The C. E. R. A. at Work and at Play

THE railway men who live in the territory covered by the Central Electric Railway Association are fortunate in having close at hand such wonderful recreational facilities as are provided by the Great Lakes. Moreover, they make good use of these in connection with the summer meeting of the association, to be held this year as two years ago on the good ship *South American*. To any one who has taken a C. E. R. A. boat trip, the mere name connotes several restful, sociable and informational days. Those who have not been able to do so have missed an interesting experience. This year the voyage begins at Chicago on Sunday, June 26, and ends at the same place on Friday, July 1, and not a month later than this as was inadvertently announced last week.

And there's a substantial program of papers, too—a good one. They will be read in the main salon, which makes an admirable meeting room, quiet, retired and cheery. It is easier to concentrate here than in meeting rooms of the type usually available.

After All, the Things that Count Are Results

SEVERAL incidents have recently come to attention which illustrate the importance of focusing interest on the ultimate end of an operation or process, rather than upon the means which are expected to achieve the desired results. For example, in one case a manager in referring to the head of a certain department said that he was forced to engage this man almost in spite of his prejudices because he knew that the man could do things. In another case, the head of an important department, in tracing his own career, said that he had frequently been obliged to antagonize his superiors, especially when they showed a tendency to interfere with his own prerogative, but that he had always held his job because those same superiors recognized that he could get results for them more reliably than any other man within their reach.

So much for examples of a positive character; now as to the negative side. There are far too many individuals who are so fond of their pet plans for doing things that the plans to them become an end rather than a means. The consequence is that the true end is never fully accomplished. One man comes to mind, a man with a very attractive personality and excellent educational training, who seemed to be so absorbed in systems for classifying information and people and in experimenting with new devices that he was not able to get out the work of his department in the required time. The source of the trouble would seem, in this case, to be the misplacing of emphasis as to relative importance rather than to any lack of real ability.

In considering the characteristics of various shops, way departments, power plants and the like, it is evident that in their operation these illustrate the working out of one or more fundamental principles. Those which show up the best on the whole are the ones in which the prime purpose is "results." It is not necessary to adopt that fallacious old adage, "The end justifies the means," to warrant one in keeping the end always prominently in sight.

Mr. Sprague Boosts the Joint Electrification Committee Idea

ON JUNE 2 Frank J. Sprague addressed the Traffic Club of Chicago on the general and local transportation situations. Outstanding in importance among the good points that he made was the need for some kind of a national body to study the problem of steam railroad electrification in a comprehensive way. Coming at the subject from a different direction Mr. Sprague reaches the same conclusion as that stated in the last annual report of the American Electric Railway Engineering Association committee on heavy traction, wherein the recommendation was made that the national associations concerned in railroad electrification get together in some kind of a joint committee. The committee will reiterate the recommendation this year. This paper suggested editorially, in the issue for Feb. 26, 1921, that the name "American Committee on Electrification" would be appropriate. Mr. Sprague calls the central body a "Commission," which implies a wider scope than "Committee" and fits in better with his proposition.

The idea of an American Committee (or Commission) on Electrification is the result of an evolution extending over a considerable period. Electrification of the railroads is so enormous and far reaching an undertaking that almost every important branch of engineering is involved in it to a greater or less degree. Then, of course, there are the transportation interests themselves, and, in addition, the present state of semi-management of the railroads by the federal government complicates the matter still more. All of this has resulted in extensive and increasing duplication of effort, which has worried the economy-loving engineers, and they have at least called attention to the overlap. They had in mind a co-operative movement largely among engineers. Mr. Sprague goes farther and takes in the Interstate Commerce Commission, the telephone interests and others not included in the earlier plan. There is no objection to this provided the body does not become unwieldy. With a strong and effective central organization the several divisions of the field could be handled by special sub-committees.

Mr. Sprague properly suggested that the initiative in this matter come from the American Railway Association. This is the body most vitally concerned, although the general public which needs better service, electric utilities which will sell the railroads power, manufacturers who will sell them equipment, and others are

greatly interested also. Mr. Sprague does not specifically mention the American Electric Railway Association in his list, but presumably includes it by inference. This body is the vehicle through which practically all of the experience in electric traction to date can best be brought to bear on the problem of electrifying the steam roads.

Can the Nickel Fare and the Graded Fare "Come Back" Together?

NEWS items announcing decreases in street railway fares are becoming more numerous. A year ago such an occurrence was almost unheard of. Fundamental economic conditions over which the street railway companies had no control have rendered general increases in charges for transportation imperative during the last few years. The nickel fare has become almost extinct. Can it ever come back?

It has been well established by the statistics of the industry that the cost of labor, fuel and supplies, not to mention taxes and other items outside of strictly operating expenses, were more than doubled since 1914. Recent decreases have been but a small fraction of that amount. Yet only in rare instances have fares been increased proportionately. Therefore it is hard to foresee wherein there is any substantial ground for expecting a general return to the universal nickel fare in the near future. This is especially true in view of the fact that the nickel was not a very profitable rate to the majority of companies even ten years ago, though all companies then did not realize this fact.

It is not unlikely, indeed, that there are still further increases to be expected for some companies. Owing to public hostility and unfavorable franchises, some companies as yet have been unable to obtain simple justice promptly and are still seeking to secure rates which the higher costs of operation of today clearly justify. But the economic pressure appears to be receding somewhat, and there are various instances of companies reducing fares on their own initiative. Notable among such cases is the action of the trustees of the Eastern Massachusetts Street Railway, reported in last week's issue. On the many lines operated by these trustees a moderate general reduction in fares has been made coincident with a decrease in the wage scale.

To a long impoverished industry the mere mention of a 5-cent fare unit may sound too far fetched even to discuss, yet certain elements of the general public are discussing it, and one need only to pick up almost any copy of the more sensational newspapers to learn that they are "demanding" it. While it is not likely that the responsible authorities will be materially influenced by the "demands" of the unthinking and the sensation seeker, nevertheless it behooves all to be forehanded in considering these matters.

There are certain advantages to the old 5-cent nickel as a fare unit, not the least of which is the casual way the average American will spend it for a phone call, a soft drink or even a short ride on the street car, whereas he is probably a little more reluctant when the expense involves some extra pennies or the use of tickets, the supply of which he has to renew at frequent intervals at an expenditure of perhaps fifty cents or a dollar. All this leads up to a renewal of the old discussion of some system of graded fares, with the feasibility and desirability of a nickel unit for a short ride. Where a company is now operating on a fare of from 6 to 10 cents, and by means of current or future reductions in wages and other costs finds itself in a position to make some reduction in fare, but not to the extent that a universal 5-cent charge would require, the alternate plan of a low fare for a short ride with a higher fare for a longer ride is worth consideration.

While several graded fare systems have been tried in the past, rather unsuccessfully to judge by their abandonment, it is obvious that the conditions are now much more favorable for such an experiment. Previous trials have all been made on the basis of the need of increased revenue, and the zone fares as established have always meant an increased fare to many, if not all passengers. But now, when a new set of conditions may permit a modified fare system on the basis of a reduction in fares to some, if not to a majority of the passengers, the chances of a successful return along these lines look distinctly better. Such an experiment, for example, is being conducted by the Boston Elevated Railway, where a universal flat fare of 10 cents was the established rate for two years, but the company is now charging only 5 cents for short rides in several suburbs of Boston. The results of the first few weeks' operation are said to have shown an increase of more than 80 per cent in the class of riders affected. While it is pointed out by the general manager of that company that an increase of 100 per cent would be necessary to give the company the revenue formerly received at the 10-cent rate, nevertheless this remarkable percentage of increase is clearly indicative of the possibilities of stimulating short haul traffic by means of 5-cent fares.

The Committee on Elimination of Waste Makes Some Suggestions

MUCH has been said in the past about the waste prevalent in America, but the reference has usually been to the waste of national resources. That industrial America has also been a spendthrift—indeed, highly inefficient in its methods—will be a surprise to some. Nevertheless this is the charge of a committee of the American Engineering Council which declares that the aggregate of the losses at least theoretically preventable runs into billions of dollars yearly. This report was presented to the Council on June 3 and its publication was authorized not as a report of the Council but as the findings of the committee. A brief summary of some of the points covered is published in this issue.

It is somewhat remarkable that in spite of the progress made in industry in many directions, the methods of engaging labor and recompensing it differ but little from those practiced in the early days when men first began to hire their services to others. Methods by which the employer who needs a certain kind of labor can be brought in touch with the man who can supply that particular kind of labor have not greatly improved. The same can be said in regard to the determination of the peculiar adaptability of the man to the work to be undertaken and the prevention of his discharge because of seasonal or other changes in the demand for the product, preventable diseases, idleness through strikes and other causes. For some of these conditions the employer is to blame, for some the employees, but for the most the cause is conditions which community sentiment and intelligence only can overcome.

The electric railway industry should profit both directly and indirectly by any comprehensive plan for increasing the efficiency of labor, reducing unemploy-

ment and otherwise increasing output. The indirect advantages include lower cost of living and greater prosperity for the community, and this necessarily means more riding. The direct advantages of increased labor efficiency are those which would apply in any business, namely, greater output per unit of cost.

The report is particularly interesting because it is an examination by an engineering body of a subject which usually has been approached not from the engineering but from the sociological side. The characteristic of engineering reports is that they deal with things in a concrete way, with definite figures, quantities and values. The committee has evidently made an effort to extend engineering methods to this particular study, and its remedies partake of an engineering nature. Thus it urges the extension of the engineering idea of standardization to such industries as the ready-made clothing industry and the printing industry, the compilation and dissemination of statistics relating to unemployment and employment needs, the scientific study of the adaptation of laborers with certain defects to their most suitable tasks and an effort to secure a reduction of seasonal fluctuations in output. The electric railway industry is founded on engineering, and the success of any attempt to extend engineering methods to other industries will be watched with interest by railway men.

The Value of Adequate Records Is Strikingly Emphasized

ONE of the principal contributing factors in minimizing the expense of the valuation of the property of the Connecticut Company by the Connecticut Commission (see ELECTRIC RAILWAY JOURNAL, May 21 and 28) was the fact that the engineers of the commission were able to base much of this work on the records of the company. This is certainly evident from an examination of Mr. Knowlton's analysis of the valuation. As remarked in the May 28 issue, this was not a weakening of the method but rather a strengthening, and it is most certainly a telling argument in favor of railway companies keeping their property records in such form that they will lend themselves to an easy and accurate analysis of the entire physical plant.

The problem of keeping property records and accounts has never been solved to the satisfaction of all who have ideas on the subject and probably never will be, but it is certainly evident that material progress has been made since the value of some sort of record began to be appreciated. Usefulness in possible, or probable, valuations is by no means the only reason for keeping such records, though the money saved for the company, in addition to that saved by the state, in one valuation might conceivably cover the entire cost of keeping the records in such shape as to be useful in such contingency. Certainly, in the continuous maintenance and reconstruction of the property of a system of any size, detailed records should prove invaluable, especially in the case of changing personnel where previous records are the only source of information to new officials.

Returning to the use of adequate records in valuation proceedings, it can hardly be denied that an accurate and up-to-date record of physical plant is a strong argument for a commission's engineering staff to use company data at a great saving of expense to all concerned. On the whole, it should be much more accurate in most details than any field inventory could ever be. In the case of track, ties, ballast and pavement, wire sizes, even, special trackwork and many other items, a record of what was installed and still exists gives more information than can easily be obtained by field examination.

Company and commission co-operation in making valuations, among other things, is getting to be more and more common. Ideas for making this co-operation most effective and mutually advantageous should therefore be welcome. In this case the concrete evidence of the value of complete records should be an incentive to railway executives to investigate their own record system with a view to its completeness and its usefulness and value in dealing with commissions and others.

Some Electrification Object Lessons from Abroad

IT HAPPENS, at the moment, that the focus of interest in electrification is shifted away from the United States to foreign lands. Although comprehensive plans are in preparation here and much important work will be done within a few years, little actual electrification can be carried out until the railroad situation clears a bit. Meanwhile a high-grade pioneer installation has been made in Brazil on which operation will soon begin, construction work is being pushed in Switzerland, and in England, and on the Continent of Europe nation-wide plans are being made. India and South Africa are also being heard from. The reduction in the cost of coal there, together with scarcity of funds, has acted to slow up the actual placing of contracts, but the urgency of early adoption of electric power is still keenly felt.

These circumstances render peculiarly timely the publication this week of several articles containing first-hand information of the Paulista electrification and the situation in Europe. From these it is evident that the electrified railroads in this country are largely in the lead in this field. The Paulista has adopted American apparatus and methods, so that the installation on its Campinas-Jundiahy section can hardly be considered foreign.

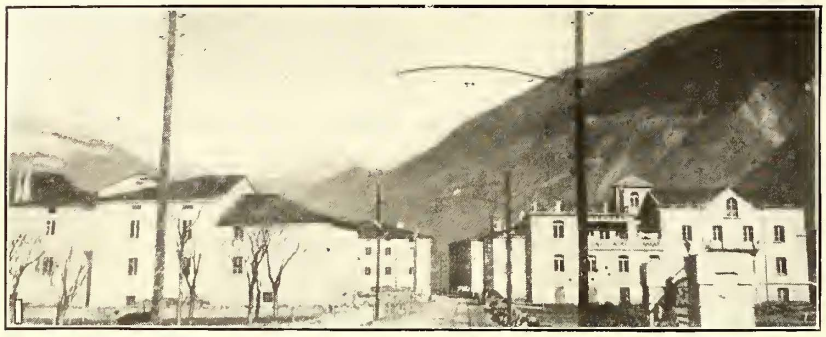
Across the Atlantic operating conditions are so different from those in the United States that comparisons can only be made with difficulty. However, able engineers and transportation men are vigorously at work there and real progress is being made. Their solutions of their problems will be of service here. And they are learning that the most economical carrying of at least certain kinds of freight involves the use of heavy tonnage trains.

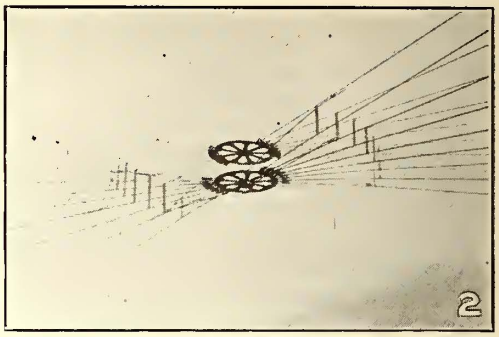
Quotation from the Federal Electric Railways Commission Report

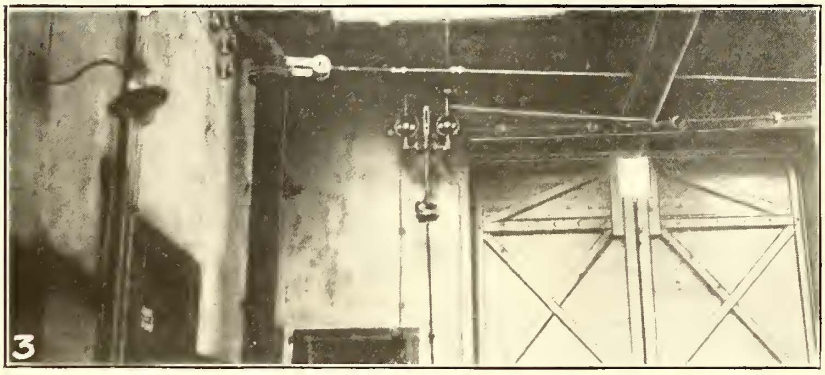
No. 24

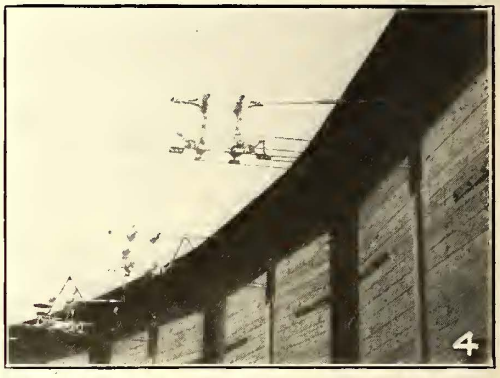
THE undisputed testimony favors an indeterminate franchise by which the company is permitted to operate subject to the right of the public to take over the property by paying its value or agreed price. Such contracts protect both the investment against confiscation and the public against extortion by providing for payment of just compensation for the use of the property. The indeterminate franchise has been most thoroughly developed in the State of Wisconsin, and it has been recognized in the District of Columbia and the States of Indiana and Massachusetts. Its earlier adoption by other states and communities would have prevented many conflicts and misunderstandings. We believe that this form of franchise should receive the favorable consideration of the public.

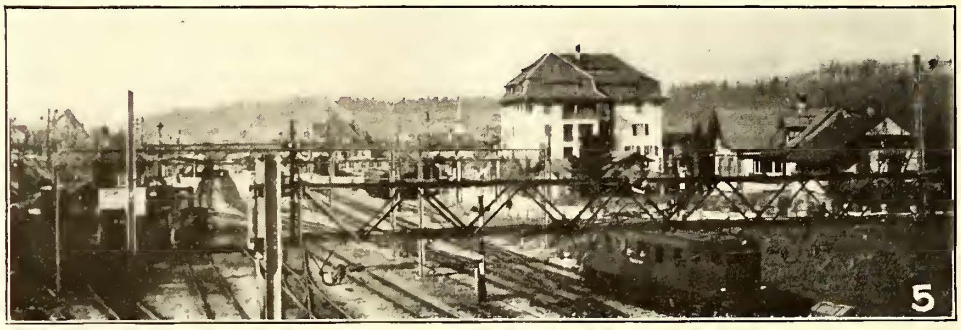
Features of Overhead and Other Electrification Details in Switzerland

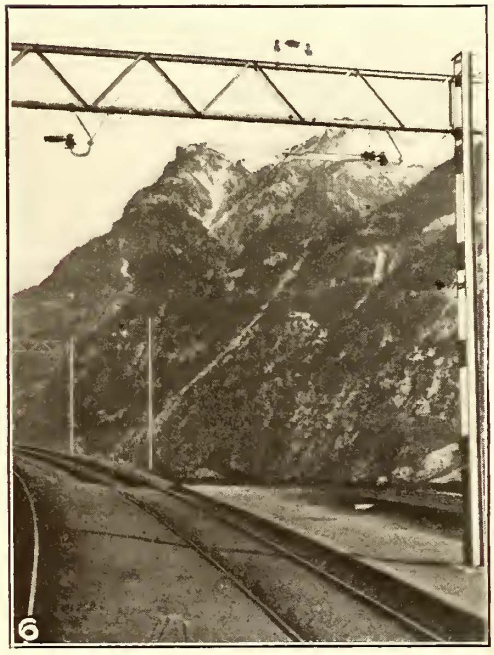


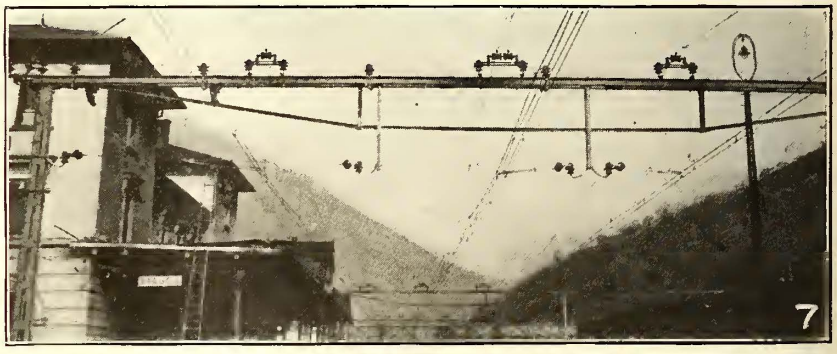


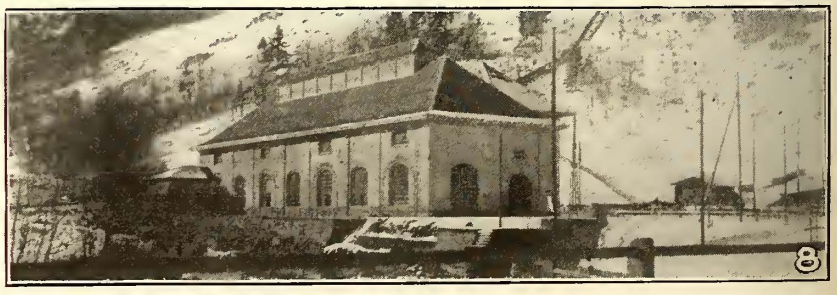












1—Some 750-volt, direct-current trolley construction on Bernina Bahn.

2—11,000-volt trolley over turntable in roundhouse, Landquart, Rhätische Bahn.

3—11,000-volt switch in roundhouse at Landquart, connecting across section break shown in the following figure.

4—11,000-volt trolley anchor and section break at roundhouse door.

5—15,000-volt, single-phase locomotive and yards at Spiez, Lötschberg Railway.

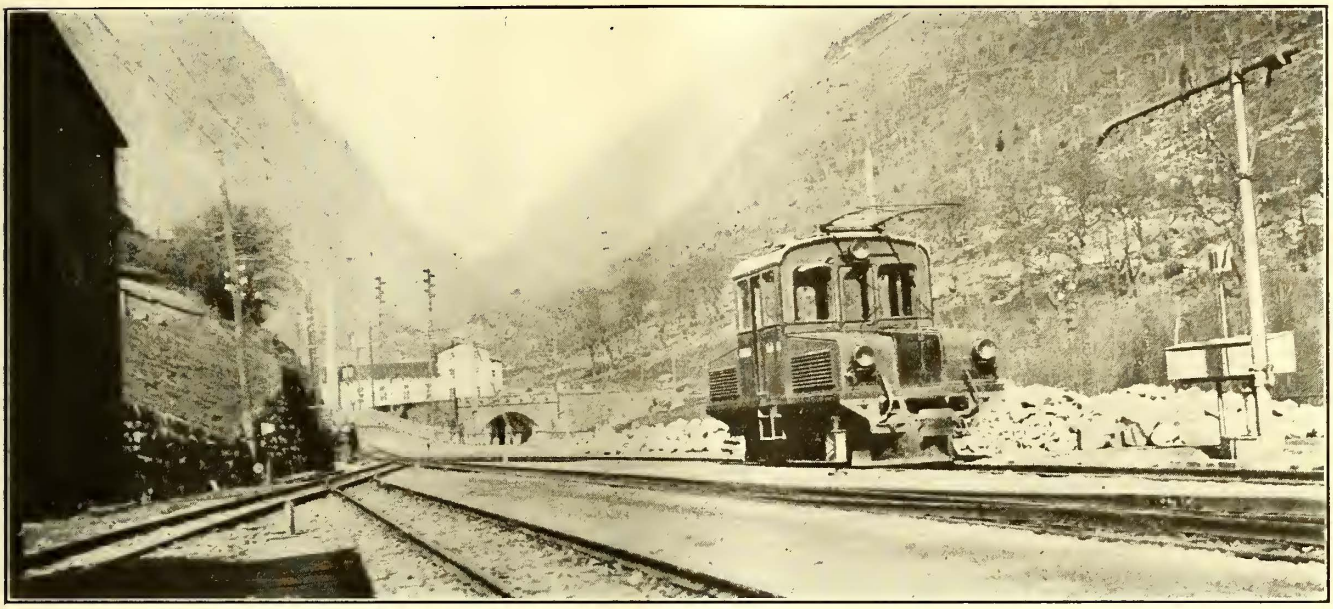
6 — 11,000-volt, single-phase trolley construction at station, Rhätische Bahn.

7 — 15,000-volt, single-phase trolley construction at Biasca, St. Gotthard Line.

8—Hydraulic power plant at Kandergrund, which under 985-ft. head generates 15,000-volt, 15-cycle, single-phase power.

Railway Electrification in Europe

BY J. V. DOBSON AND F. E. WYNNE*



A 250-HP., 5,000-VOLT, 20-CYCLE, SINGLE-PHASE LOCOMOTIVE ON THE LOCARNO-PONTEBROLLO-BIGNASCO RAILWAY, SWITZERLAND

The Authors, Recently Returned from a First-Hand Study of Transportation Conditions in England and on the Continent, Have Set Down Their Impressions of Present Practices and Tendencies in This Field—They Summarize the Points of Difference Between American and European Railway Usage

A FEW months ago the writers had occasion to make a trip through the European countries in which railroad electrification has made substantial progress or in which there is a promising field for development in this line. In the course of their travels, covering a period of two months or more, they visited England, Norway, Sweden, Germany, Switzerland, Italy and France. Some observations made on the tour are set down in the paragraphs below. Before taking up in detail the conditions noted in the several countries respectively, a summary of some of the points of novelty in railway practice, considering the trip as a whole, may be of interest. These items refer to practices noted in one or more places. They do not necessarily imply general tendencies.

SOME TRANSPORTATION FEATURES THAT ATTRACTED ATTENTION

The points of detail which we noticed particularly were these:

1. The double-deck street car for large cities.
2. The bow trolley for street cars.
3. Ball and roller armature bearings for street-car motors.
4. Rheostatic braking for street cars and locomotives.
5. The system of zone fares.
6. The three-car unit for suburban service.
7. Control equipment mounted within the car body.
8. Separate generators and transmission for heavy railway power supply.
9. Low frequency for alternating-current motive power.
10. Fifteen thousand volts on single-phase contact lines.
11. Four-thousand-volt direct-current system.
12. Tension devices, automatic or semi-automatic, for overhead contact lines.
13. Oil-cooled transformers on single-phase locomotives.
14. Regenerative braking on single-phase locomotives.
15. Manually operated control of locomotives.
16. Plate frames for locomotives.
17. Rod drive for moderate speeds.
18. Light axle-loading on cars and locomotives.
19. Light draft gear on cars and locomotives.
20. Strict observance of specified limits in loading and speed of locomotives.
21. Passenger train-heating plant not carried on electric locomotives.
22. Quality of workmanship in both manufacture and maintenance.
23. Track rails supported in chairs.
24. Permanent character of roadway structures.
25. Artistic designs of railway buildings.
26. Light-weight cars, freight and passenger.
27. Open-top freight cars for all kinds of loads.
28. Freight cars with brakes for holding only.

*Mr. Dobson is section engineer, alternating-current railway motors, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., and Mr. Wynne is manager of the railway equipment engineering department of the same company.

29. Freight cars with hand brakes only.
30. Vacuum brakes.
31. High speed of freight trains.
32. Side door compartment type passenger cars.
33. Ticket retained by passenger throughout journey.
34. Strict enforcement of laws against trespassing.

The inclusion of a practice in the above list does not indicate an opinion that it is adaptable to American conditions. Many of them, however, deserve serious consideration.

English Railways Are Well Built

One of the most noticeable features of the English railways is the excellence of the roadbed. The track is well ballasted and well drained. The rails are carried on chairs and held tightly by wooden wedges between one side of the chair and the rail. There are practically no grade crossings, the roadways usually being carried on bridges above the railway track. Where these bridges are not entirely of stone, they are supported from heavy masonry piers with masonry wings for retaining the fills on the approaches. Of course, the roads are on private right-of-way, and the laws against trespassing are very strict and rigidly enforced.

The cars are of exceedingly light construction, most of them having only four wheels and two independent axles. Some of the later and longer cars have six wheels on three independent axles, and there are some double-truck cars. The maximum capacity of a freight car is approximately 20 long tons. The majority of the freight cars are not equipped with brakes except for holding when standing on a grade, and these brakes are set up by the crew passing along the side of the train and throwing them to the desired position. Others of the cars are provided with hand brakes operated from a small cab on the end of the car. Standard Continental couplings are used, consisting of hooks and links. Except in a few cases, the maximum working drawbar pull for this type of coupling is approximately 38,000 lb. Many of the cars are similar to our gondola type without tops. Freight which might be damaged by the weather when loaded in such cars is protected by tarpaulins drawn over the top of the load and down over the car sides. This practice greatly facilitates the loading and unloading of cars and was found to be a valuable factor in securing the rapid movement of freight during the war.

Compartment Cars Are Standard

Passenger rolling stock is, of course, of the compartment type with side doors. At present, the railways are giving only first class and third class service. The cars used for third class service have the compartments extending all the way across the car with a door opening from each side. Those used for first class service have a corridor running down one side of the car, one door from each compartment opening into this corridor, and the other door located in the opposite side of the car.

In both passenger and freight service the train weights are small in comparison with those common in American main line traffic, but the speeds are high. A great many passenger trains are operated at speeds comparable with our fastest trains and the average freight train speed is considerably above ours. Interesting features of steam locomotives are the protected drivers, the use of inside rods and cranked axles, low fire boxes and small coal bins, particularly on switching engines.

In England there are no heavy electric locomotives. At present the Northeastern Railway is designing a trial locomotive of the 4-6-4 type which will weigh approximately 105 long tons with a one-hour capacity of 2,500 hp. and a maximum speed of 90 m.p.h. This engine will have quill drive, designed after Westinghouse practice, and will be given its preliminary test on the 1,500-volt, direct-current Shildon-Newport line.

There is a large amount of suburban electrification terminating in London. These are 600-volt, third-rail, direct-current installations, with the exception of the 6,600-volt, 25-cycle, single-phase system of the London, Brighton & South Coast Railway. The tendency in suburban electrification is toward three-car units, comprising one motor car with a quadruple equipment and two trailers, and with only two control stands, one at each end of the three-car unit. In the motor cars, the general practice is to mount the control equipment in a compartment immediately back of the motorman's cab and to have a baggage compartment just back of the equipment room. Generally, doors are provided between the equipment room and both the motorman's cab and the baggage compartment, providing ready access to the electrical apparatus for inspection and repair.

The preference of railway engineers seems to be for electro-magnetic control rather than electro-pneumatic. This is influenced greatly by the brake situation as vacuum brakes are much more common than the compressed air brakes.

Single-Phase Overhead on London, Brighton & South Coast Railway Improved as to Flexibility

On the London, Brighton & South Coast Railway the overhead is the double catenary type similar to the initial installation on the New York, New Haven & Hartford Railroad, although somewhat lighter. Recent modifications of the initial construction include: (1) The securing of flexibility by means of clips having stems passing through openings in the fittings at the bottoms of the hangers, thus permitting free vertical movement. (2) The omission of the horizontal member of the triangle which initially connected the two messenger wires.

This company has also devised a method of satisfactorily using the spool type of insulator, which at first gave trouble. The scheme is to mount the spool on a metal sleeve with tow between the spool and the sleeve and having the supporting member passing through the sleeve. The tow gives a cushioning effect, permitting unequal expansion of the porcelain and metal without producing destructive strains in the porcelain.

The London & Northwestern Railway, in combination with the Bakerloo Tube, gives a combined subway and suburban service, each of the railways furnishing part of the equipment. This is a very convenient scheme for suburban passengers living along the line of the North-Western, as they get direct service from down town to their own stations. One of the first features of street traffic noticed in England is the general use of double-deck cars, some of which have the upper deck inclosed, while others have the open upper deck similar to the bus. The bus service in London is really remarkable for its convenience, frequent service, speed and amount of traffic handled.

After observation of the operation of these vehicles through the crowded, crooked and hilly streets of London, it is evident that they give a class of service which could not possibly be approached by street cars.

As an indication of their flexibility, one frequently notices at street crossings, where the street is wide enough, three or four of these buses drawn up, side by side, waiting for the traffic officer's signal to go ahead. This is a great advantage over the necessary series position of street cars under similar circumstances.

In addition to the gasoline buses, there are now a number of gasoline-electric buses of somewhat larger capacity and which may prove to be more economical than the straight gasoline vehicles.

NORWAY IS RICH IN POWER

There are several interesting electrified railway propositions in Norway. Leaving Bergen, the Christiania-Bergen line of the Norwegian State Railways follows along the mountains beside a fjord for some distance and then continues to climb up the west slope of the main backbone of Scandinavia. The road is crooked and steep and passes through many tunnels and snowsheds. In the more rugged part of the country the roadway is not fenced. The condition of track is fair, although not to be compared with that of most English railways.

Of course, it is more difficult to maintain a good roadbed in Norway than it is in England, because the former country is subject to much wider temperature variations and a great quantity of snow.

The structures, bridges, tunnels and snowsheds along the right-of-way are of substantial character. Cars and locomotives are of the standard light construction used throughout Europe.

The traffic is comparatively light, as is indicated by the fact that only two passenger trains each way daily are operated between Bergen and Christiania. It is proposed to electrify at least the mountain section of this line as soon as it is convenient to finance the project. The features which tend to promote electrification throughout Scandinavia are that all coal must be imported, and there is abundant water power which can be readily developed. The total available water power is said to amount to 4 hp. for each inhabitant of Norway and Sweden. It is thought that the density of traffic is insufficient in itself to justify electrification.

In Christiania the street cars are mostly of the single-truck type with hand control and bow trolley and operate at the usual city speeds. The operation of the bow collectors is excellent and this is noticeable wherever this form of collector is used for street car service in Europe.

An interesting suburban installation is the Holmenkollen Railway, which starts in the outskirts of Christiania proper at a station having special provision for handling enormous crowds during week-ends and on holidays. These cars are equipped with Westinghouse motors and HL control built at East Pittsburgh. They are large, double-deck, center-entrance cars of modern design. A novel feature of these cars is that the outside is provided with hooks and straps for transporting up the hill the sleds and skis of the passengers who use these primitive vehicles for the descent by way of a steep, crooked, picturesque forest course. The regular schedule on skis is 7 miles in eight and one-half minutes.

The Christiania-Drammen line of the Norwegian State Railways is now being electrified for operation at 15,000 volts, 15 cycles, single-phase, with locomotives having side rods and geared series motors. The overhead construction will be practically the same as that which has proved its excellence on the Kiruna-Riksgränsen line of the Swedish State Railways. Power will be secured from a hydraulic plant which is one of a number to be included in a general plan of electrical generation and transmission. Probably the next step in Norwegian electrification will be the line between Riksgränsen and Narvik, 25 miles of continuous 2.6 per cent grade.

The principal traffic will be handling the cars loaded with iron ore down the grade to Narvik, which is an open port all the year, being under the influence of the Gulf Stream. At Narvik, the trains are run out on an elevated structure where the ore is dumped into vessels for transportation to England and western German ports.

It is probable that regenerative control will be required on the locomotives for this service. The general impression received in Norway is that their electrification will proceed under the guidance of competent engineers as rapidly as the necessary funds can be secured.

OVERHEAD CONSTRUCTION WELL DEVELOPED IN SWEDEN

Railway service between Stockholm and Riksgränsen is given three times per week by a mixed passenger, baggage, mail and freight train.

This railroad employs the European standard equipment. The road is good, the structure substantial and the speed moderate. The electric zone now extends from Riksgränsen to Ripats, 155 miles, and is being prolonged from Ripats to Lulea, 115 miles. The hydraulic plant at Porjus, located 34 miles from the main line, furnishes all the electric power in northern Sweden. This novel power house has been described previously in the ELECTRIC RAILWAY JOURNAL.

The present development comprises four 12,500-hp. turbines, two of which drive single-phase, 15-cycle generators, one drives a 25-cycle, three-phase generator and the fourth drives two spare generators, one of each frequency.

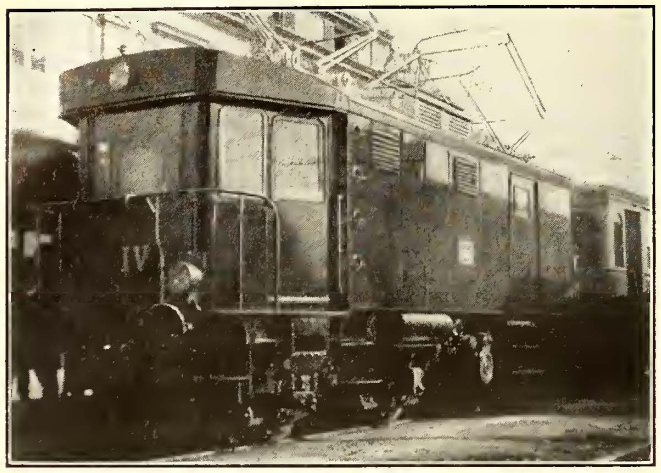
This power house is being extended and development is under way to provide for a total of 60,000 hp. at this point. The most impressive feature of the entire power station is the great amount of space; nothing is crowded and clearances are ample. This is true of the substations also. A novel feature is that all the control wiring of the power house is lead covered and carried on open racks just under the ceiling of the lower rooms.

The three-phase power is transmitted at 70,000 volts for industrial purposes. The single-phase transmission for railway service is at 80,000 volts with the middle point grounded.

In the design of the transmission lines, more than normal sag is provided for the purpose of keeping the stresses within reasonable limits under the wide temperature variations and the great weight of frost frequently present during the winter.

The trolley line construction is a remarkably good piece of work. The supports are light structural steel poles on open line and similar bridges in yards. Foundations are concrete. Insulators throughout are porcelain. All fittings are bronze. Both contact wire and messenger are copper, as are the flexible hangers.

The line is divided into sections averaging about 0.85 mile in length. Contrary to American practice, the sections are not anchored, but at each end the trolley and messenger are brought together and carried over pulleys to movable weights running in guides in the



A 55-TON, 560-HP., 4,000-VOLT DIRECT-CURRENT LOCOMOTIVE ON THE TORINO-CIRIE-VALLE DE LANZO RAILWAY, ITALY

special poles at these points. The bracket arm consists of three members arranged in form of a Z, supported at the left on two pin-type insulators and at the right supporting the messenger and trolley. The insulator pins are free to rotate about the vertical axis. The entire construction is light, flexible and reliable and its record indicates its suitability for the severe climatic conditions. In eight years of service there have been only four cases of broken trolley wires, although the temperature varies from plus 100 deg. Fahr. to minus 70 deg. Fahr., and the frost on a single wire at times weighs 1 lb. per yard.

The maximum wear on the contact wire occurs where the overhead changes grade relative to the plane of the track and shows a maximum flat of less than 0.1 in. This construction could be studied with profit by American engineers and deserves a service trial. If successful under our conditions, it would assure great economy in one of the most expensive elements of railway electrification.

Following exhaustive studies, which were begun prior to the electrification, and experimental variations in the system of distribution during operation, the Swedish engineers have concluded that the best way to correct interference in the parallel communicating circuits along this line is to use track transformers in conjunction with stub-end feed each way from each substation, the track as well as the overhead being sectionalized between substations.

The freight cars and trains on this road are the heaviest operated electrically in Europe. The double-truck ore cars weigh over 12 short tons each and have a capacity of 39 short tons, which gives a loaded car weight comparable with that of many American box cars. These cars are made up into trains of 1,500 to 2,000 tons and operated over a rolling profile with a maximum grade of 1 per cent. The line electrification is being extended to the East and in this direction loaded trains will be moved with the aid of a helper up a maximum grade of 1.6 per cent. Several types of locomotives are in service, the largest weighing about 138 tons and having a maximum starting capacity of 2,500 hp. The draw-hooks of these cars and locomotives are special, being heavier than the standard Continental type and good for a maximum operating pull of 55,000 lb. This seems small in comparison with our draw-bars, but is a substantial advance beyond general European practice.

To provide steam heat for passenger cars of the electric zone, a special car carrying the heating equipment and supply of fuel and water is attached to the train. Thus, the electric locomotives are relieved of the handicaps incident to carrying train-heating equipment in the locomotive cab, which has been American practice.

It is interesting to note that on this railway the motive-power department can order a locomotive off the road for inspection or repairs without regard to the demands of the transportation department.

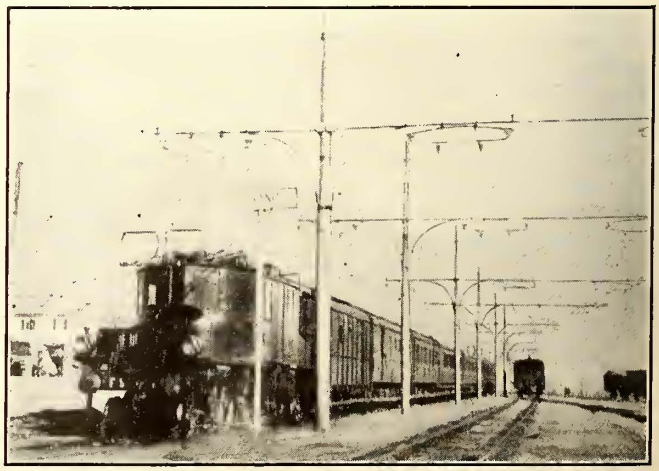
The impression produced by inspection of the Swedish State Railways electrification is that their engineers have carried through a large amount of valuable research and original design, and further notable contributions to the art of railroad electrification may be expected from this source. It is likely that the next electrification undertaken will be from Stockholm to Gothenburg.

German Development Has Been Dormant

Although considerable work has been done in the last two years toward getting the German roadbeds and equipment in workable condition again, they are yet in great need of repairs. Much progress has been made in rebuilding locomotives, a large part of such work being done in the locomotive shops of electrical manufacturers. The car repairs have not been so extensive, being largely confined to the trucks; the bodies need paint, windows and doors are loose, and many of the fittings are rough iron where they were originally brass or copper. On some electric lines, the trolley wires, which were removed several years ago, have been replaced and electric service has been resumed.

Apparently, electric railway development until recently has been dormant since 1914. Some locomotive orders taken in 1913 are just being completed substantially in accordance with the original designs. However, it is noteworthy that these locomotives have commutating-pole, series, single-phase motors. This general type in a variety of forms is now the standard single-phase railway motor of Europe. There are no high-voltage direct-current railways (3,000 volts or more) in Germany. For street car service both split and box-type motors are being manufactured, but the tendency is to standardize on the box type as has been done in America.

Armature bearings of the roller type are popular and for the very small railway motors there is a tendency toward ball bearings. The inspection of several types



TYPICAL 3,300-VOLT, 3-PHASE LOCOMOTIVE AND OVERHEAD CONSTRUCTION, ITALIAN STATE RAILWAYS

of locomotives under construction indicated that cab construction, equipment layout, motor mounting and method to drive are yet considered to be in the experimental stage and subject to much further development. The impression gathered from seeing the quantity of railway equipment now building, and the diligence displayed by the workmen, is that German competition with all other countries will be very keen in the near future.

ELECTRIFICATION WORK IS ACTIVE IN SWITZERLAND

Switzerland is particularly interesting, not only on account of its magnificent scenery but also because of the extent to which its railways have been electrified. The locomotives and cars are well built and maintained and the roadbed is good. Throughout Europe the great pains taken to build for permanence is striking, and in Switzerland this is emphasized by the enormous amount of labor required to overcome the natural handicaps to railway construction.

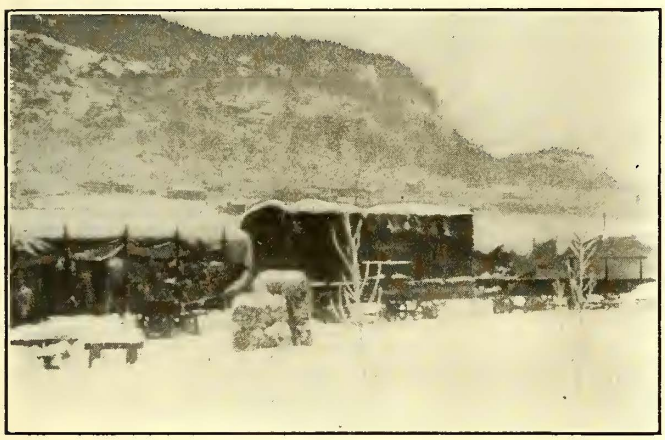
The mountainous nature of the country, of course, makes it necessary to build the railways with many grades, long and steep. The result is that no especially high speeds were observed; but on the other hand, the speeds of both passenger and freight trains on the heavy grades are higher than in America. For instance, on the Lötschberg Railway the regular speed up a grade 50 per cent steeper than that on the Pennsylvania Railroad from Altoona to Gallitzin is 35 m.p.h. and on the 3.5 per cent grade of the narrow-gage Rhätische Bahn the up-hill speed is 20 m.p.h. Another result of the ruggedness of the country is that the only way grades can be kept within reason in many places is by winding back and forth up the side of a mountain, constructing spiral loop tunnels within the mountains, and crossing back and forth between the sides of the gorges. On the St. Gotthard line of the Swiss Federal Railways there are seven spiral tunnels between Erstfeld and Bellinzona, a distance of 68 miles. On the Rhätische Bahn much of the track is located on benches cut in the vertical mountain sides.

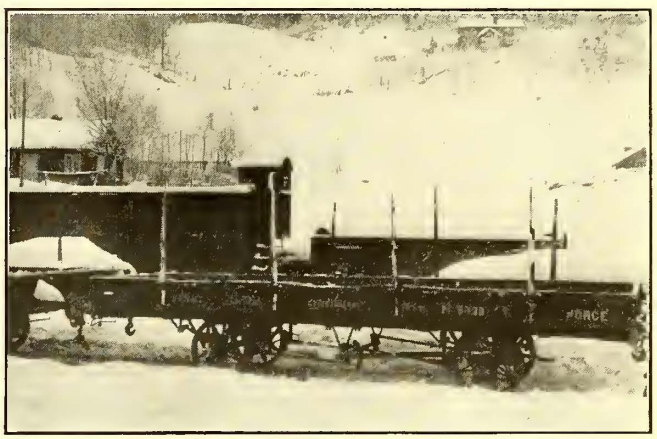
On the Bernina Bahn a straight line will cut the track in nine places on the south side of the Alps and six of these levels may be seen from one point, the other three being higher up and on the other side of the mountain's nose. On this line the longest grade is 7 per cent for 20 miles. On light-traffic lines rack railways are used with grades up to 25 per cent, while the cable roads for tourists are on a grade of 55 per cent in places.

Long tunnels are numerous, the Simplon (13 miles) being the longest in the world. This will ultimately be a twin tube tunnel. The second bore is now approaching completion.

Most of the Swiss railway electrification is at 15,000 volts, 15 cycles, single-phase. However, between Bergdorf and Thun there is a three-phase line with locomotives and motor cars. The Rhätische Bahn is an 11,000-volt, single-phase line. The Bernina Bahn operates at 750 volts direct current, entirely with motor cars (with magnetic track brakes) and trailers, except for one freight locomotive. At Locarno there is a light railway, 20 cycles, single-phase, which has been operating for fifteen years. It uses 800 volts on the trolley in town and 5,000 volts in the country. The collector is a whip of pipe section, operated by a clock type spring and does very well at the low speeds.

Of course, all of the later installations use the catenary type of overhead. That on the Lötschberg Railway and Rhätische Bahn is heavier than the Swedish construction, but somewhat lighter than ours, while the St. Gotthard Line uses a light form of compound catenary and rather heavy supports, more comparable to American practice. All three of these roads use semi-automatic tension in the overhead; that is, the messenger is anchored at the ends of sections and the trolley alone is attached to the weights.





TWO VIEWS SHOWING TYPICAL FREIGHT CARS AND LOADING IN NORWAY

A noteworthy feature on both the Lötschberg and St. Gotthard is that the power-house generators are wound for 15,000 volts and feed directly into the trolley line, as well as through substations.

The locomotive equipments in use have nearly all been supplied by the Oerlikon and Brown-Boveri Companies, and the mechanical parts by the Swiss Locomotive & Machine Works. The locomotives are of various types of wheel arrangement, and all but one have some form of rod drive. Although the single-phase locomotives are all operated with low-frequency power, they are quite free from vibration and quiet in operation. This is largely due to the excellence of their mechanical construction and maintenance. Rod bushings, pins and bearings are made accurate initially and are set up with very small tolerances. Further, they are maintained in good condition. The maintenance cost is reasonable, if one may judge from the small number of men in the shops.

It is interesting to note that resistors for dynamic braking are located on the locomotive roof and give satisfaction in spite of the severe climatic conditions.

Switzerland has embarked on a definite program of electrifying all main lines on account of the scarcity of fuel and abundance of water power. The next step now under way is the line between Zurich, Lucerne and Erstfeld. Swiss engineers seem well satisfied with the gear-and-side-rod type of drive for freight and moderate-speed passenger service. For higher speed passenger service on the lines with easy grades two types of locomotives with independently driven axles are now under construction and both types will have quill drive.

Italy Is Strong on Three-Phase

We entered Italy by way of the Bernina Bahn on Sunday, encountering a recent innovation in railway rates. In common with those of other countries, the Italian Railways have had difficulty in securing enough revenue to meet expenses. The deficit is now being decreased by charging 20 per cent excess fare for Sunday travel.

The most extensive electrification in Italy is that of the State Railways at 3,000 to 3,700 volts, 15 to 16⅔ cycles, three-phase, using double trolley with induction motors. At present the roadbed and cars are in poor condition, both maintenance and operation suffering from the difficult labor situation, but the locomotives are well maintained.

This system has in operation and on order a total of 222 locomotives. Although various forms of wheel arrangement are used, all engines have rod drive. Line voltage is applied direct without transformers to the primaries of the driving motors. For speed variation, pole-changing or cascade connections, or both combined, are used. These locomotives are notable as having greater power per unit of weight than any other electric locomotives built to date.

Some locomotives are equipped with liquid rheostats, while others have metal resistors. In general, the acceleration is smooth and the locomotives are free from vibration. Of course, these locomotives brake by regeneration automatically on down grades. As severe grades are numerous in the electrified zones, this feature is a valuable asset.

The double overhead construction is a handicap to this system. Originally direct suspension was used for the trolleys, but later installations employ catenary suspension. With the direct suspension construction, it has been found necessary to replace the contact wires in tunnels every three years and on open line at the end of nine years. Maximum wear occurred at the hard spots formed by the suspension clips. Although the double overhead construction is expensive and complicated, its operation and that of the pantograph collectors are successful at 3,300 volts. It is proposed to continue the electrification of the State Railways in the north of Italy with this system on account of the many heavy grades. For southern Italy, where service conditions are much easier and where 42 cycles is the prevailing frequency, plans are under way for experimental lines with both high voltage, direct current and 42-cycle, three-phase power.

The results obtained on these experimental lines will serve as a guide in selecting the system for the south of Italy.

Since the first of this year the Torino-Cirie-Valle de Lanzo Railway has been operating three 55-ton (2,000 lb.) 560-hp. truck-type, box-cab locomotives with axle-mounted geared motors and manually operated control from a 4,000-volt, direct-current trolley fed by a 1,300-kw. substation located at Cirie.

The driving motors are grouped two in series and the groups arranged for series-parallel operation and rheostatic braking. In addition to providing two enginemen's compartments and housing the control and auxiliary equipment (excepting compressor), the box cab also has space for a small baggage compartment. The motors have natural ventilation and the resistor is cooled by a fan driven by the motor-generator which supplies low-voltage current for the compressor and lights.

The service given comprises sixteen passenger and eight freight trains daily. The total train weight is 121 short tons. Initial operation has been very satisfactory. Minor defects which appeared in the motors have been corrected and some of the switching apparatus has been modified. Twenty-five short circuits on the trolley line have failed to flash the power generators, even when occurring in front of the substation.

Large Plans for Electrification in France

In France the Paris-Orleans Railway has a number of 600-volt, direct-current electric locomotives of the double-truck type with axle-hung motors, operating out of Paris. Some of these locomotives have box cabs with baggage compartments, and others have the steeple type of cab, seven of the latter having been in service for twenty years. The performance of these locomotives has been very good. They are inspected once a week, and at the end of 20,000 miles are out of service three days for overhauling. The life of motor windings is ten years, which is an evidence of the good results to be secured in general from electrical apparatus by imposing upon it only such duty as is within its capacity.

This railroad has recently placed in service the first of an order of five 1,800-hp. locomotives of the 2-8-2 type, equipped with two gearless motors and the open "V" type of rod drive. Up to the time it was examined this engine had made 12,000 miles in service with good results. Field control motors are used and a novel feature of this equipment is that the short field connection is controlled by a separate handle on the master controller.

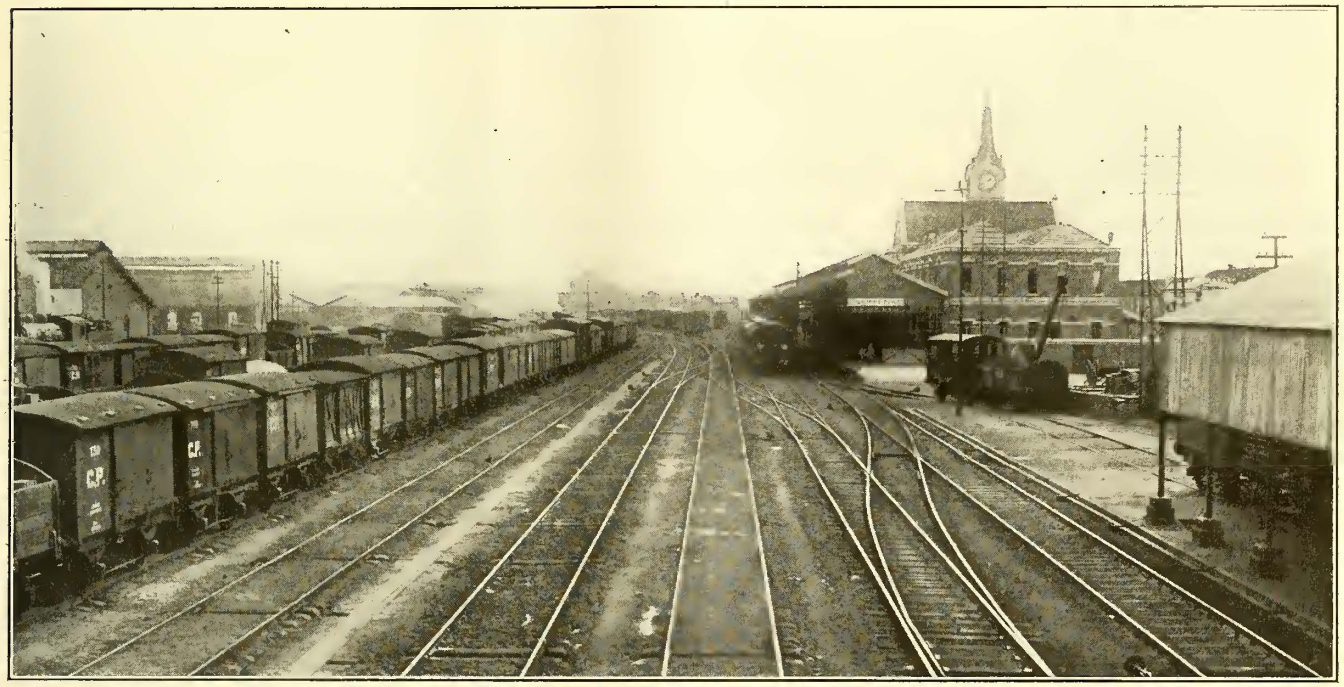
The Midi Railway is in the process of changing its electrified zones from single-phase to 1,500 volts direct current in order to conform to the adopted standard system for France. For use in this connection sixteen 1,200-kw., 1,500-volt mercury rectifiers have been ordered. These will be located in the existing transformer station buildings and will be operated in parallel with other substations containing synchronous converters.

The State Railways (formerly the Western Railway of France) employ some of the heaviest suburban equipment in Europe. One type of motor car, weighing 63 tons, has two-axle trucks and a double equipment of 225-hp. motors. Another type, weighing 72 tons, has a quadruple equipment of 165-hp. motors, two of the motors being mounted on each three-axle truck. This road also has ten 800-hp. gearless locomotives with an early form of quill drive.

As in England, there is a tendency to the use of the three-car unit (one motor car and two trailers) for suburban service. It is planned rapidly to extend the multiple-unit electric service around Paris, and a definite program of main line electrification also has been started.

3,000-Volt Electrification on Paulista

Initial Installation on One of Brazil's Crack Railroads Now Practically Complete—Details of Locomotives, Substation and Power Distribution System Are Given by Engineers of American Manufacturers Who Supplied Equipment—This Pioneer Undertaking Is Forerunner of an Extensive Application of Electric Motive Power in Brazil



STATION AND YARD AT CAMPINAS, THE NORTHERN END OF THE PRESENT ELECTRIFICATION

THE most notable electrification project on this continent during the past two years is that of an important section of the Paulista Railway in Brazil. Within a few weeks the new equipment will be in operation. While brief notes regarding the Paulista have appeared in the ELECTRIC RAILWAY JOURNAL from time to time, it is only now possible to present a comprehensive statement of the electrification. To this end the editors requested two engineers, of the General Electric Company and the Westinghouse Electric & Manufacturing Company respectively, men who are familiar with the details, to discuss the subject with respect to the work done by these two companies. The following two articles are the result. The General Electric Company is supplying eight freight and four passenger locomotives, the substation equipment and the line material and is doing all of the erection work. The Westinghouse company is furnishing two passenger and two freight locomotives. All of this, together with much general information regarding the railroad itself, is covered exhaustively in the articles. As Mr. Cooper's article includes an account of the conditions under which the Paulista Railway operates it is placed first.—EDITORS.

The Paulista Railway and the Westinghouse Locomotives

BY S. B. COOPER
General Engineering Department, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

THE Companhia Paulista de Estradas de Ferro is about to begin electric operation over a 28-mile section of double track on its main line between Jundiahy and Campinas, Brazil. This marks the initial step in what is expected to become a broad program of electrification in Brazil, with the ultimate aim of substituting hydro-electric power for expensive coal.

Brazil's supply of native coal is not abundant; it is located in southern Brazil at some distance from the principal consuming centers and is of comparatively poor quality. It is high in sulphur and ash and, although some experiments have been made along the lines of preliminary treatment and pulverization, railroad men there are convinced that it cannot be considered a satisfactory fuel.

Some years ago, when the South American countries were essentially producers with a comparatively small consuming capacity, ships bound from the United States and Europe to South America for cargoes of cereals, meats, coffee, hides, etc., were able to carry coal at comparatively low rates on outbound voyages. Coal could be landed in Rio de Janeiro or Buenos Aires for $6 or $7 per ton. Since that time, however, the development of these countries has been phenomenal—their consuming capacity has increased with the development of their resources and industries, so that high-class outbound cargoes are available. The world-wide shortage of ships caused by the war has raised ocean freight rates enormously and these two factors, combined with the increased coal prices at the mines, have caused the price of coal to reach almost prohibitive figures.

WOOD BURNED EXTENSIVELY ON LOCOMOTIVES

During the war it was almost impossible to obtain coal at all, except in very limited quantities at exorbitant prices, so that many of the Brazilian railroads, the Paulista among them, fell back on wood as

locomotive fuel. Brazil has, of course, a wonderful supply of hard woods that make excellent fuel, but even Brazil could not keep up with the demand for wood fuel for her railroads, at least from sources within commercially practicable distances of the lines. Furthermore, for a given calorific value wood fuel requires a comparatively large amount of labor in cutting, transportation, storing, handling, fire patrolling in supply yards, etc. With the rapid development of her marvelous resources, Brazil, and particularly the State of São Paulo needs labor badly. I heard the statement made in 1917 that there were 15,000 men in the State of São Paulo engaged in getting out wood for the railways.

ELECTRIFIED SECTION OF THE PAULISTA AND CONNECTIONS

The topographical and climatic conditions are such as to give abundant water power. A sharp mountain range, the Serra do Mar, rises practically at the seacoast, reaching a height of 2,000 to 2.500 ft. or more within a very short distance from the ocean. From this range the drainage is, in general, toward the northwest, with a gradual fall into the Paraná River, which thence flows south, emptying into the Atlantic Ocean through the Rio Plata at Buenos Aires. The State of São Paulo is semi-mountainous, with abundant rainfall, and is crossed by several fairly large rivers with frequent falls and without excessively low water periods.

What then could be more logical than the utilization of this abundant native power instead of inferior or expensive coal? The officials of the Paulista company have made careful studies, during the last four years, of the possibilities of electrification, and in the spring of 1920 placed their orders for the equipment necessary for the electrical operation of the 28 miles of double track between Jundiahy and Campinas.

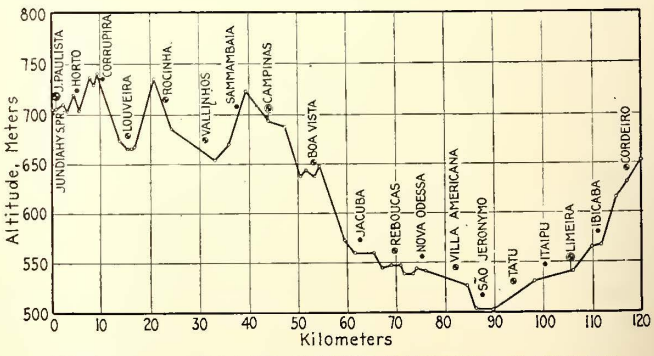
Present Electrification Is but the Beginning

Jundiahy is the southern terminus of the Paulista system, where it joins and exchanges traffic with the São Paulo Railway, the English owned line running to Santos. Campinas, one of the most important centers of this wonderfully rich state, is the terminus of the Mogyana Railways, an extensive meter-gage system, covering the northern portion of the state. The Mogyana traffic is transferred to Paulista broad-gage (1.6 meters, or about 5 ft. 3 in.) cars at Campinas, for movement over the Paulista and São Paulo Railway lines to Santos, so that the section now being electrified is the one of heaviest traffic on the Paulista system. It is planned to extend the electrification in the near future beyond Campinas, and it is probable that eventually the entire broad-gage main line will be electrically operated.

The Westinghouse Electric International Company is furnishing two freight and two passenger locomotives for this initial electrification. The freight locomotives are of the six-axle type, with two six-wheel articulated trucks. There are six axle-mounted motors rating 280 hp. at the one-hour rating. Each motor is wound for 1,500 volts for operation two in series on 3,000 volts and is arranged for field control. Each motor drives its axle by a single flexible gear. The passenger locomotives are of the 2-4-0+0-4-2 type, with each driving axle equipped with a 560-hp., 3,000-volt twin motor and quill drive.

These details were chosen because they lend themselves particularly well to the requirements of this road. The passenger and freight train weights and schedule speeds are such as to require locomotive horsepower ratings almost exactly in the ratio of four to three, so that by using eight armatures on the passenger locomotive and six on the freight locomotive it was possible to use identical motors in both services, except for the external frames. The passenger motors are in twin frames, while the freight motors are in axle and nose-suspension frames, but the motors are identical electrically, and all replacement parts, coils, complete armatures, field poles, brushes, armature bearings, etc., are interchangeable throughout. This operating advantage is obtained without the sacrifice of fitness of type of each engine for its service. The freight locomotives, operating at speeds up to 40 m.p.h. with comparatively light axle loads, have the mechanical simplicity inherent in axle-mounted motors and direct-geared drive, while the passenger locomotives for speeds up to 65 m.p.h. have the advantages of high center of gravity and large proportion of spring-borne weight given by the quill drive, so desirable in high-speed service.

Mechanical practice on the Paulista, as on many South American railroads, follows European rather than American lines, and their standards of mechanical workmanship and maintenance are higher than those followed on North American roads. Every effort was made in the design of these locomotives to meet these high standards of mechanical practice. The frames are of solid slab steel with the openings drilled and burned out by torch. The brake rigging and equalizer parts are fitted with case-hardened pins and bushings throughout, thus minimizing wear and facilitating replacement. The



PROFILE OF TRACK ON THE PAULISTA RAILWAY NORTH FROM JUNDIAHY

pedestal shoes are of bronze and the journal boxes are arranged for grease lubrication of the hub liners.

The control equipment has been worked out to give the greatest possible degree of simplicity consistent with operating flexibility, including the Westinghouse system of unit switches. All switches required to break heavy currents are of the unit type mounted in two

rows just below the main grid resistors. Motor combination circuits for motoring and regenerating are set up by cam switch groups and stabilizing resistor connections for regeneration are made by smaller unit switches without blowout coils.

The Paulista uses the Continental type of coupler with take-up screws on the passenger cars, but only open links on the freight equipment. For this reason it is particularly desirable to have a high degree of flexibility and smoothness in the control. This is accomplished by having three motor combinations of six, three and two armatures in series on the freight locomotives, giving, with field control notches, six running speeds. The main handle on the master controller has eighteen positions, giving a total of fifty-four notches. On the passenger locomotives the armatures are connected eight, four and two in series, giving six running speeds and fifty-four notches.

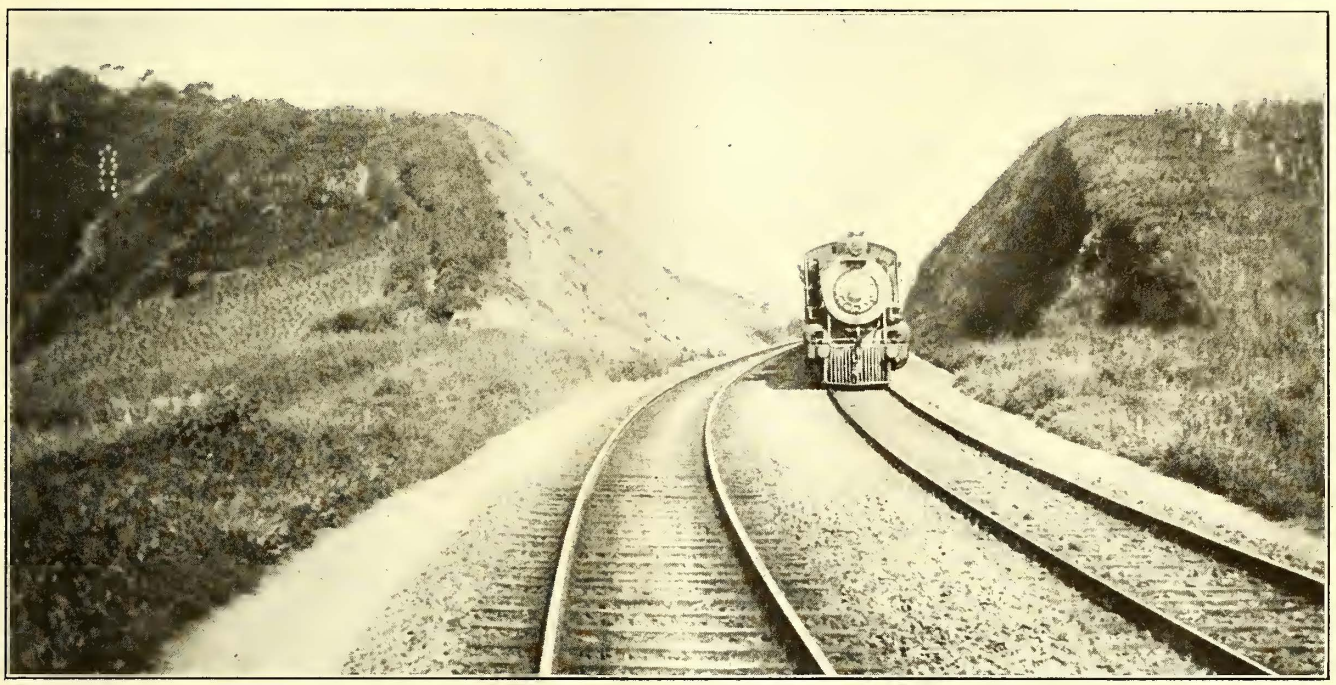
Regeneration is provided for in all three combinations, with thirteen notches in each combination, giving a particularly wide range of regenerating speeds, a most desirable feature with the various classes of trains and varying grade conditions existing on the Paulista.

In the auxiliary equipment a single high-voltage auxiliary motor-generator set furnishes power for control, lights, motor excitation during regeneration, for blowers, compressor and vacuum exhauster. The motors driving the exhauster and blowers are practically identical. The control and auxiliary equipment throughout is the same on the freight and passenger locomotives, excepting for such detailed differences as are required for the control of six and eight armatures respectively. The brake equipment consists of a combination of air and vacuum brakes. The space requirements for the cylinders made it impossible to use vacuum brakes on the locomotives, so they are equipped with air brakes. The control of the brakes is so arranged that air on the locomotive and vacuum brakes on the train are handled from a single valve with uniform rates of application and release. An independent straight air valve is provided for the separate control of the locomotive brakes as desired, thus making it possible to shut down the exhauster during light engine or switching movements.

TABLE I—GENERAL DATA OF WESTINGHOUSE LOCOMOTIVES

	Freight	Passenger
Type of truck	0–6–0+0–6–0 Articulated	2–4–0+0–4–2 Articulated
Rigid wheelbase	14 ft. 0 in.	8 ft. 4 in.
Total wheelbase	37 ft. 0 in.	41 ft. 2 in.
Length over buffers	50 ft. 2 in.	52 ft. 11 in.
Total height over cab roof	12 ft. 7 in.	12 ft. 7 in.
Total height with pantograph down	14 ft. 10 in.	14 ft. 10 in.
Diameter of driving wheels	40 in.	63 in.
Total weight, short tons (2,000 lb.)	116.6	140.8
Weight on drivers, tons	116.6	101.8
Motors	6 — No. 350	4 — No. 351
Gear ratio	16.63	28.86
One-hour rating, per motor	280 hp.	560 hp.

The traffic on the Paulista system is growing at a very healthy rate and even with double track it will not be many years before track capacity becomes a serious consideration. It seems probable that by that time both the São Paulo and Paulista Railways will change over to M. C. B.-type couplers, enabling them to handle much larger trains. With this end in view, these locomotives have been equipped for multiple operation so that they can be double-headed with a single crew and handle 1,540-ton (2,000-lb.) instead of 770-ton trains. The bumper castings have been so designed that M. C. B. couplers can be readily applied.



A SAMPLE OF THE WELL-CONSTRUCTED TRACK THAT IS BEING ELECTRIFIED ON THE PAULISTA

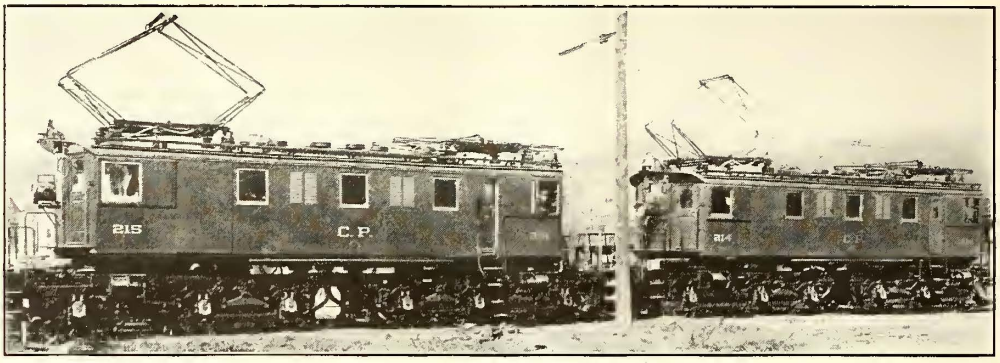
The more important ratings and dimensions of the two types of locomotive are shown in Tables I and II. Ratings are on the basis of the A. I. E. E. rules throughout, the continuous rating being based on 80-deg. C. rise by thermometer, or 105-deg. rise by resistance, thus giving conservative total temperatures with the high air temperatures encountered at certain seasons in Brazil.

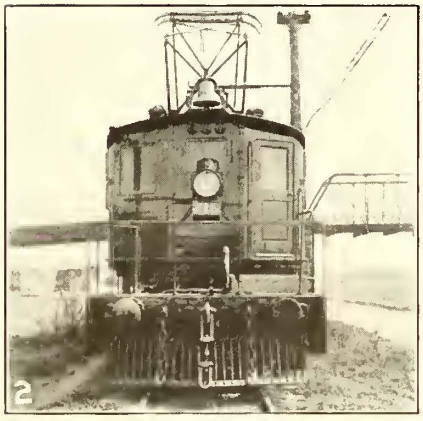
TABLE II—WESTINGHOUSE LOCOMOTIVE RATINGS—SHORT FIELD

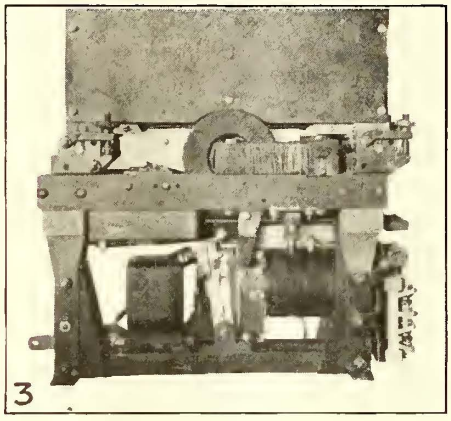
One-hour rating, horsepower	1,680	2,240
Tractive effort, pounds	29,400	19,400
Speed, miles per hour	21.4	43.2
Continuous rating, * horsepower	1,350	1,800
Tractive effort, pounds	21,600	14,300
Speed, miles per hour	23.4	47.2
Tractive effort at 25 per cent adhesion, pounds	58,500	51,000
Maximum safe speed, miles per hour	40	65

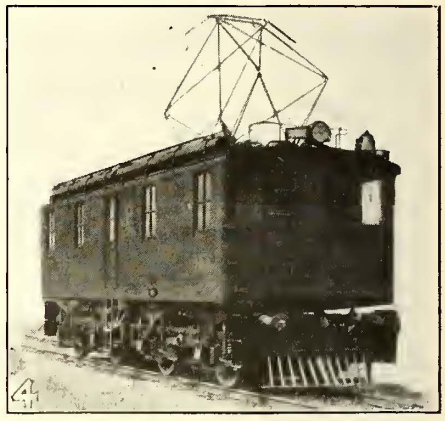
* A.I.E.E. Standardization Rules, 80-deg. C. rise by thermometer; 105-deg. C. rise by resistance.

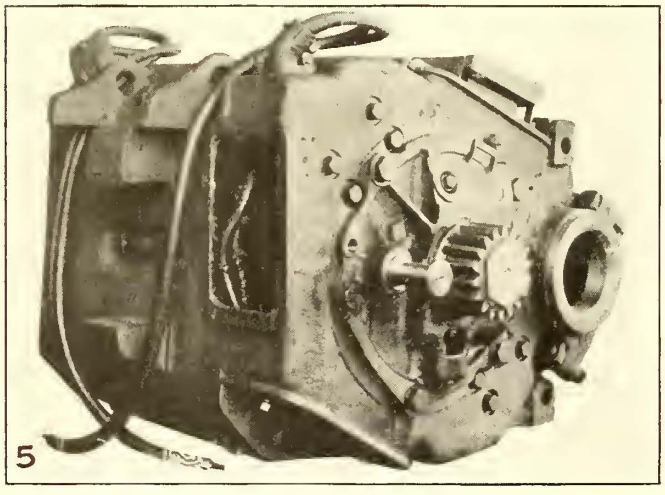
Paulista Electric Locomotives and Important Parts of Their Electrical Equipment

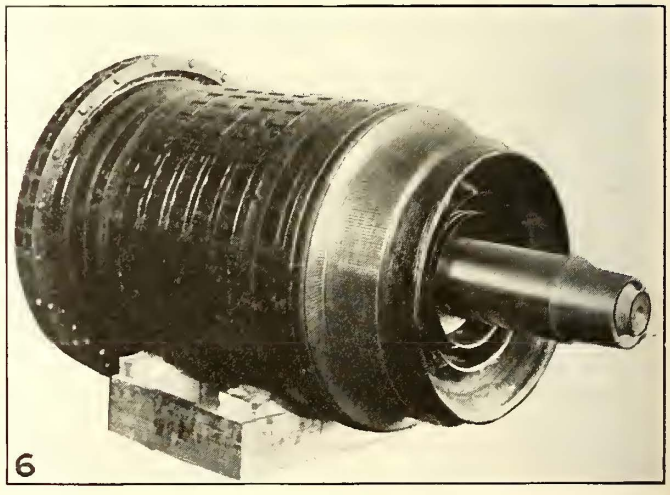


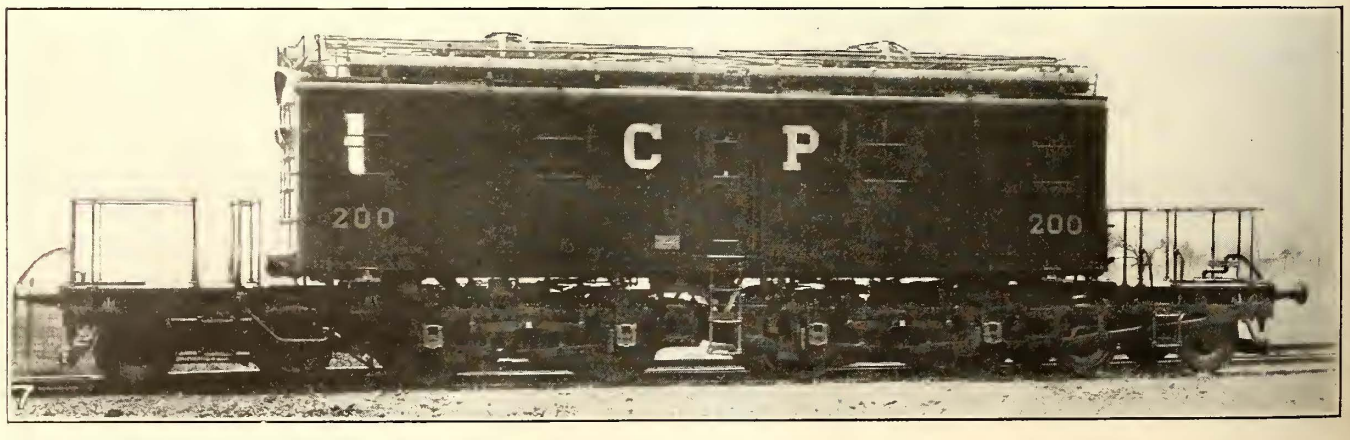






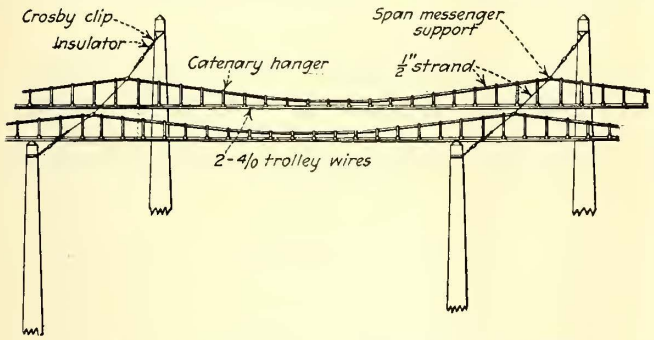






1—The Baldwin-Westinghouse freight locomotive.
2—End view of same locomotive, showing Continental coupler.
3—High-speed circuit-breaker used on the General Electric locomotives.
4—The General Electric freight locomotive.
5—Commutator end of G.E. motor, Type 267, Form A.
6—Armature for GE-267A motor.
7—The 120-ton General Electric passenger locomotive.

The shipment of these locomotives involves some interesting features. Each cab is completely housed in after being mounted on a heavily framed platform. The housing consists of a double lumber sheathing interlaid with heavy waterproof building paper. Each truck complete with its motors and gears mounted in



DIAGRAMMATIC SKETCH OF DOUBLE-TRACK, CROSS-SPAN CATENARY ON TANGENT

place is similarly boxed and two additional boxes per locomotive carry the pantograph trolleys. The truck and pantograph boxes are loaded in the ship's hold and the two cabs are carried on deck, one on either side of the main hatch, securely bolted and lashed in place. After unloading and unboxing, it will only be necessary to set the cab on the trucks, mount the pantographs and connect up the motor leads and brake connections and the locomotive will be ready for service. By the time this article is printed the freight locomotives will probably have been landed in Brazil. The passenger locomotives are now approaching completion in the East Pittsburgh works of the company.

The General Electric's Contribution to the Paulista Electrification

By W. D. Bearce
Railway and Traction Engineering Department, General Electric Company, Schenectady, N. Y.

THE concluding shipments are being made on the $2,000,000 contract with the International General Electric Company in connection with the electrification of the Jundiahy-Campinas section of the Paulista Railway.

The motive power equipment being furnished by this company consists of eight freight locomotives weighing 100 tons (2,000 lb.) each and four passenger locomotives weighing 120 tons each. Work has been progressing on these locomotives for about a year at the Erie works and the first locomotive was put on the test track about the middle of March. Complete running tests were made and two freight locomotives were shipped before the middle of May. One of the passenger locomotives was also put on the test track and shipment was made, according to schedule, during May.

In addition to the locomotives, the contract included the equipment of a complete 3,000-volt, direct-current substation of 4,500-kw. capacity, comprising three 1,500-kw., three-unit motor-generator sets, transformers, switchboards and high-tension equipment. Overhead line material has also been furnished for 76 miles of track and material for about 10 miles of 88,000-volt, three-phase, 60-cycle high-tension transmission in duplicate from the lines of the São Paulo Light & Power Company.

The line from Campinas to Jundiahy is a main line section connecting at the southern terminus with the São Paulo Railway and the Central Railway of Brazil. The Central Railway is government owned and electrification of this line has also been authorized. At Campinas and other points north connection is made by the Paulista Railway with a number of feeder lines, which bring large quantities of coffee and other raw material from the interior.

The road is rock ballasted and the construction throughout is equal to any of the main-line roads in the United States. The track gage is 5 ft. 3 in. on the section to be electrified, but some of the connecting lines are narrow-gage and facilities are provided for transferring the car bodies complete with merchandise to narrow-gage trucks and vice versa. The passenger service includes high-speed passenger trains with full Pullman accommodations. The present locomotive equipment consists of heavy-type locomotives for freight service with high-speed engines for passenger service. All are equipped for burning wood. The variety of wood most used is known as quebracho, which gives satisfactory results except that, of course, the quantity required for a 100-mile run is very bulky. Recently there has been difficulty in procuring even wood that is suitable for this work.

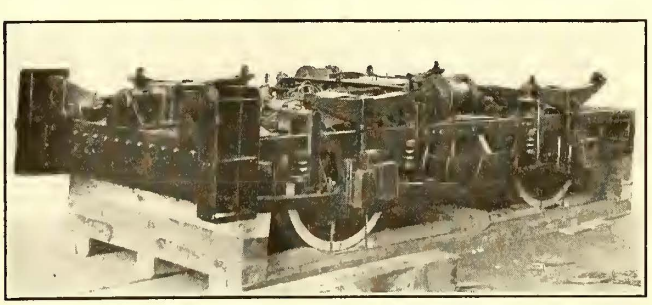
Enormous Tonnage Handled on Section Being Electrified

The section selected for electrification presents a rather difficult profile, including maximum grades of 1.5 to 1.8 per cent. While the immediate plans of the Paulista company contemplate electrification for only a distance of 73 miles, the design and capacity of all apparatus and equipment are suitable for operating on an extension to São Carlos, a total distance of 128 miles. The approximate traffic handled over this line during the year 1918 from Jundiahy to Cordeiro was about 275,000,000 ton-miles, including freight, passenger and non-revenue service. The electrical equipment is designed for handling approximately double this amount, as is also the substation and line equipment. As a basis for estimates it was assumed that the number of trains per day over the initial electric zone will be six passenger and twenty-one freight in each direction, making a total of fifty-four trains per day.

Locomotive Design Follows United States Models

The initial order for locomotives included eight freight and four passenger, all of the twin-geared type. These are similar to those in successful use in the United States on the Chicago, Milwaukee & St. Paul, the Butte, Anaconda & Pacific, the Michigan Central (Detroit River tunnel) and other roads.

The freight locomotives weigh 100 short tons, all weight being on the driving axles. They are designed



TRUCK OF THE GENERAL ELECTRIC 100-TON FREIGHT LOCOMOTIVE

for handling a trailing train of 770 short tons on the maximum 1.8 per cent grade at speeds of from 12 to 16 m.p.h. The maximum allowable speed on tangent level track is 30 to 35 m.p.h. It is expected that because of the greater capacity and higher speed characteristics the electric locomotives will provide an appreciable improvement over the existing steam service, both as regards schedule speed and weight of trains handled.

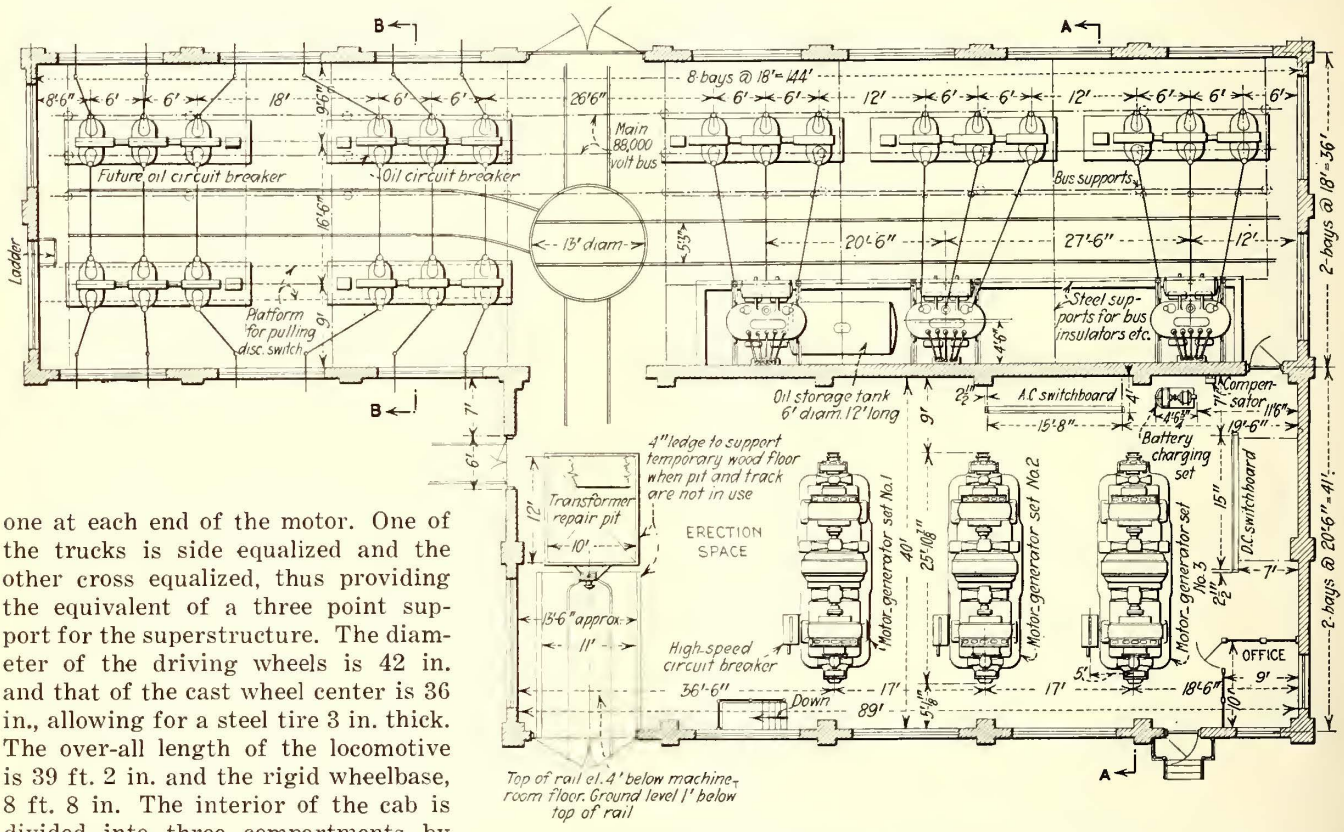
The freight locomotive has a running gear consisting of two two-axle trucks coupled together by an articulated joint, and a single cab of the box type. The draft gear is mounted on the trucks, and all hauling and buffing stresses are transmitted through the truck frames and articulated joint, thus eliminating any possibility of damage to the cab and platform structure. Each truck is equipped with two GE-267 motors of the box-frame type, geared to the driving axle by two sets of gearing, one at each end of the motor. One of the trucks is side equalized and the other cross equalized, thus providing the equivalent of a three point support for the superstructure. The diameter of the driving wheels is 42 in. and that of the cast wheel center is 36 in., allowing for a steel tire 3 in. thick. The over-all length of the locomotive is 39 ft. 2 in. and the rigid wheelbase, 8 ft. 8 in. The interior of the cab is divided into three compartments by partitions or bulkheads so placed as to form two end compartments about 5 ft. in length for the operator's cabs and the remainder for housing the control equipment, compressor-exhauster set and other auxiliary apparatus. Two pantograph trolleys, of the double-pan sliding type similar to that used in other heavy electrification projects, are mounted on the cab roof. These are insulated for 3,000 volts and were designed to operate through a range of from 15 to 22 ft. above the rail.

Two Types of Brake Necessary

To conform to the equipment on this road it was necessary to provide control for the vacuum type brakes used on the cars. Two entirely different systems of brakes are therefore provided for—a straight air brake system for the locomotive and vacuum-type brakes on the train. The two systems are manipulated like the usual all-compressed-air type, the locomotive brakes being applied automatically simultaneously with the train brakes under normal running. Brakes can be applied on the locomotive alone or on the train alone if desired. During regeneration, however, a magnet valve insures that straight air cannot be applied while power is being returned to the trolley. However, should an emergency application be made, regeneration is discontinued and the brakes are applied on the locomotive.

Wide Gage Permitted Use of Motors of Self-Ventilating Type

The motors are of the box-frame commutating-pole type designed for self-ventilation, made possible by the ample room due to the wide gage. To supply clean air for ventilation of the motors, a ventilating pipe is provided, reaching to the outside of the locomotive truck. The fan is of the multiple type made integral with the armature-head flange on the end opposite the commutator. Air is taken into the frame at the commutator end through a screened opening and divides into two streams, one passing over and around the armature and field coils, while the other is drawn through longitudinal ducts in the armature core. All of the air is expelled from the frame at the end opposite the commutator. These motors are designed for operation at 1,500 volts per commutator with two motors connected permanently in series for the 3,000-volt supply. The gears are of the forged steel type with a reduction of 82 to 18 or 4.56.



PLAN OF THE LOUVEIRA SUBSTATION, CONTAINING THREE 1,500-KW. M. G. SETS

Non-Automatic Single-Unit Control Installed

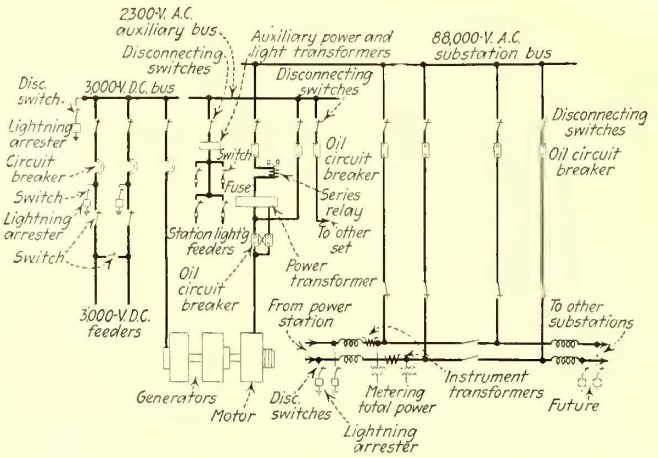
The control equipment is the type M, designed for non-automatic single-unit operation of the locomotives. All contactors, rheostats, transfer switches and the reverser are located in the central compartment of the cab. The master controllers, brake control, sander control, pantograph and other control devices are in the operator's cabs at the ends of the locomotive.

Energy for operation of the control is obtained from a 65-volt generator which is a part of the compressor exhauster unit. A 65-volt storage battery is connected in parallel with the generator to maintain constant voltage and to supply auxiliary lighting when the set is not running.

The motors may be operated all four in series through fourteen steps of resistance, and with two motors in series and two groups in parallel through ten steps of resistance. Regenerative braking is provided for returning energy to the line on descending grades. Ten steps are used for the regenerative braking control. The lighting and miscellaneous equipment includes the necessary lamps, switches, fuses and wiring for illuminating the cab and for headlights and accessories. The headlights are of the incandescent type with side number plates and are supplied from the 65-volt generator or battery. Speed recorders are included as a part of the locomotive equipment. The draft gear is attached to the end frames of the truck and is of the usual European type. The compressor-exhauster set is a combined unit having a compressor with a total piston displacement of 48 cu.ft. of air per minute at a pressure of 90 lb. per sq.in., an exhauster with a displacement of 150 cu.ft. of air per minute and a 65-volt direct-current generator above mentioned. The unit is driven by a 3,000-volt, direct-current motor, operating from the trolley.

Passenger Locomotives Have Guiding Truck at Each End

The passenger locomotives are similar in design to the freight units except that a two-axle guiding truck is provided at each end to comply with the railway company's specifications for high-speed service. The motors used are identical with those on the freight locomotive except for the change in gear ratio to provide for maximum speeds of from 56 to 62 m.p.h. The running gear consists of two two-axle driving trucks, the inner ends of which are connected by an articulated joint. The outer ends are extended and supported on the guiding trucks by roller centering devices over the front axle and an articulated joint over the rear axle which also connects the guiding and motor trucks. The general arrangement of motors and control is the same as that on the freight locomotives, and a similar system of regenerative braking is also provided. This locomotive is designed for hauling a train of 440 tons trailing up a 1 per cent grade at a speed of 38.8 m.p.h. The gear ratio on the passenger locomotive is 70:30 or 2.33.

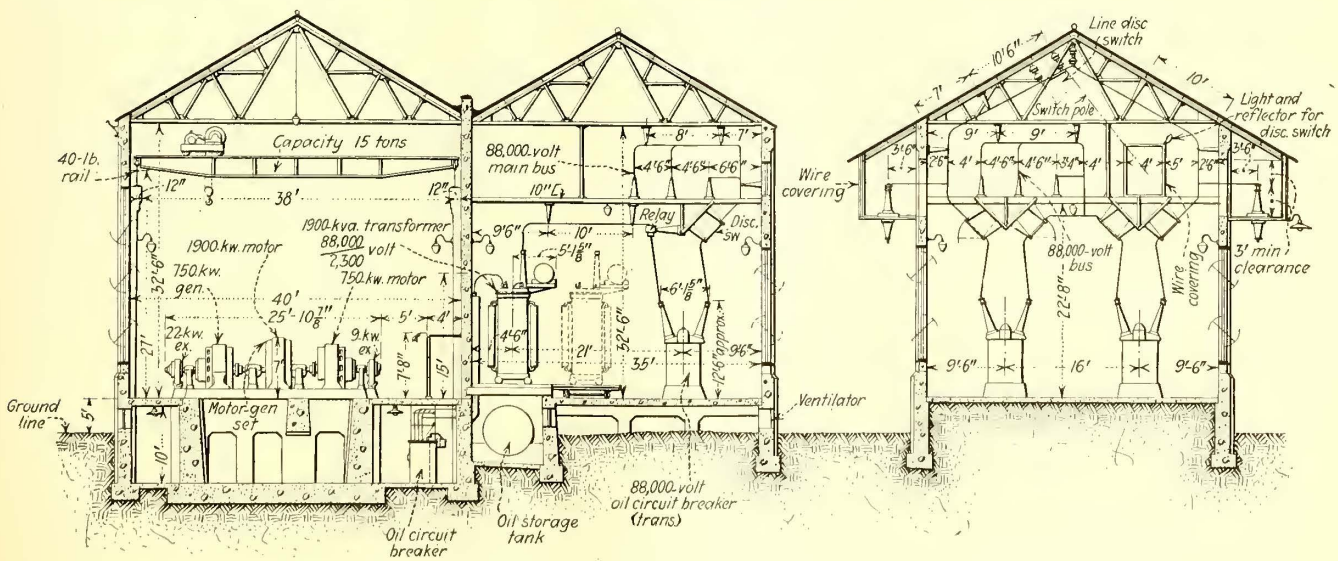


SIMPLIFIED WIRING DIAGRAM, LOUVEIRA SUBSTATION

For speeds above the full series and full parallel connections a shunted field connection is provided by means of which the field current is reduced for maximum speed running.

Regenerative braking is accomplished by connecting one motor in such a way that it excites the field of three other motors and also its own field. This scheme is in general similar to that used on the Chicago, Milwaukee & St. Paul gearless passenger locomotives; it eliminates the necessity for a separate motor-generator set for excitation. A balancing resistance is connected in the circuit to protect the motors against sudden surges of the line voltage and to give effective protection against line voltage changes. In order to begin regeneration the main controller handle is turned to the first notch series position and the selective handle to the braking position. The main handle is then notched up until the desired braking effect is obtained.

A high-speed circuit breaker is placed between the 3,000-volt trolley and the locomotive apparatus. The duty of this breaker is to protect the motors and equipment from injury due to short circuits or overloads. In case of a short circuit this breaker cuts in a protective resistance and then opens the line contactor. The



VERTICAL SECTIONS OF SUBSTATION (SEE A-A AND B-B IN PLAN)

action is very rapid so that in case of heavy overload, or short circuit, the possibility of damage is reduced to a minimum. Breakers of a similar type are in operation in many parts of the United States both on locomotives and in substations.

Table III gives the dimensions, capacity and weights of the two locomotives.

Substation Installed at Louveira

For the initial electric zone between Jundiahy and Campinas one substation is being installed located at Louveira, a distance of 9.5 miles from Jundiahy. This station contains three 1,500-kw., three-unit synchronous motor-generator sets, each arranged to operate its two generators in series for 3,000 volts. Power is received from an 88,000-volt, 60-cycle transmission line and stepped down through three three-phase, 1,900-kva. transformers to 2,300 volts for the synchronous motor.

The three-phase oil-insulated and oil-cooled transformers are rated at 1,900 kw. and are inclosed in tanks of steel plate with all joints welded. Four separable steel radiators are mounted on the outside of the tank to provide sufficient radiating surface.

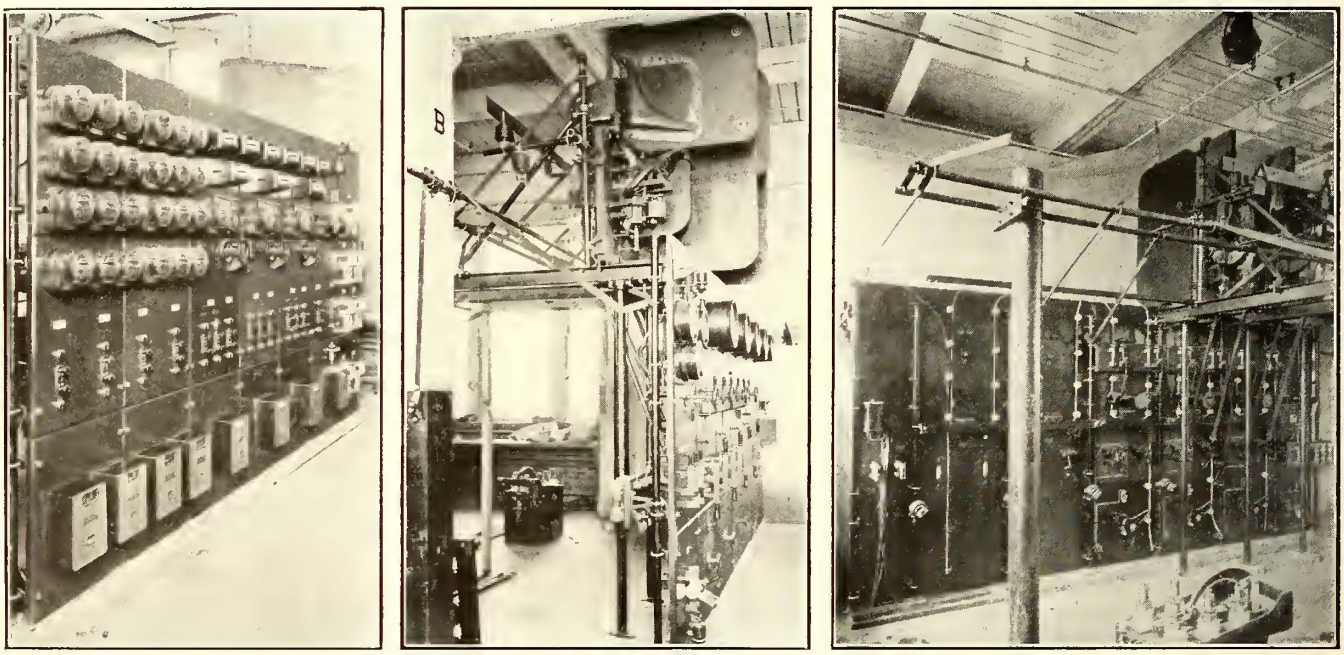
Each transformer is provided with an oil conservator or auxiliary tank mounted on the cover. This device permits the main tank to be completely filled with oil and differences in volume of oil due to temperature changes take place entirely within the conservator. This prevents the condensation of moisture within the transformer. Such condensation as may occur in the conservator is collected in a sump, is indicated on a gage glass and may readily be drawn off through a pet-cock.

Since there is no air in the main tank above the oil there is no possibility of explosion due to ignition of gases formed from hot oil. The guaranteed efficiency of these units at normal load is 98.3 per cent.

Four 2½ per cent taps are provided in the low-voltage winding to compensate for variation in the transmission line voltage and 50 per cent starting taps are also provided for starting the motor-generator sets.

The motor-generator sets are substantially similar to those furnished for heavy electric railroad work in the United States. The generators are designed for 1,500 volts per commutator and are permanently connected in series for 3,000-volt operation. They are separately excited from a 125-volt, direct-current exciter mounted at one end of the set. The series field is designed to provide flat compounding from no load to 150 per cent load. They are equipped with commutating poles and compensated pole-face windings to insure sparkless commutation at all loads. A load of three times normal rating can be carried for five minutes without injury, and under tests made before shipment loads of from five to six times normal were carried without sparking.

All of the fields of both generators are connected to the "low" side to reduce the possibility of injury from high voltage. A simple form of flash barrier is provided for the commutators similar to that supplied on other high-voltage, direct-current machines.



SWITCHBOARD VIEWS, LOUVEIRA SUBSTATION

At left, 90-in. feeder and synchronous motor switchboard. In center, 3,000-generator and railway feeder switchboard. At right, back of the generator and feeder board shown from another angle in the center illustration.

The synchronous motor is excited from a second 125-volt exciter direct-connected to the opposite end of the set. This exciter carries a compound winding excited from the main 3,000-volt conductor so that the motor

TABLE III—DATA ON GENERAL ELECTRIC LOCOMOTIVES FOR PAULISTA RAILWAY

	Freight	Passenger
Length over all	39 ft. 2 in.	55 ft.
Width	10 ft. 1½ in.	10 ft. 1½ in.
Height over trolley down	14 ft. 3 in.	14 ft. 3 in.
Total wheelbase	26 ft. 8 in.	46 ft. 0
Rigid wheelbase	8 ft. 8 in.	7 ft. 9 in.
Total weight, pounds	200,000	240,000
Weight on drivers, pounds	200,000	160,000
Weight per driving axle, pounds	50,000	40,000
Weight per guiding axle, pounds	None	20,000
Weight of mechanical equipment, pounds	115,400	155,400
Weight of electrical equipment, pounds	84,600	84,600
Diameter of drivers	42 in.	42 in.
Diameter of guiding wheel	.....	36 in.
Number of motors	4	4
Gear ratio	82:18	70:30
Total continuous rating, horsepower	1,600	1,600
Total (one-hour rating) horsepower	1,680	1,680
Tractive effort, continuous, pounds	28,820	14,720
Tractive effort, one hour, pounds	30,600	15,680
Speed, continuous rating, miles per hour	21 (34 km.)	41.25 (66.4 km.
Speed, one-hour rating, miles per hour	20.8 (33.5 km.)	40.5 (65 km.)
Maximum safe speed, miles per hour	28	53
Tractive effort, 30 per cent adhesion, pounds	60,000	48,000

field excitation varies in proportion to the load on the set. This provides for the proper excitation to give correct power factor with varying loads and also insures stable operation under heavy overloads. The equipment is designed for inverted operation to take care of reverse power in cases of regeneration.

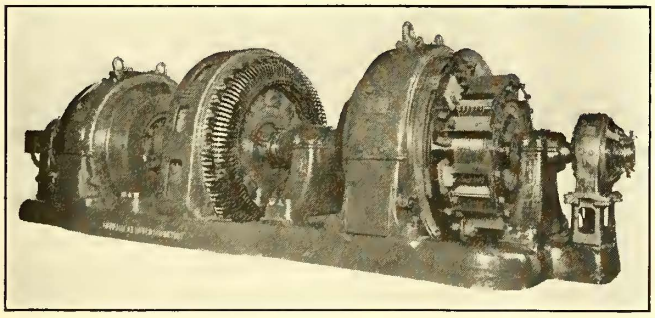
The switchboard is similar in design to other 3,000-volt, direct-current equipment. The 3,000-volt panels are installed together with the auxiliary station lighting panel. The high-voltage panels include one for each of the motor-generator sets and one for each outgoing feeder. The main circuit breakers are located above and to the rear of the switchboard panels so as to be well out of reach to prevent accidental contact. They are remote-controlled from operating levers located on the front of the panels. A 3,000-volt line switch is also included with each circuit breaker. These switches are remote-controlled from the front of the panel, as a safety measure. The switch handles for the circuit breakers are inverted to distinguish them from the line switches. The alternating-current switchboard is electrically controlled throughout. For lightning protection, a 96,000-volt aluminum-cell arrester is installed in the high-tension room of the station.

As a protection from short circuits and excessive overloads a high-speed circuit breaker is furnished with each motor-generator set. This is connected to the negative terminal of the machine and arranged to connect a limiting resistance into the circuit upon opening. At the same time the station circuit breakers are opened, completely cutting off the power supply. The speed of these circuit breakers is such that resistance is inserted in the circuit before the short circuit current reaches sufficient value to injure the apparatus.

Other auxiliary equipment supplied to the station includes a 15-ton hand-operated crane, a portable oil filter press and oil testing equipment, and a stationary compressor set. For control current a 4¾-kw. battery-charging motor-generator set is used with a 170-volt storage battery.

High-Tension Connection with Power Company's Line

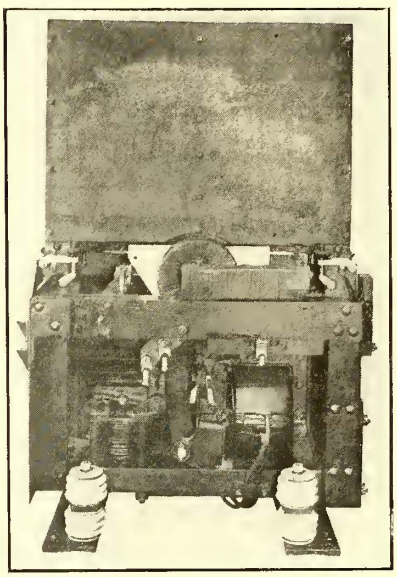
The railway company's high-tension transmission line has been constructed with duplicate circuits mounted on separate wood poles between Jundiahy and Louveira, a total distance of 10 miles. At Jundiahy this line is



THREE-UNIT, FOUR-BEARING, 1,500-KW. M. G. SET IN LOUVEIRA SUBSTATION

permanently tied in with a new line constructed by the São Paulo Light & Power Company, extending a distance of about 16.8 miles to the hydro-electric station at Parnahyba. The power company's line is constructed with an H-type pole line carrying the duplicate circuits. This transmission line from the waterpower plant to the substation will thus be operated over a distance of 26.7 miles as a single system at 88,000 volts, three-phase, 60 cycles. The line is designed ultimately to supply three substations and the conductors are of No. 0 B. & S. stranded copper which will insure a very low line loss under ordinary operating conditions. On the railway company's lines two crossarms are used, with large pin-type insulators. A ground wire is also carried on each transmission line for lightning protection.

The overhead line construction is of the same general design as that used on the Chicago, Milwaukee & St. Paul. This is known as the twin-catenary construction, with two No. 0000 contact wires supported from the same steel messenger by loop hangers. Wood poles suitably guyed support the catenary. Hangers for the two contact wires are attached at alternate points to give a flexible construction and to insure the elimination of all "hard spots." Bracket supports are used on single-track and cross spans on multiple-track construction. The normal height of the contact wire is 21 ft. above the rail. For all sidings and yard tracks a single wire is used over each track. The General Electric Company furnished hangers, pull-offs, copper and steel wire, miscellaneous hardware, etc., for 76 miles of track.



HIGH-SPEED SUBSTATION CIRCUIT BREAKER

The twin-catenary construction is particularly successful on lines operating heavy trains requiring the collection of large amounts of current through pantograph trolleys. In addition to the advantage of the two contact wires for handling the current required, this construction also insures practically sparkless collection at the point of contact, both for heavy freight and high speed passenger operation.

The rails on this line weigh 91 lb. per yard. They are bonded with pin-terminal-type bonds, 42 in. in length and of 211,600 circ.mil cross section. Cross bonds are also used for interconnecting the rails of the same track and for bonding between tracks on the multiple-track section.

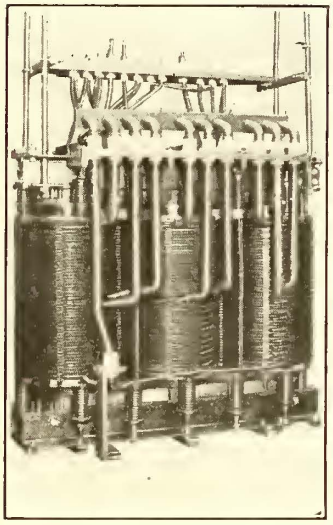
Testing and Shipping the Locomotives

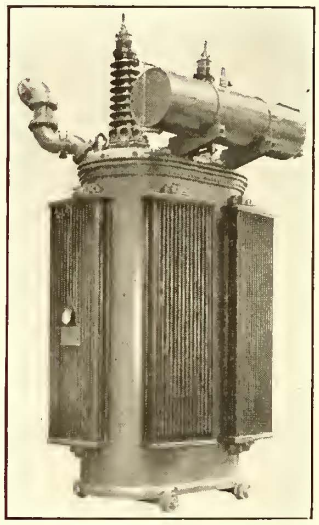
In the preparation of the locomotives for testing and for export shipment there were a number of unusual features. As the gage of track on the Paulista Railway is 5 ft. 3 in., special arrangements were necessary to provide for removing the locomotives from the shop to the test track and other arrangements were necessary to provide the necessary test track. For this purpose about 1 mile of extra rail was laid on the East Erie Commercial Railroad with 5 ft. 3 in. gage. In order to transport the locomotives from the shops to the test track, a distance of about ¾ mile, special transfer trucks were used, one for each truck of the locomo-

tive. By means of these trucks, which operate on their own wheels of standard gage, the locomotives were moved out over the usual transfer table and standard-gage track to the special-gage section provided for testing. Upon reaching this section they were moved off the transfer trucks over a ramp, the end of which was elevated to the same height as the special trucks.

A complete set of tests is made on all locomotives, including regenerative braking and high-speed running. After test the locomotives are transferred to the shipping department, where they are dismantled and prepared for export shipment. The cab complete is removed from the truck and the pantograph, bells, etc., removed from the cab roof. Each truck is shipped separately without removing the motors from the truck frame. In the case of the passenger locomotive, each bogie truck is shipped with the adjacent motor truck without dismantling. As large vessels were available for making this shipment it was not necessary to reduce the locomotive to small packages.

As to progress on the construction of these locomotives, the first freight machine was ready for test on





AT LEFT, THREE-PHASE TRANSFORMER FOR LOUVEIRA SUBSTATION, HIGH-TENSION SIDE

At right, case for a single-phase transformer, showing type to be used at Louveira. (Exterior view of actual case not available at this time.)

March 15. During May three freight and one passenger locomotives were shipped and progress on the balance of the order indicated that similar shipments will be made the following two months in accordance with the terms of the contract.

Responsibility for Accident Fixed

THE Interstate Commerce Commission in fixing the responsibility for head-on collision between a passenger train and an extra freight train of the Northern Ohio Traction & Light Company near Ravenna, Ohio, on Dec. 8, 1920, resulting in the death of four people and injury to seventeen, finds the conductor and motorman of the extra train to blame. The conductor of the extra train, which was being operated ahead of the regular train, proceeded from a siding at the sound of a whistle from the regular train intended as a signal to move ahead so there would be room for it to clear the switch. The extra train proceeded on this signal, the conductor assuming that the following train had orders to meet the opposing train at the next station.

Recommends Electrification Commission

Frank J. Sprague Points Out the Advantages of Such a Body at the Meeting of the Chicago Traffic Club on June 2—He Includes Representation of the Interstate Commerce Commission in Its Personnel

ACCORDING to Frank J. Sprague the time is ripe for the formation of a national engineering commission to consider electrification problems, the commission to be selected by the American Railway Association and to include representatives of the Interstate Commerce Commission, the National Electric Light Association and the water power, telephone and telegraph interests, in full touch with manufacturing developments. This suggestion was made by Mr. Sprague in the course of an address by him before the Traffic Club of Chicago on June 2, in which he considered also the development of the electric railway.

In Mr. Sprague's opinion the demand for electrification will come not because of superior fuel economy or savings in operating expenses possessed by the electric locomotive but because of the need for increasing the capacity of the railway by "that increase of speed which can only be obtained when unlimited power is at the command of operative officials and a type of equipment is used which will permit radical changes in methods of train handling, both on the road and at terminals." Mr. Sprague recognizes that electrification must come progressively, but he believes that the financial problems concerned with main-line electrification would be ameliorated if the railroads recognized that their primary province is the transportation and distribution of passengers and freight and that their power requi ements should be supplied from central generating stations.

He then points out that the railway power demands in the city of Chicago, for instance, could be met by the Commonwealth Company by the addition of only a fraction of its present capacity and that this could be added in less time than the railroads could possibly be electrically equipped. He also expressed the belief that electrification in Chicago should be determined not according to the needs of a single railroad, but by that of all the railroads centering in the district, in co-operation with the local authorities, keeping in view the ultimate best interests of the railroads and of the community.

In answer to any criticism of his suggestion that the proposed national engineering association should include in its membership representatives of the Interstate Commerce Commission, Mr. Sprague called attention to the fact that the equipment and operation of trunk-line railways, in fact of all railways crossing state bounds, is a matter of national concern and under the jurisdiction of the Interstate Commerce Commission. Moreover, it alone today has the right to demand intimate comparative statistics and data covering the equipment and operation of railroads by different systems and its power and authority are likely to be augmented rather than restricted. Finally, in the consideration of another railway problem, that of automatic or auxiliary train control, the power to order the installation of such a system was placed in the hands of the commission in the recently enacted general railway bill.

N.E.L.A. Meeting Well Attended

At Its Annual Convention, Held at Chicago May 31 to June 3, National Electric Light Association Considered Railroad Electrification, Power Generation and Distribution, and Other Technical Subjects, but Laid Special Stress on Public Relations, Finance and Operation in Their Broad Aspects

THE convention of the National Electric Light Association, held in Chicago last week, occupied itself largely with finance and public relations. Executives, engineers, bankers and heads of the manufacturing and jobbing concerns were in attendance. The questions of regulation were discussed from all angles by managers of utilities and by public service commissioners. Public relations, to the betterment of which the association has devoted so much time and publicity during the past few months, received earnest consideration. From without the industry, manufacturers, bankers, publicists and government officials contributed their impressions of how utilities may best win public recognition and support, while from within the testimony of executives and others showed that the electric public utilities of the country are doing their part through excellent service at fair rates and through various channels of public information to carry the message of the utilities to the man in the street.

Samuel Insull, speaking on future expansion in the use of central-station power, touched on some of the vital issues of the day and gave wholesome advice on superpower systems. It is fair to say that no session of the very many held during the week was without its important feature. In fact, the program was so crammed with excellent reports, papers and addresses that their immediate absorption and appreciation was out of the question during the sessions of the convention.

A masterful analysis of the fundamental economics affecting electric light and power company service, in which the attention of the industry was focused on the points of primary interest, was made by Martin J. Insull in his presidential address. Mr. Insull stated that the industry is in a strong position but in need of tremendous sums of money to take care of the program of expansion demanded by the public. Money, he believed, must be obtained from the public, which fact necessitates careful attention to good public relations. Finally, he saw the cessation of municipal regulation and operation in favor of state regulation. The small-town plant is going; the big system feeding the small towns from a transmission line is taking its place.

In general, said Mr. Insull, the electric light and power business continues its growth. It is estimated that there is necessary and will be installed 1,000,000 kw. of generating capacity during this calendar year. The industry may, therefore, look forward to a promising future. It is estimated that for the next five years the electric light and power industry, in order to provide for the demands that will be made upon it by the public, will require approximately $1,000,000,000 per year.

At the second general and executive session, in reporting for the Superpower Survey, M. S. Sloan said that the government had appropriated $100,000 for the study and that a number of utilities and manufacturing companies had contributed $50,000 more to complete the work. The chief difficulties were legal and financial rather than engineering. It was the purpose, he said, to seek a federal charter because of limitations imposed by state laws and the charters of the large public utilities involved. The committee was unanimous in its opinion that the superpower system should be controlled by the existing public utilities and financed by private capital.

R. H. Ballard of Los Angeles, in reporting for the public policy sub-committee on inductive interference, told of the meetings held between executives of the National Electric Light Association and the American Telephone & Telegraph Company for the purpose of correlating their activities and jointly working out solutions to inductive-interference problems. While the engineers will continue their work, it was agreed that no precedents would be invoked in establishing the rights of either the telephone or electric light companies, but that both interests would seek the best economic solution of the problem.

The report of the underground systems committee was of special importance because of manufacturers in the country now being able to construct cables capable of withstanding voltages up to 33,000. Discussing higher voltages for underground cables, Mr. Roper said that the Commonwealth Edison Company is planning to distribute 33,000 volts over cables which during the last two years have been installed for 22,000 volts. No trouble is expected with the higher voltage. The report of the committee on prime movers was a complete one. It will be abstracted in a later issue of this paper. That of the committee on railroad electrification is abstracted below.

Electrification of Steam Railroads

THE committee on steam railroad electrification presented a general study of the subject with a view to showing the members of the association how and why the railroads will furnish an increasing market for electric power. The committee comprised L. A. Ferguson, vice-president Commonwealth Edison Company, Chicago, Ill., chairman; A. H. Armstrong, General Electric Company; W. C. L. Eglin, Philadelphia Electric Company, and F. H. Shepard, Westinghouse Electric & Manufacturing Company. The following abstracts from the report will indicate its general form and spirit:

The steam locomotive has been developed to a point where it meets the conditions imposed upon it by the transportation problems of freight and passenger services, satisfactorily in most cases and in all cases where the traffic is light. As the traffic has increased on roads on which there are heavy grades, additional capacity has had to be provided by laying additional tracks. It is not the intention of the committee at this time to advocate the abandonment of either the freight or the passenger steam locomotive in places where it can be used to economical advantage.

The steam locomotive suffers from the disadvantage

that the steam generator must be carried with it, and it must be capable of withstanding shocks and vibrations, thus limiting the design of the fire-box to a metal fire-box of relatively small size and materially reducing the efficient burning of the coal. The standby losses of the locomotive must be high and these losses increase in the larger units, as the coal must be consumed whether the engine is running or not, as long as the locomotive is in service.

Real Estate Considerations in Electrification

The economical advantages of moving freight in bulk, requiring the use of heavy trains, are causing increase in the size of the yards and the terminal facilities so as properly to assemble these trains. With the growing value of real estate in the large communities, the cost of these terminals now forms an important part of the total railroad investment, and with the development of the city with buildings surrounding the existing yards it is becoming very difficult to enlarge these facilities to meet the growing requirements. Thus means must be provided to increase the capacity of yards and terminals. It seems logical and rational that both the railroad tracks and especially the yards and terminals must be operated at a number of levels to increase their capacity in the existing areas. This must be accomplished by the elimination of the steam boiler from the locomotive.

For two essential reasons—the ability must be had to increase the locomotive capacity to any desired limit for haulage purposes on the existing main tracks and it must be possible to permit the tracks to be placed on various levels—some method of delivering power to the locomotive other than in the form of coal in the present locomotive tender must be employed.

Where the Electric Locomotive Fits In

The application of electricity to the railroads will naturally follow the line of its application to the industries. It will permit a better accomplishment of the functions of the railroad by increasing the speed of trains and reduction in the investment cost of terminals or the increase in their capacity. Its application must come where the greatest advantages of its use will be shown. Probably the most notable examples will be in the operation of trains through long tunnels, where the ventilation problem makes it more mandatory; in meeting the increasing requirements of terminal and yard facilities; in maintaining the highest speeds on the roads with heavy grades, and in its use on sections in which increased speed of general or special movements is necessary to handle existing or growing passenger or freight traffic.

The committee believes that the extension of the use of electricity for motive power must come through its economic advantages and its ability to assist the railroad organization in meeting the growing requirements of traffic and reducing the cost of operation and maintenance.

Variety in Type of Motive Power Will Continue

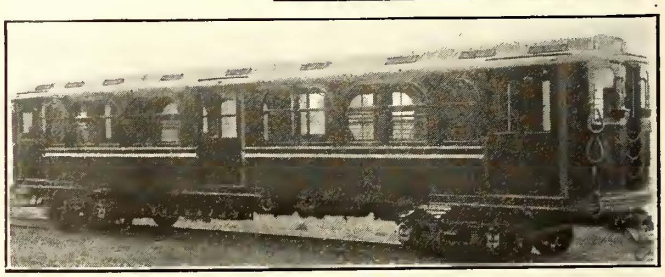
There are now available methods and apparatus such that electrical energy may be supplied to the train to meet the requirements of speed, load and grade. The selection of the type of apparatus will vary with the requirements of the railroads, and it is probable that there will be as many different sizes, types and designs of electric locomotives as there are at present of steam locomotives.

The power companies of the United States should be ready to furnish electrical energy to take the place of the coal which is now delivered to the railroads at the mines, enabling the railroads to obtain promptly and in any quantity the required electrical energy produced by the large generating stations of the power companies, and that at a rate which would compare favorably with the cost of its production in power houses built for the railroad load alone.

New Tube Cars

Hudson & Manhattan Railroad Lengthens Doors on Latest Twenty-five Cars and Makes a Few Changes in Interior Equipment of Car

THE Hudson & Manhattan Railroad has recently purchased twenty-five additional steel cars to accommodate the traffic of the road. The construction of these cars follows very closely that of the cars previously used by the company, but they have wider side doors and are 3 ft. longer over all than the older cars. The use of the wider center doors does not change the seating capacity, but adds greatly to the convenience of passengers in entering and leaving the cars. Another point of difference is that while the system of vertical posts and horizontal rods for passenger support in the car is retained the posts directly on each side of the side doors have been omitted. This change is shown in the view of the car interior. The purpose of this change is to prevent passengers from blocking the side entrance by holding on to one of these posts.



THESE NEW HUDSON & MANHATTAN CARS EMBODY SEVERAL CHANGES FROM THE FORMER TYPE

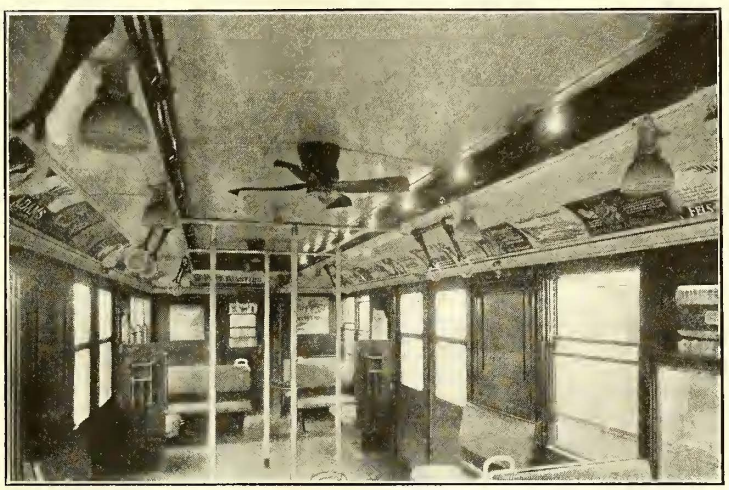
The new cars are equipped with ceiling fans. Similar fans are also to be applied in the older cars to provide for a brisk circulation of air even when the cars are standing at stations. The fans do not show in the interior view of the car as they had not yet been installed when the picture was taken.

The cars are equipped with GE-259-A motors, G. E. P. C. control and Westinghouse A. M. L. E. air brake equipments, all adapted to function with the older equipment, which has been fully described in the ELECTRIC RAILWAY JOURNAL.

New York Municipal Car Improvements

Since the Introduction of the Large Multi-Side-Door Cars on the Lines of the New York Municipal Railway Various Additions and Refinements Have Been Made to Provide Increased Comfort and Safety for Passengers

WHEN the Brooklyn Rapid Transit System offered to operate a part of the vast subway and elevated network as suggested by the city of New York in 1911 the design of a car most desirable was one of the vast problems presented to the engineers of this company for solution. When the various details of design were finally settled the most noteworthy characteristics of this car in which it differed from other designs were its large size, its unique seating arrangement and its multi-side-door construction. The value of these new features embodied in the design has now been demonstrated by more than five years of service under the most severe traffic conditions that can be found in any city. At present 900 of these cars are in service or on order and in the fundamental considerations the last cars, namely, the 2,800 series, are identical with the first ordered. Quite a number of refinements and improvements have been added, but the changes which were made in construction were very few.



LOW MONITOR TYPE ROOF CONSTRUCTION WITH DECK-SASH VENTILATORS, VENTILATING FANS AND REARRANGED LIGHTING

The essential characteristics of the design, construction and equipment of these cars were very completely covered in a series of articles published in the issues of the ELECTRIC RAILWAY JOURNAL for June 6, 1914; June 13, 1914; Dec. 26, 1914; March 13, 1915; March 27, 1915, and May 8, 1915. The purpose of the present article is to describe some of the improvements and changes incorporated in the last 100 cars ordered and include additions made since this series of articles was published.

MONITOR TYPE ROOF FOR VENTILATION

The form of roof used with the 2,800s is of a low monitor type with twenty deck-sash ventilators on each side of the car. This construction provides a clearstory 4 ft. 11 in. wide inside by $12\frac{3}{4}$ in. deep. The deck-sash ventilators are arranged in four groups, so that those in a quarter of the car can be operated separately from a lever near the center of the car. The ventilators swing horizontally and have an opening of 25 in. by $4\frac{1}{2}$ in. This type of roof construction lends itself particularly well to the ventilation system using five ceiling fans in each car.

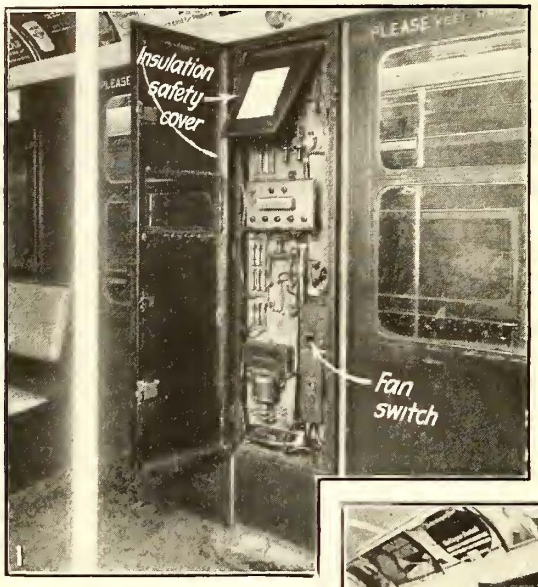
The five ceiling fans are arranged with one opposite the center pair of doors and the others at about equal distances along the center of the headlining. The five fans of each car are connected in series across the line, so that each fan is wound for 115 volts. The fan motor frame is designed for direct attachment to the car ceiling and a metal canopy incloses the top part of the motor.

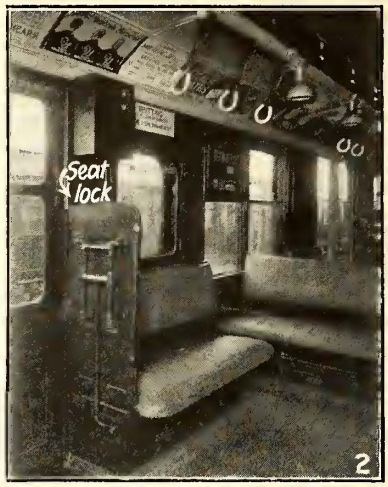
With the use of the ceiling fans the arrangement of lights consists of fourteen side lights, seven on either side, installed just at the edge of the clearstory, and six center lights, two of which are end lights. There is thus a total of twenty 56-watt lamps with shades per car. The fundamental principle of the seating arrangement adopted for the New York Municipal cars was to obtain maximum seating capacity during hours of normal traffic and maximum standing room plus a reasonable proportion of seating capacity during the rush hours. In order to facilitate movement to and from the door openings the space opposite each active doorway was kept free, except for vertical stanchions installed for the accommodation of standing passengers. Study of the conditions that existed with the cars loaded to their maximum capacity indicated that a few hand straps on either side of the door openings provide comfort for the standing passengers, and accordingly twenty-eight hand straps, fourteen on either side of the car, have been installed. These are grouped with two hand straps on either side of the end side doors and three hand straps on either side of the center pair of side doors. These are of the Henry type, all metal with white enameled hand grips, and arranged to be held back close to the side of the car by spring pressure when not in use.

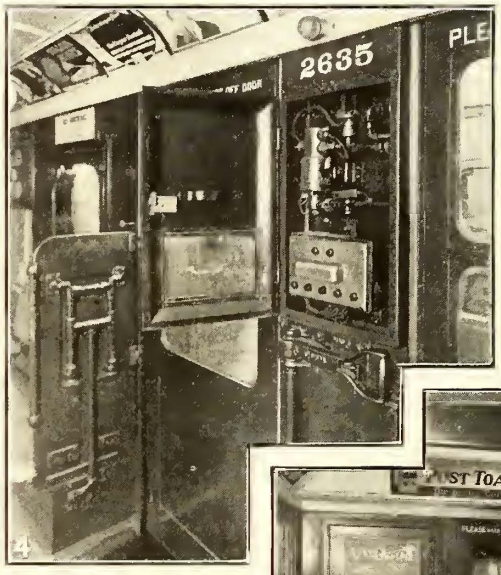
IMPROVEMENT IN FOLDING SEATS

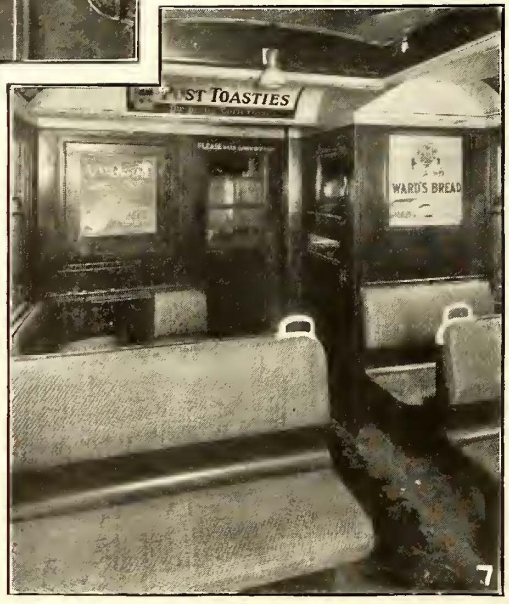
In order to increase the seating capacity during hours of normal traffic, hinged folding seats are used on either side of the door openings. In their raised position these folding seats serve as ends for the longitudinal seats and a grab handle along the front edge enables standing passengers to get a firm hold. These folding seats are held in their raised position by a lock catch which can be released only by the aid of the key used for the end doors and the operator's push-button box. With the seats in their "down" position a prop swings out from the under side and rests on the floor. This seat prop is made of a pipe framework with two legs which have rubber cushions at the points where they

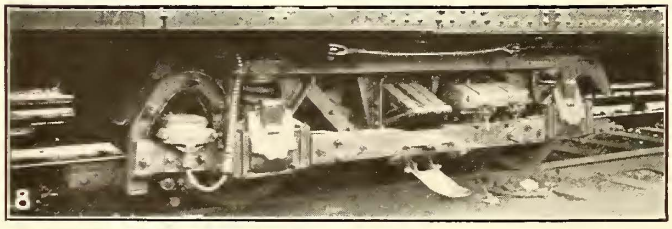
Some Features Embodied in New York Municipal Railway Company's Cars











1—Interior of switchboard panel.
2—Push-button section of switchboard panel, pipe framework footrest interlocked with door engine, cut out, coasting recorders, destination sign and hand straps.
3—Wide type pantograph shoes.
4—Small panel box with push-button switch, recess provided for hand brake.
5—Types of end-door threshold plates.
6—Cross-seat recessed to provide knee room for passengers in seat behind.
7—Paneling at end of car, design of motorman's cab door and end door with drop sash.
8—Truck mechanism, cast steel contact shoes and shoe-fuse box cover.
9—Safety hangers for truck slack adjusters and shoe hangers cross connected.

rest on the floor. All parts are rounded so that no sharp corners or projections are presented, which might prove injurious to passengers or their clothing, and as this framework is mounted so that it extends out from the side of the seat it also serves as a grab handle for standing passengers, with ample space for their fingers to provide against accident. A center leg of this framework is attached to a lever which is connected to the door engine underneath the stationary seat at this point. The lowering of the folding seat cuts off the air from the door engine, so as to insure that the door behind the seat cannot be operated with the seat in its down position.

It is the practice of the New York Municipal Railway to operate trains with the end doors of the several cars closed, and the seating arrangement provides a small seat just to the left of each end door with hinges, so that it can be raised but cannot be removed.

Two cross seats are located just to the rear of the motorman's cab. This is the only position in the car where two cross seats come one behind the other. To provide additional leg room for passengers in the rear seat, the back part of the front seat has been constructed with a cut-out portion, which comes just below the back seat cushion. By this ingenious arrangement, an additional 3 in. of leg room is provided for passengers without change in the other parts of the seat construction.

No Danger of Interference with Motorman

To provide maximum privacy for the motorman the door of the cab has been provided with a steel panel in the top portion and a small length of wire-ribbed glass in the center portion. The bottom of the door is also provided with a dust guard, as it is found that with the car in motion a current of air from the end door blows in through the motorman's cab, particularly when the window is raised. Thus dust and other particles are blown under the bottom of the door. The steel panel in the rear of the motorman's cab is utilized for an advertising sign rack.

Several window positions have steel panels. One of these is just to the left of the end door and others are provided just to the side of the end side doors. The use of steel panels reduces the maintenance cost for broken glass considerably and also provides increased revenue from their availability as advertising sign racks.

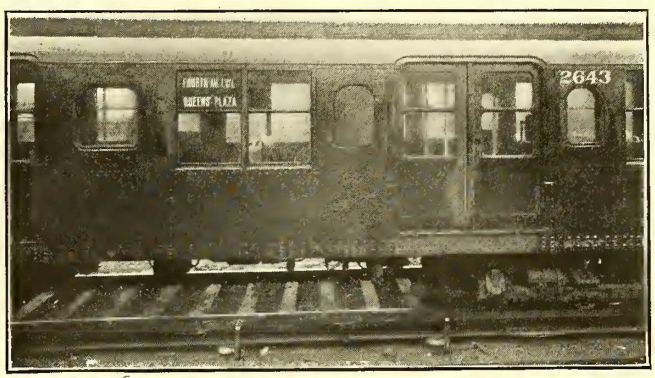
Drop sash have been provided in the end doors which are arranged for the dropping of the top part of the sash, the window being made in two parts. This gives increased ventilation and a circulation of air through the entire train.

In one of the accompanying illustrations showing exteriors of the cars the paneling of the small window to the left of the end-side doors can be seen. In these cars the car number has been placed on the side of the car over this window. It was found that this is preferable to numbered glass which when broken causes considerable delay in returning the car to service, as a new glass has to be numbered and the paint thoroughly dried before it can be installed. The routing and destination sign is located in the second window to the right of the center side doors. This location provides for use of signs with large letters which can be distinctly and easily read, and also gives more space for the sign proper, as the number of destinations and routes are increasing considerably due to the addition and operation of new lines.

In the illustration of the outside end of the car the pantograph safety gates are shown. A wide shoe now used insures proper contact even on sharp curves. Another view, taken between two cars, shows the threshold plates at the end doors. In the new design the outside ends have been cut off so that they extend but a few inches outside of the end doors.

Electric Trip Switches Added

In the views showing truck construction and equipment electric trip switches are shown at the left end of the truck. Two of these are installed per car on diagonally opposite corners. This truck mechanism for the trip switches consists of a lever which extends down toward the rail and engages the track trip. This lever is self-centering by heavy springs and acts through a gear and pinion to operate a contact device and open the circuit whenever it is operated. The opening of this circuit de-energizes the holding coil of an electro-pneumatic valve installed in the small cabinet over the push-button switches on the inside of the car.



DESTINATION SIGN WITH LARGE LETTERS, AND NUMBER ON SIDE OF CAR

This electro-pneumatic valve operates a dead man's valve which opens the brake pipe and causes an emergency application of the brakes. As soon as the track trip has been passed, the truck trip switch returns automatically to its central position, closing the circuit at that point. However, the circuit still remains open, due to the dropping of the electro-pneumatic valve. A reset circuit is used for restoring the valve to its normal position, with a reset switch in each motorman's cab. There is also a pneumatic switch in this circuit, which is connected directly to the brake pipe. This closes whenever the brake pipe pressure has been reduced to 5 lb. or less. The electro-pnuematic valve can then be reset without the motorman moving from his cab, but as the brake pipe pressure must be reduced to 5 lb. before this circuit is closed ample time is given to insure that the train comes to a stop before the normal condition can again be re-established.

The cast-steel contact shoe is also shown in the second illustration, and the shoe-fuse-box cover. The cover is of wood, reinforced with wide steel bands having spring mounting.

The journal boxes provide substantial support for the shoe beams and heavy brake-shoe release springs assure prompt release from the wheels. Following the general practice in this design of providing safety straps for all brake-rigging parts, additional safety straps have been added under the truck slack adjusters. A cross-connection has also been added between the brake-shoe hangers at the end of the truck. This gives

a rigid construction and prevents brake shoes from developing false flanges or wearing out of true.

All doors of a car are controlled from push-button boxes forming a part of switchboard panels located on either side of the car between the center pair of doors. The push buttons are arranged in three rows, those in the center row being for opening the doors. To energize any of the push buttons it is necessary for the operator to insert a key in the key switch at the upper left-hand corner of the box and to turn this to close the circuit to the button. As an extra safeguard on the opening buttons, a cast-bronze guard is installed over them. With this in place there is no danger of false operations with the cars in motion should the operator forget to remove his key from the key switch.

The lighting, heater and compressor switches are located at the top of the panel board. An ingenious method of preventing the operator from hanging on to the steel door of the panel board or other grounded metallic parts while he is throwing these switches involves the use of an insulated safety cover. This cover is hinged from a point just above the top of the switches, and in its normal position extends down so as to cover the switches and the fuses completely. In order to throw a switch it is necessary for the operator to raise this insulated panel, and the most natural method of doing this is to hold it in its raised position with the left hand while the switches are being thrown with the right hand. The operator must maintain his hold on this insulating panel, which insures his being insulated from ground without danger of receiving a shock should he inadvertently touch any live part. This insulated panel also forms a very conspicuous place for posting information regarding the various fuses and switches. All fuses and switches are given numbers on the panel board and the instructions tell what circuits they are used in, so that should trouble occur in service the operator does not need to test several circuits to find the trouble, but can locate it immediately by referring to the instructions.

Convenient Method of Operating Light Switch

Another ingenious and trouble-saving device is the key-lighting switch, located at the right-hand center part of the panel. As these cars operate in the open as well as in tunnels, it is necessary to turn the lights on and off during each trip. With the usual type of lighting switch this would require the opening of the panel board door each time it was necessary to throw this switch. This requirement has been done away with by the use of a key switch in the lighting circuit which can be operated by the insertion and turning of a key without opening the panel board door. The keyhole for this switch is made with a large funnel-shaped guard, so that the operator can readily find the keyhole even should he neglect to turn the light on in the car until after it enters the tunnel.

This panel board also contains the switch for operating the ventilating fans. This is a safety switch located just underneath the safety lighting switch. All exposed parts of this switch are insulated, so that the operator cannot come in contact with any live parts.

The hand-brake handle folds back against the side of the car just underneath the small switchboard panel and is held in position by a safety catch. The steel side panel has been cut out just at the handle to provide additional space for the inserting of the hand for operating the hand brake.

The storage batteries of the car are charged from the line as well as through the compressor circuit. A battery-charging relay operates to connect the car batteries to line through a resistance whenever the pressure drops as low as 26 volts. With the batteries connected for charging directly from the line a 2-amp. charging current is received. The normal voltage for these batteries is thirty-four, and whenever this voltage is reached the battery-charging relay automatically cuts out. In normal operation the batteries are charged through the compressor circuit.

Electro-pneumatic line switches, Westinghouse type 267-E-9, are used on these cars. These are found desirable on account of the large number of times that the main operating circuit is opened and closed while going over gaps in the third rail.

Improvements in the electro-pneumatic brakes used provide for a quick application of the brakes throughout a train at all times whether they are applied pneumatically or with the electric features cut out. An indicating pilot lamp is connected so as to show whenever the brakes on a car are cut out. This pilot lamp is located inside the car just to the right of one set of the end side doors, and its conspicuous location insures that cars are not operated in service with brakes cut out unless it is essential due to trouble on that particular car. The motorman is then advised of the condition, so that safe operation is assured.

California Association Meets

THE sixth annual meeting of the California Electric Railway Association was held at the Palace Hotel, San Francisco, on May 11. At the close of the meeting W. R. Alberger, vice-president and general manager of the San Francisco-Oakland Terminal Railways, was re-elected president for a third term. W. V. Hill was re-elected manager, and the executive committee, composed of the following, also was re-elected: Paul Shoup, president Pacific Electric Railway; W. E. Dunn, vice-president Los Angeles Railway; William Clayton, vice-president San Diego Railway, and William von Phul, president Market Street Railroad.

W. V. Hill, the manager, is now in Washington, D. C., having accepted the office of Washington representative of the tax committee of the National Utilities Association.

Applying the Stethoscope to Machinery

A RECENT issue of *Engineering*, London, gives details of an ingenious scheme for permitting supervision of the condition of bearings and other vital parts of machinery. A specially constructed telephone microphone is screwed to each bearing or other possible source of trouble and supplied with current from a dry battery cell. All of these "trouble detectors" are wired to a central point where a simple switchboard permits plugging in of a telephone receiver on the circuits in succession. A milli-ammeter forms a part of the switchboard and is used to insure the continuity of the test circuit, so that silence in the telephone due to a broken circuit may not be taken as an indication of a perfect bearing. This device is an application and extension of the familiar stethoscope used by physicians in studying the action of the human heart. It virtually places the ear of the superintendent at every essential bearing in the plant.

Elimination of Waste

Report of Engineering Council's Committee Contains Concrete Suggestions Which Are Applicable to all Industries—High Labor Turnover One of the Commonest Wastes

THE report of the American Engineering Council's Committee on Elimination of Waste in Industry was presented on June 3 to the executive board of the Council in St. Louis. After discussion on the acceptance of the report, its publication was authorized not as a report of the Council but as the findings of the committee.

The report declares that between 4,000,000 and 5,000,000 workers were idle during January and February of this year, that billions of dollars are tied up in idle equipment and that high labor turnover is a rough index of one of the commonest wastes. Nationwide machinery to obtain continuous information concerning unemployment conditions throughout the country is called necessary, means for regularizing employment in the principal industries is urged and an elaborate plan of nationwide co-operation between the government, the public, trade associations, the industries, labor, bankers and engineers is outlined.

The waste inquiry was in charge of a committee of sixteen headed by J. Parke Channing of New York as chairman and considered particularly the industries of housing and building, ready-made men's clothing, shoes, metal trades and printing, but the results are said to be typical of all industries in all parts of the country.

The economic loss annually from preventable diseases and death according to the report is over $3,000,000,000; 42,000,000 persons gainfully employed lose 350,000,000 days from illness and disease and non-industrial accidents annually; 42 per cent of the wastes of ill health is preventable. In 1919 there occurred in industry 3,000,000 accidents, resulting in an economic loss to the country of about $853,000,000.

Trade associations, it is declared, should help and can do so, among other ways, by promoting programs for standardization of production of cost accounting methods, of material specifications and of equipment and by encouraging industrial research.

The duties of management include a reduction of the high labor turnover, establishment of improved relationship with employees, maintenance of inspection control, and detailed planning of work in advance.

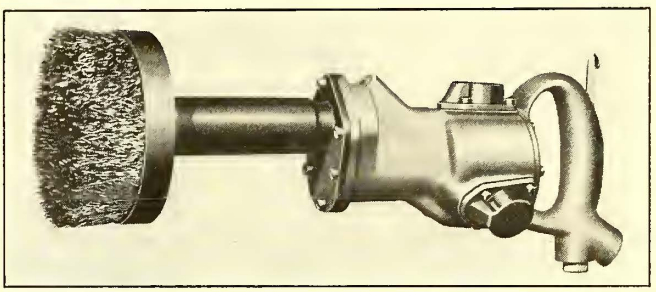
Organized labor, the report says, should develop a policy for increasing output; the attitude of opposition or indifference to proper standards for production should be changed to a frank and aggressive insistence on such standards; there should be a scientific examination of the bases for wages; certain union rules should be modified in regard to machine operation, apprentices and craft distinctions which result in restriction of output, and individual workers should realize their responsibilities for waste resulting from ill health and disregard of safety measures.

The banking interests, it was said, should especially encourage the stabilization of industry, and it is the duty of the engineers of the nation to support a wide and more thorough research into the following problems: Collective bargaining, hours of labor; methods of compensation; means of preserving and stimulating the creative instincts and the pride of craftsmanship of industrial workers; a standard labor and management terminology; common principles for the methods of management, and the measurement of production standards.

The building industry was said to be about 60 per cent efficient. In the shoe industry the waste is put at about 35 per cent. The average plant in the metal trades group is from 25 per cent to 30 per cent behind the best plant in output per employee. In the ready-made clothing industry, the report says, it should be relatively easy to save three-quarters of a million dollars a day—an increase of 40 per cent in effectiveness.

Wire Brush Cleaner Attachment for Air Drill

WIRE brush cleaning of metal surfaces offers an opportunity for saving time and labor over that required by hand methods for removing paint, rust, scale, etc. Manufacturers have found difficulty in obtaining a wire brush of proper design and material which would work effectively and still not wear out too rapidly. A wire brush of very rugged design has recently been placed on the market by the Ingersoll-Rand Company, New York, which is intended for use with its standard No. 6 "Little David" drill. The face diameter of this brush is 5 in. and the wires are made of special heat-treated steel, which has been found to possess good wearing qualities.



AIR-OPERATED BRUSH CLEANER ATTACHMENT

The No. 6 drill which is used with this brush has bearings designed particularly to take up the end thrust when pressing down on the work and the motor has a particularly high speed, which is also desirable. The whole outfit weighs but 11½ lb.

A New Structural Material

A NEW structural material called "Plymetl" has been produced by the Haskelite Manufacturing Corporation, Chicago. It is a composite of wood and sheet steel. It is manufactured by cementing thin sheet-metal faces to a relatively thick core of lightweight material. The two sheet-metal faces form smooth, impervious and durable surfaces. The non-metal core places the faces relatively far apart, giving the material great strength for its weight. Plymetl is furnished from stock in panels $\frac{3}{16}$ in., $\frac{1}{4}$ in. and $\frac{5}{16}$ in. thick, with faces of black or galvanized sheet metal, No. 30 gage, and with planed fir wood veneer cores. These panels are made 30 in. by 96 in. and weigh 1.6 to 1.8 lb. per square foot. It is also manufactured to order in 24, 26, 28, 30 and 36-in. widths and in lengths of 96 and 120 in., and in thicknesses from $\frac{3}{16}$ in. to $\frac{3}{4}$ in. The material can be cut with light machine shears and such cutting gives a desirable bevel to the edges.

A panel of this material, $\frac{5}{16}$ in. thick and made up of No. 30 gage sheet steel and fir wood core and weighing 1.8 lb. per sq.ft., is claimed to have eighty times

the stiffness of a sheet steel of the same weight, namely, No. 19 gage. Its elastic limit in bending is claimed to be about five times that of the No. 19 gage sheet steel. The shearing strength of the cement that binds the metal to the core is even greater than the shearing strength of the wood.

Some of the advantages claimed for this new product are that it is strong and of light weight, that the even surface afforded by the metal does away with the cheap appearance of sheet metal, that the wood core takes away the metallic sound of sheet metal, and that the material will stand great abuse. Its use is suggested for car roof, interior panels, bins and shelves.

Repairing Decayed Poles

THE George C. Eggers Company, distributer of the Harding process for the reinforced concreting of pole butts, has given some results of the use of poles with concreted butts used by the Kootenai Power Company at Cœur d'Alene, Idaho. These have now been in service about six years.

In applying this method the ground is excavated around the butt. All decayed wood is removed and the butt of the pole is brush-treated to a height of 2 ft. above the ground line. A template is then adjusted around the butt of the pole at the proper height and twelve nails for supporting the reinforcing iron and the sheet metal form are driven to the proper depth. The template is then removed, the rings are put in place and the vertical tension rods are hung on. The lower form is then wrapped around the six lower nail heads and is backed up with earth as it is being filled with concrete. The lower form is next withdrawn and the upper form is adjusted at the proper height around the upper and lower nail heads, and a rubber form for casting the sealing groove is wrapped around the pole and tacked in place. The upper form is then filled with concrete and the top is sloped and smoothed off by means of a trowel. After twenty-four hours the forms are removed. When the concrete has become thoroughly dry the groove around the pole as well as the checks in the pole itself are well filled with a special sealing compound which is applied hot. The use of this process makes it unnecessary to replace old poles due to ground-line rot, as the concrete reinforcement can be applied to give a substantial construction and add much life to that of the pole.

DECAYED POLE WITH CONCRETE BASE APPLIED

Seal Replaces Lettering

A CONSIDERABLE saving in paint and painters' time is expected to result from a recent decision to do away with all lettering on the San Francisco Municipal Railway cars and to substitute a simple seal. Inasmuch as the municipal cars are painted a distinctive gray color, the seal will serve all purposes as well as the more elaborate lettering, it is believed. The seal bears the words Municipal Railway in letters 1¾ in. high encircling the letters S. F. All letters are of gold leaf with ⅛-in. black borders. The diameter of the outermost circle is 15 in.

SEAL

Letter to the Editor

Stick to Safety-Car Design Standards

BROOKLYN RAPID TRANSIT COMPANY
BROOKLYN, N. Y., June 6, 1921.

To the Editors:

I have read with much interest the article by J. C. Thirlwall of the General Electric Company appearing in the issue of the ELECTRIC RAILWAY JOURNAL for April 16, 1921, and again the article of May 7 by W. H. Heulings, Jr., vice-president and general sales manager the J. G. Brill Company, both emphasizing the fact that there is no real reason for changing the design of the standard Birney safety car. I write to indorse their views.

It is one of the unfortunate phases of the electric railway industry, excusable in part on account of its newness, that some men in responsible charge of executive and operating departments believe that they are not measuring up to the expectations of the owners of the property and their local public unless they stamp their own individuality upon the property. They alter railway equipment that has proved generally successful elsewhere, forgetting that the real field for effort lies in the direction of initiative in design rather than in such changes. We are far from having reached standards in any respect, and in the field of car equipment it is improbable that one or even two or three types of cars will ever be generally adopted for general use. While the advantages to the purchaser of standardization are obvious, individuality in design on the part of the car builder, often involving patents upon parts, and the attitude of the purchaser in desiring to adhere to designs which are locally popular or which fit in with some well-founded policy, make such a course impracticable if not impossible.

It is particularly unfortunate, therefore, that certain properties should be engaged in efforts to make changes of doubtful value in the Birney safety car, the one prominent example of standardization falling within the scope of car design. It is the only example of consequence that illustrates what might be termed *standardization of design or direction of design.* Great credit is due the man who first conceived the idea of this car and those interests that first applied it. But credit is also due the manufacturers who have co-operated with the users in developing a standard car with standard electrical and mechanical equipment that has done much to keep down the initial price of the complete unit and to make possible prompt delivery of repair parts at reasonable cost. All of the manufacturing interests concerned are represented by a manufacturers' committee, of which the writer and one other railroad employee are members. In this every consideration is given to the further improvement of any part or feature of the car and its equipment and with especial reference to keeping down car weight. The sentiment is against increasing the weight without a real and compensating advantage.

Probably many one-man double-truck cars will be operated in the near future, cars fully equipped with the safety devices now used on the Birney car. I believe that there will be a very general adoption of such cars,

either through the modification of existing cars or the acquisition of new units more suitably equipped for economical operation. But this is entirely separate from the suggestions that have emanated from a few quarters to the effect that "something different" be furnished, thereby entailing additional first costs and future operating costs.

What is needed are broader conceptions of the principles involved, closer co-operation with the manufacturers in the development of standard railway equipment of whatever character, and less effort to change unnecessarily what some one else has designed in the effort to obtain the highest efficiency and the greatest economy in the management of properties that now need such a service as never before. W. G. GOVE,
Superintendent of Equipment.

Association News

Committee of One Hundred to Give Dinner

ANNOUNCEMENT has been made this week of a dinner party to be held on July 8 at the Commodore Hotel, New York, to celebrate the second anniversary of the creation of the Association's Committee of One Hundred. The dinner will be at 7 o'clock and the tickets are priced $7.50.

Each member company is invited, under the plan of holding the dinner, to send one accredited delegate. In addition the members of the Committee of One Hundred are also extended an invitation to attend.

The speakers' program calls for a review by President Gadsden of the activities accomplished during the existence of the Committee of One Hundred and an outline of what can properly be done in the future. In addition there are to be other speakers of prominence who are to talk on subjects that pertain to national situations other than the electric railway problem.

Recent Presidential Appointments

PRESIDENT GADSDEN of the American Electric Railway Association, chairman of the joint tax committee of the National Utilities Association, has appointed W. V. Hill, manager of the California Electric Railway Association, as representative of this committee. Mr. Hill's office is located at 950 Munsey Building, Washington, D. C., and all matters relating to federal taxation can be taken up directly with him there.

President Gadsden has appointed several new members on the American Association committee on company sections and individual membership, the personnel of which is now as follows: Martin Schreiber, Public Service Railway, Camden, N. J., chairman; P. S. Arkwright, Atlanta, Ga.; J. P. Barnes, Louisville, Ky.; F. G. Buffe, Kansas City, Mo.; J. H. Mallon, Chicago, Ill.; H. H. Norris, New York, N. Y.; Charles C. Peirce, Boston, Mass.; E. F. Wickwire, Mansfield, Ohio.

Chicago Men Well Entertained

THE monthly meeting of the Chicago Elevated Railroad company section was held on May 17, with an attendance of about 150, with President J. H. Mallon in the chair. F. W. Shappert, who accompanied Secretary Denby on his recent inspection of the Atlantic fleet, reviewed this event with the aid of stereopticon slides. H. A. Johnson, organization engineer Chicago Elevated Railroads, talked of his recent trip through the West as the representative of the Elevated Railroads on Mayor Thompson's Chicago transportation committee.

Stock Offering to Employees at Section Meeting

THE regular monthly meeting of company section No. 13 was held on May 19, at Camden, N. J., with a large attendance. President C. V. Wallace introduced E. G. C. Bleakley, city solicitor of Camden, who, in his talk, spoke on the way in which the general public left the responsibility to the operators of the trolley cars, depending on them for their safety and speed in being taken from town to town. He added that the trainmen not only received the pay which comes in an envelope but also that which comes from the appreciation of the daily riders, who place their confidence in these worthy men for work well performed. Martin Schreiber, manager of Southern Division Public Service Railway, outlined the plan of the Public Service Corporation under which it plans to sell $2,000,000 of cumulative preferred stock to the general public and employees at the par value of $100 per share, payable $10 down and $10 monthly. The stock is to pay 8 per cent, and 6 per cent is allowed during the time that payments are being made. He outlined also the many advantages to be derived from having the general public as part owners of the corporation.

Spraying Car Cleaner Fluid

AT THE Wheaton Shops of the Aurora, Elgin & Chicago Railroad H. A. Barbero, master mechanic, is working on a plan of using Wilson ONC cleaner by spraying it on under the 90-lb. shop air system pressure, instead of rubbing it on by hand. The hand method of cleaning takes four men about four hours per car. Experiment has gone far enough so that it is thought that four men will be able to clean a car in one hour with the spray method, assuming that proper equipment is afforded, including a tank at either side of the car. The present facilities at the shop are limited and it is necessary to place the car first on one track and then on another in order to get space in which to spray both sides. It is planned to build a shed outside of the shop particularly for car-cleaning.

The ONC cleaner is diluted with water and the car sprayed all over and then permitted to set about ten minutes. A wet brush on a long handle is then run over the car, windows and all, and they are rubbed as much as can be with this soft brush. The whole car is then rinsed down with a fountain brush. This latter process avoids the necessity of wiping the windows. The spray process requires about one-quarter more of the fluid than the hand process. At the same time, it saves considerable labor and provides a cleaner car, mainly because it will be possible to clean it more often with the same force of men. The present cleaning system is inadequate, though it is costing the company a large sum. At the Chicago terminal alone $35 a day is being spent for cleaning cars on the inside only. It is planned ultimately to do away with this $900 a month charge entirely at Chicago by concentrating all of the car-cleaning work at the shops, and it is believed that this can be done with the present working force under improved methods.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Railroad Labor Board Cuts Wages 12 per Cent

Highest Reduction of 18 per Cent on Section Workers Should Provide Stimulus to Track Construction

Reductions in the pay of railway workers averaging 12 per cent for all classes of employees have been authorized in the decision of the United States Railroad Labor Board handed down on June 1. The decrease becomes effective July 1, on which date the national working agreements are also abrogated. Nullification of these agreements, it is estimated, will mean a saving of about $300,000,000 annually to the railroads of the country, while the wage decrease is expected to lop off about $400,000,000 more.

The decision in general grants reductions of from 5 to 13 cents per hour or about 5 to 10 per cent, and reduces section laborers approximately 18 per cent, in this instance completely wiping out the increase in pay granted that class of employees in the $600,000,000 wage increase of July 20, 1920. On other classes of workers, however, the wage reduction does not meet the increase in pay granted last year, and some disappointment over this has been expressed by the railroads. It is significant, however, that the largest decrease, or 18 per cent, affects section workers, for with lower costs in maintaining and constructing track, greater activity in this much neglected field may logically be expected.

Segregation of City and Suburban Lines Talked

While no definite future policy has been announced for the Detroit United Railway since the election of Harrison Williams and Alex Dow as directors, city officials believe that one of the main steps to be taken by the new organization will be the segregation of the city lines from the interurban system. It is also believed that the policy indicated by the company in agreeing to sell the day-to-day and non-franchise lines at such times as the city desired, and in agreeing to co-operate with the city in the matter of crossings by the municipal line, will be followed with a view to harmonizing the company and the city in the city's municipal program.

If complete harmony results, the disposal of the company's entire city system to the city would ultimately result in bringing about a unified municipal system, although it is not believed by city officials that a project to take over at one time the entire city system of the Detroit United Railway would be approved by the voters.

Following the defeat of the service-at-cost ordinance at the April election the company signified its willingness to allow the city to make crossings at the intersection of the municipal ownership lines and the company's lines. Agreement has been reached between the company and the city providing for submitting the matter of crossings to the United States Bureau of Standards.

The city officials hold that the company and city should share equally the cost of crossing non-franchise and day-to-day lines, while in general practice the junior system bears the entire cost. The Corporation Counsel claims that the company has no rights on such streets except by permission of the city. Company attorneys do not accede this point and cite that the company is willing to sell the non-franchise lines on Fort Street and Woodward Avenue when the people vote to purchase them.

D. U. R. in Charge of Administrative Committee

Announcement was made in New York on June 7 that the operating properties of the Detroit (Mich.) United Railway will be in charge of an administrative committee composed of Harrison Williams, New York, as chairman; Alex Dow, president of the Detroit Edison Company, recently elected a director of the railway; J. C. Hutchins, A. F. Edwards and R. W. Martin. This committee, just formed, will immediately consider the problem with which the Detroit United Railway is confronted. At the present time there is no announcement to make regarding any future plans or policies. It is not anticipated that any further changes will be made at this time in the board or in the operating organization.

Third Des Moines Arbitrator Chosen

After more than a month's dickering in trying to secure a third arbitrater to hear the wage dispute between the Des Moines (Iowa) City Railway and its union employees Judge Scott M. Ladd, for many years member of the Iowa Supreme Court, was agreed upon by Rev. J. E. Kirbye, for the men, and B. F. Elbert, for the company. By reason of the fact that Rev. Kirbye plans to leave for Asia on June 22 it is thought that the wage dispute will now be pushed to a speedy settlement.

California Legislation Reviewed

Tax and Labor Bills Defeated Which Would Have Burdened Electric Railways Further

More than seventy bills were introduced at the recent session of the Legislature of California effecting directly or indirectly the electric railways of the state. The two most important measures were those dealing with taxation and hours of labor. A tax bill was introduced during the first half of the session providing for a uniform increase of 33 per cent in taxes of public utilities. As an illustration the bill proposed to increase the electric railways tax rate from 5¼ per cent of gross receipts to 7 per cent.

This measure resulted in one of the bitterest fights that has ever been waged in the Legislature of California. The first bill having passed the Senate was defeated by a narrow margin in the Assembly, whereupon a very similar bill was introduced in the closing hours of the first half of the session.

During the thirty-day recess the Governor and his administration stumped the state in advocacy of the passage of this measure. The public utilities and the banks, however, carried on an intensive campaign taking the position that, first, public utilities and banks were paying their just proportion of taxes as compared with general property taxes; second, that the state government was extravagant. They presented figures to substantiate the first claim and submitted facts with respect to the second claim showing that the budget could be cut many millions without impairing the proper functioning of the state's business.

The second bill passed the Senate by a margin of one vote, but was defeated in the Assembly by a margin of four votes. On reconsideration, however, over a period of ten days the Governor's machine supported by the farmers' association (fearing an ad valorem tax on their property), automobile interests and labor organizations, the bill was finally passed by the necessary two-third vote which is required on revenue measures. The electric railways succeeded, however, by an amendment to the bill, in avoiding the increase tax, but their representatives refused to abandon the fight after their interests were excluded from the measure. Thus about $3,000,000 will be saved to the electric railways during the next two years.

Companion bills providing for an eight-hour day within ten hours for electric railway platform men were introduced and were strongly supported

by representatives of the Amalgamated Association. The Senate bill was reported favorably out of committee, but was defeated on the floor of the Senate by three votes after a strenuous fight. The Assembly bill was then taken up in committee, amended to read nine hours within eleven and was defeated in committee.

The bill against the one-man car was not taken up, the author realizing that it could not be passed. The electric railways were involved in an amendment to the "full-crew act," which bill was defeated in committee. Numerous bills were defeated, limiting the Railroad Commission's power with reference to contracts and franchises. Other bills were defeated requiring gangways or sidewalks along bridges, prompt adjustment of damage claims, construction of caboose cars, septic toilet retainers, abolition of grade crossings. The electric railways were excluded by amendments to other bills affecting their interests.

The indeterminate franchise bill in which all public utilities were interested passed the Assembly by a substantial majority, but was not pressed for passage in the Senate, owing to strong opposition brought to bear by the Governor as a result of the defeat of a bill providing for a power commission and the fight made by the public utilities against the tax bill.

A bill was passed repealing the paving section in the state statutes, which should bring considerable relief to the electric railways providing the Governor can be induced to sign it. Several bills were passed affecting the jitney interests, requiring them to file reports of their operations with the Railroad Commission and subject to restrictions on the issuance of free and reduced transportation; also placing them under constitutional amendment No. 1, relating to taxation, under which other public utilities are classified for taxation, and a bill imposing a 2 per cent license tax on motor carriers, which will apply until the amendment to the constitution becomes effective.

A constitutional amendment reclassifying public utilities for taxation purposes was passed. This will enable the electric railways to be classified separately from the steam railroads. On this measure the contention was made that the electric railways should be given a lower percentage than that of the steam railroads owing to the additional burdens imposed in their franchise conditions.

It is interesting to note that the automobile interests maintained the largest lobby of any interests represented.

Wage Reduction to Be Made.—Britton I. Budd, president of the Chicago, North Shore & Milwaukee Railroad, has notified the employees of the company that effective on June 16 working conditions will be revised and wages reduced. The amount of the reduction and other changes to be made are under negotiation.

$1,022,276 Program

Duluth Company Gives Details of Work to Be Carried Out in Next Two Years.

Improvements, extensions and new equipment involving expenditures aggregating $1,022,276 are planned by the Duluth (Minn.) Street Railway within the next three years, according to schedules filed by the company with the State Railroad & Warehouse Commission supporting its previous request for an emergency fare of 7 cents or four rides for a quarter.

The program outlined includes several extensions which have been long contemplated, the construction of additions to the general shops at a cost of $305,000 in addition to the purchase of considerable equipment and the relaying of several tracks.

In setting forth its financial condition, the company asserts that if it were forced to comply with the City Council's request of Jan. 10 last for increased service it would have to spend $145,000 more annually for the increased cost of operation, or more than the company has been able to credit to profit and loss in any one of the last three years.

In addition, the company claims, it would have to lay out $196,000 in new equipment and it now faces litigation in which the city is asking more than $108,000 on account of paving about the track space on various streets.

A total of $345,000, or approximately one-third of the total expenditure, is planned for 1921, in the event that the request for an emergency fare of 7 cents is granted. If the commission grants the emergency fare the new rate will hold until engineers employed by the city and by the company have presented their figures on the company's valuation. After that the law provides that the permanent rate of fare shall be based so as to permit a reasonable return on a fair valuation of the company's assets.

The classification of the proposed expenditure of $1,022,276 for the next three years is briefly as follows:

In 1921	
Relaying tracks account street paving	$211,784
Conduits and underground feeders	46,683
Building improvements and renewals	23,134
New tracks	11,400
New equipment	55,000
In 1922 and 1923	
Relaying tracks, account street paving	$88,745
Conduits and underground feeders	8,270
Building improvements and renewals	345,100
New tracks	115,158
New equipment	120,000

The following is the income and expense account as presented to the state commission:

	1918	1919	1920	1921*
Operating revenues	$1,263,873	$1,477,701	$1,486,053	$475,931
Operating expenses	984,717	1,215,092	1,203,314	380,460
Net revenue	279,156	262,609	282,739	95,471
Operating income	209,972	177,937	192,206	65,956
Gross income	226,317	196,222	212,130	73,059
Total deductions from gross income (interest on bonds, amortization and miscellaneous debits)	127,311	125,382	125,618	41,734
Net income transferred to credit of profit and loss	99,005	70,840	86,511	31,325

* Four months.

Argument Concluded for New Plan at New Orleans

After several conferences with the City Commissioners and the Mayor, C. C. Chappelle, utility expert, brought to a close on June 3 his advocacy of the "assured service" railway plan for terminating the city's railway troubles. Mr. Chappelle in concluding his argument for the immediate adoption of the plan submitted by him drew a gloomy picture of the future of the city and the fate that awaited its people if those interested in its welfare delayed action further in the matter.

According to Mr. Chappelle the railway is carrying 50 per cent more passengers now than were carried in 1910 and has fewer cars now with which to do the work. Those responsible for the future of the company could not accept a valuation of less than $44,700,000 as a basis of settlement.

Wage Cut Accepted at Toledo

Trainmen in the employ of the Community Traction Company, Toledo, Ohio, accepted on June 7 the proposed wage scale of 45, 57 and 60 cents, which has been in operation for two weeks. They will continue their efforts to retain their vacations with pay. This matter was not voted on.

Negotiations for a new scale have continued since March. Two weeks ago the new scale was fixed by the company and since that time the men have been at work while international union officials attempted to have the matter arbitrated.

The men were first offered a cut of 2 cents an hour from their maximum of 60 cents. This was flatly turned down and further negotiations extended after the time of settlements made at Cleveland and Detroit, which cities set a pace for Toledo.

In addition to the cut of 10 cents an hour several changes in working conditions are also included in the new agreement. Overtime pay will be effective after nine and one-half hours' work rather than after ten as first proposed in the new agrement. Arbitration of wages is not provided for in the new service-at-cost franchise.

New City Official Suggests Settlement

Corporation Counsel Rules City May Control Buses and Fix Adequate Fares for Railway

Judge Miller, the new corporation counsel at Des Moines, Ia., has pointed out the way for the settlement of the railway problem there. Individual members of the Council have also expressed their opinions freely, but tangible action still remains to be taken. It is generally agreed that a settlement must be brought about quickly if Des Moines is not to suffer irreparable loss through further disintegration of its railway system.

REMOVAL of equipment from the substations and central power station of the railway was simply a business arrangement to which the General Electric Company was forced by the inability of the railway to meet payments due on the equipment supplied by the manufacturer.

At the very time the General Electric Company was authorized by Federal Judge Martin J. Wade to seize the equipment approximately $90,000 of the cost of the equipment remained unpaid. No criticism of the equipment was in any way attached and officials of the railway publicly announced that they could offer no objections to the General Electric Company starting suit to recover the property.

New Franchise Burdensome

The entire Des Moines case offers an almost impossible situation to an unprejudiced observer, particularly one who is not a resident of the city. Five years ago, before the United States had entered the war that turned business conditions upside down, the railway sought and was granted a twenty-five year franchise with a fixed fare of 5 cents with six tickets for a quarter.

As the purchasing power of the dollar declined the railway, in common with many other public utilities, began to feel the pinch of the franchise rate provisions. In the summer of 1919 the question was submitted to the people of granting the company relief in the shape of a 7-cent fare. The proposition was defeated.

Shortly after this the North American Construction Company, Chicago, which had rebuilt the Des Moines plant, brought action to throw the company into the hands of a receiver, and since that time the company has been operated under the direction of the federal court with F. C. Chambers, general manager, and Homer A. Miller, a Des Moines banker, as receivers.

Court Increased Fare

Last August Judge Wade over-rode the franchise provision and allowed a 6-cent fare. This failed to furnish sufficient revenue to meet wage awards secured to the men through arbitration and later there was a material service cut. A few months ago Judge Wade again reviewed the case and upon the agreement of the railway to increase service approximately 45 per cent he granted an 8-cent fare.

With the fare increased to 8 cents a flock of motor buses appeared, handling largely the short haul business and charging a nickel fare. By this time wage and salary reductions were well under way and Des Moines in common with the rest of the country suffered a considerable business depression which to a great extent still prevails.

The bus operators pooled their interests and have a fairly compact organization. They operate almost exclusively along railway lines and have picked up the cream of the business. Their service, however, is intermittent and unreliable. As an example Des Moines had her heaviest snow of the winter after the middle of April. Buses were helpless until the streets had been cleaned by railway sweepers.

With their incomes decreased Des Moines people have looked at the 3 cents to be saved by patronizing the autos, have ignored the merits of the question and have ridden in the buses, with the result that for the past three months the railway has been operating at a deficit which has been increasing steadily.

When the General Electric Company refused to wait longer for payment on equipment supplied and Judge Wade allowed a 46 per cent service cut, fair-minded citizens were of the opinion that this would serve as the last straw and that the city would be so aroused that the agitators would be squelched and a way found to settle the difficulties.

Problem Allowed to Drift

To date this has failed to be the case. Des Moines has sat placidly back and let the railway problem take care of itself. It is true that a Chamber of Commerce-Greater Des Moines committee has three representatives working on a service-at-cost franchise and that a few organizations have held meetings but there has been no general popular demand for a solution.

The City Council has been as lackadaisical as the citizens and even in the face of advice from its new corporation counsel that it had the right to take the situation into its own hands, rule the buses off the street and fix a fare which would permit the railway to operate successfully, no real steps have been taken to bring the farce to an end. Five days have elapsed since Judge Miller sent his first communication to the Council and on June 6 he reiterated the opinion expressed by him previously, in answer to a newspaper editorial. There have also been newspaper interviews from individual members of the Council, but nothing tangible has been done.

More than a week ago the president of the bus owners' association said that if the city would grant a franchise for a definite term of years they would put eighty buses in service and guarantee to handle the traffic. To date the matter has been entirely newspaper talk, and nothing has developed.

Judge William E. Miller, newly appointed Corporation Counsel in Des Moines, Ia., who has displaced H. W. Byers in charge of litigation between the city of Des Moines and its public utilities, forecast a complete change of front for the city in its relations with the Des Moines City Railway in a sweeping opinion which he filed with the City Council late during the week ended June 4.

Judge Miller not only advised the Council that it had full power to rule the buses off the streets, but that it had the power to increase railway rates without a vote of the people. He held that the franchise ordinance passed a few years ago was invalid.

Judge Miller suggests that the buses be ruled off the streets entirely or be compelled to operate on streets other than those occupied by railway tracks. A portion of his opinion is as follows:

> Assuming that the city through its Council had and has power to regulate fares by franchise, contract or by ordinance (a power the city never had and does not have now), and assuming that the 5-cent fare and transfer privileges provided for do not yield a fair return to the owner, it would be within the power of the Council to change the fare provisions.
>
> The state courts have held that a franchise ordinance or a contract between a city and public service corporations fixing a flat rate as is done in your ordinance No. 2406 is invalid. Cities such as Des Moines have no right to fix street car rates. The rate clause in the franchise ordinance No. 2406 is and always has been void.
>
> It is manifest that the competition of the buses is proving ruinous to the railway. The company shows an estimated deficit of $46,000 a month. A new franchise, however liberal in its general terms, would not remedy this condition if unfair competition were still permitted. Ordinances passed by the Council regulating buses could be revoked at any time. The way is open to you to remove the buses that are competitors destructive of the railway. It may be they could serve in other territory without material detriment to the car company. There is an obligation on the part of the city not to obstruct efficient car service.
>
> I am inclined to believe, or at least to hope, that if the foregoing propositions are wisely and fairly handled a strong inducement would be furnished the owners of the Des Moines City Railway and its creditors to back the enterprise with additional funds and rehabilitate the physical property.

Judge Miller's stand is a complete opposite to the baiting methods adopted and maintained by Mr. Byers during his ten years as Corporation Counsel. It came as a surprise to members of the City Council when read to them in open meeting. No definite action was taken at the meeting.

Iowa Electric Railway Association

The Iowa Electric Railway Association will hold its annual meeting at "The Inn," Lake Okoboji (near Spirit Lake, Iowa), on June 24, 1921.

The Iowa Section, N. E. L. A., is holding its annual meeting at the same time and place, and it is intended that on Friday morning a joint session will be held to consider subjects of mutual interest and on Friday afternoon a separate "round-table" discussion of matters of particular interest to street railways will be conducted.

Wages Cut Materially in Jackson

New rates of wages were put into effect by the Michigan Railways, Jackson, Mich., on June 1. These rates in cents per hour compared with previous rates are as follows:

	June 1, 1920 to June 1, 1921	June 1, 1921 to June 1, 1922
City Divisions		
First twelve months	60	44
After twelve months	62	46
One-Man Safety Cars		
First twelve months	60	49
After twelve months	62	51
Interurban Divisions		
First six months	65	49
After six months	70	54
Extra Work		
Work in exeess of regular runs	10 addl.	5 addl.

Extra men are not to participate in the 5 cents per hour additional until they have been in the service of the company for six continuous months. City men transferred to interurban work will participate in the 5 cents an hour additional after they have been in interurban service six months.

Wage Cut Proposed by Jersey Company

Thomas N. McCarter, president of the Public Service Railway, Newark, N. J., operating about 1,000 miles of line, has notified William Wepner, of the Amalgamated Association, that the company cannot renew the present contract with the men. That agreement expires on Aug. 1. The present scale calls for 51, 53, and 55 cents an hour. Mr. McCarter desires to revert to the award of 41, 43, and 45 cents an hour made by the War Labor Board in 1918.

In his communication to Mr. Wepner, Mr. McCarter says:

> It must be apparent, I think, to you and your associates that these companies are not in a position to pay the rates of wages set forth in the draft of contract nor to continue after Aug. 1 the rate of wages now being paid.

While no distinct mention is made in the correspondence of the new scale sought by the men it is understood that the employees desire a continuation of the present rates, but seek important changes in the other terms of the operating arrangements. In their communication to Mr. McCarter the men, through Mr. Wepner, "respectfully insist that the financial condition of any company does not determine a reasonable and living wage and further protest that the profits of an industry shall not be obtained through the unreasonable lowering of any already very low standard of living."

Mr. McCarter refers to the recent unsuccessful effort of the company to obtain relief in the matter of advanced rates, also to the inability of the company to secure just consideration at the hands of the public authorities with respect to the regulation of the jitneys. In this connection he says:

> Thus far, however, all its efforts have failed, and in addition to having had practically no money for the depreciation reserve aecount and none whatever for dividends it has lost upward of $2,000,000 in operating the property in the last three years.

Mr. McCarter said in his communication that quite a number of matters of lesser importance than the question of wages are referred to in the draft of contract submitted, and suggested that these could best be threshed out to a friendly basis of agreement by negotiations between the committee of the union and the company's own operating forces.

Byllesby Property Suffers Loss

The greatest damage to electric railways in the recent Colorado flood was suffered by the Arkansas Valley Railroad, Light & Power Company, a Byllesby property operating in Pueblo. This loss is estimated at $100,000. One of the officials of the company has announced that electric current would be supplied by the Colorado Fuel & Iron Company. He said he was confident of being able to run the electric cars in a few days. Every attention is being given to equipping the local utilities so that operation will be resumed as early as possible.

News Notes

Railway Opportunity at Miami.—The Miami Chamber of Commerce and all other civic bodies, as well as the City Council, desire to secure an electric railway for the city. They will gladly assure their assistance in getting a franchise without restrictions as to rates, paving of streets or other outside expense. Additional information may be obtained from the City Council or the Chamber of Commerce.

Arbitrators Selected for Wage Matter.—The five arbitrators have finally been selected to hear the arguments of the Utah Light & Traction Company, Salt Lake City, Utah, and its employees over the proposal of the company to reduce wages 25 per cent. The five arbitrators are: George H. Dern, the neutral member; A. L. Hoppaugh and Stephen H. Love, representing the traction company, and George H. Islaub and James H. Wolfe, who represent the employees. The first session of the arbitration board was held on May 27.

Interurban Men Accept Cut.—Trainmen and freight handlers and motormen and conductors of the Cincinnati & Dayton Traction Company, Hamilton, Ohio, have accepted a decrease in wages after the matter had been referred to arbitration. Affecting approximately 150 employees the reduction makes a decrease of 5 cents an hour in wages of freight helpers and of 3 cents for motormen and conductors. Although the trainmen demanded 80 cents an hour, where they were receiving 51 cents, arbitration resulted in trainmen being offered 48 cents and freight helpers 40 cents an hour, commencing on June 1.

Program of Meeting

C. E. R. A. Summer Meeting

The tentative program for the summer meeting of the Central Electric Railway Association, which is to be held on board the S.S. *South American* en route from Toledo to Chicago by way of Lake Huron, St. Mary's River, the "Soo" Locks, Mackinac Island, Lake Michigan, Green Bay, Sturgeon Bay and Benton Harbor, has been drawn up by the program committee, of which Sam W. Greenland, Fort Wayne, is chairman.

Two formal sessions have been arranged, one on Wednesday morning, June 29, and one on Thursday afternoon, June 30. The subject that will be treated on Wednesday morning is "Automatic Substations," led by a paper by C. A. Butcher, Westinghouse Electric & Manufacturing Company. As there has been a feeling on the part of a number of the electrical engineers that there has not been opportunity at any meeting to give this subject the full discussion warranted, and as this subject is now up for very keen study in many cities and on many interurban lines, the committee has planned that ample time shall be given for a full discussion. Several written discussions will be presented by men particularly able and experienced in this study and several other electrical engineers are taking the trip expressly to hear this discussion and to take part in it.

On Thursday afternoon the theme is to be "Merchandising Transportation." This subject will be led off by the report of the Committee on Education and Training of Employees, of which James P. Barnes, Louisville, is chairman. Mr. Barnes has been giving the training of employees, particularly that phase of the subject looking to their functioning as salesmen for the company, a great deal of study, and it is expected that he will have some very worth-while thoughts to express to the association.

Arrangements are being made for running several special cars from various points in Indiana and Ohio to Toledo or Chicago, where the members will embark on the cruise. As a great many of the members desire to make the entire trip from Chicago to Toledo and return, leaving Chicago Sunday morning, June 26, at 8:30 a.m., it is expected that some of these special cars will be routed to Chicago. The committee on arrangements, for which John Benham, 15 South Throop Street, Chicago, is acting as secretary, reports that reservations from the railway men are coming in satisfactorily and that every effort is being put forth to furnish plenty of entertainment and to insure a highly successful meeting and trip. As the meeting of the association which voted to have a boat trip this summer was unanimously and enthusiastically for the boat trip and was unwilling to substitute anything else it is expected that there will be a large attendance.

Financial and Corporate

New Bedford Earnings Gain

Nearly 12 per Cent Return on Capital Stock from a Five-Cent Basic Fare

The annual statement of the Union Street Railway, New Bedford, Mass., shows a surplus of $92,630 after payment of 8 per cent dividends on capital stock for the year ended Dec. 31, 1920, as compared with a deficit of $28,435 the previous year. This is especially notable as the city lines are still being operated at a 5-cent fare. During the year, however, transfers were eliminated, and a traffic center in the heart of the city was established, beyond which a second 5-cent fare is charged. This company also operates a 14-mile suburban line between New Bedford and Fall River, on which a 25-cent fare is charged. The company owns and operates two summer amusement parks which it reports are self-supporting. According to the 1920 census, New Bedford has a population of 121,217.

INCOME STATEMENT—UNION STREET RAILWAY COMPANY

Year ended Dec. 31	1920	1919	Per Cent Change
Gross earnings from operation	$1,729,396	$1,439,769	20.12
Operating expenses	1,303,582	1,123,851	15.97
Net operating revenue	$425,814	$315,918	34.80
Non-operating income	3,570	1,090	227.00
Gross income	$429,384	$317,008	35.4
Deductions from gross income:			
Interest on funded debt	$11,250	$11,250	....
Interest on unfunded debt	16,510	16,076	$2.70
Taxes	113,994	123,118	*7.41*
Total deductions	$141,754	$150,444	5.77
Net corporate income	$287,630	$166,564	72.80
Dividends, 8% on $2,437,500 capital stock	195,000	195,000	....
Surplus for the year	92,630	*28,436*	....
Surplus end of preceding year	322,314	402,782	....
Adjustments of losses and depreciation	*2,511*	*52,032*	*95.2*
Surplus end of current year	$412,433	$322,314	28.0

STATISTICAL INFORMATION—UNION STREET RAILWAY COMPANY

	1920	1919	Per Cent Increase
Number of revenue passengers carried	31,730,868	27,354,946	16.03
Number of revenue passengers per mile of main track	755,496	592,552	27.50
Passenger car-miles run	3,046,484	3,015,824	1.02
Number of employees as of Dec. 31	514	480	7.08

Italics indicate deficit or decrease.

Fixed Charges Earned by Beaver Valley Line

According to the annual report of the Philadelphia Company two of its subsidiary traction properties, the Beaver Valley Traction Company and the Pittsburg & Beaver Valley Street Railway, were operated very successfully during the year, and at a time most difficult to formulate and carry out a new policy.

During the year, the report says, a new 5-cent zone fare system was established with the zones located to take care of the short haul travel within the various boroughs. The unusual condition of high labor cost and high material cost which prevailed was offset to a large degree by the thorough co-operation of the cities, towns and municipalities along the line (particularly by the chambers of commerce and boards of trade at these places), together with the active and earnest consideration of the employees. With such co-operation it was possible so to operate the properties as to serve the people better and earn fixed charges.

Much, however, has yet to be done to give better car service to meet the demand for transportation in this rapidly growing industrial community, and it is expected that with the continued co-operation of employees and the public-spirited citizens it will be possible to improve the service constantly, so that within a reasonable time every proper demand for these facilities can be met.

Gross earnings for the calendar year were $705,242, an increase of $114,136, or 19 per cent more than those for the previous year, while the net income of $3,189, together with certain credit adjustments, enabled the deficit, which at the commencement of the year amounted to $342,243, to be decreased by $16,222. The car mileage operated during the year was 1,544,335, an increase of 21,583 miles, or 1.4 per cent over the previous year.

Five new safety cars for one-man operation were purchased during the year and have proved satisfactory in every respect. Thirty per cent of the price was paid upon delivery, and the remainder will be paid from earnings. It is expected further to increase the number of such cars in service so that a more frequent service can be provided. This increase in service, it is hoped, will be reflected in the earnings.

Wider Securities Market

Representatives of N. E. L. A. and Members of Chicago Stock Exchange Discuss Plan

At a conference between representatives of the National Electric Light Association and members of the Chicago Stock Exchange in Chicago on June 2, at the time of the annual convention of the N. E. L. A., plans were discussed for establishing a wide market in Chicago for public utility securities. The plan would be to list on the Chicago market all of the leading utility securities of the country, give publicity to utility companies and create a broad market for the securities of these companies. It was pointed out that while there are $21,000,000,000 of these securities in the hands of the public there is an open market now for only a small portion of such issues.

Samuel Insull, president Commonwealth Edison Company and other utilities, said:

> There can never be a real market in utility securities until we have a free and open market. Take the Commonwealth Edison Company. Its various issues are listed, and its securities have never been more easily salable. I am a very strong believer in the public having the full light of day shed on any of the affairs of the utilities with which I am affiliated, and that comes when the securities are listed. I believe it would do the utility industry good. Chicago is the natural place for such a market and I welcome any interest bringing its securities to Chicago for sale.

It is the plan of the members of the Chicago Stock Exchange and the bankers to go ahead at once with the work of broadening the market for utility securities in the hope of making Chicago the great central market for utility securities just as Boston is for the coppers.

Suspension Suggested Pending Better Business

The North Carolina Public Service Company has thrown itself on the mercy of the State Corporation Commission with respect to the future operation of its lines in Concord. The lines there consist of 3 miles of track and 3 cars. An 8-cent fare is charged. The population served is less than 10,000.

The plant with all equipment is valued at $123,000. Last year the company spent $1,800 in actually running the cars, and $5,000 more on paving required in the franchise. Business is still falling off with the idleness of many of the cotton mills, and the owners of the property seek the advice of the commission with respect to the future of the road.

Ten-cent fares were suggested as a remedy, but neither the commission nor the municipal authorities thought that 2 cents added to present rates would materially increase the gross income. It was suggested that the line suspend temporarily business in the hope of better conditions, but this plan was not generally acceptable. No further suggestion was offered, and the commission took the matter under advisement.

Answers to Accounting Questions

Another Series of Questions and Tentative Answers Under the Uniform System of Accounts for Electric Railways

Another series of tentative answers to questions raised in connection with the uniform system of accounts, prescribed by the Interstate Commerce Commission, has just been issued. As these answers have not received the formal approval of the commission, however, it should be understood that the decisions do not represent its final conclusions and that they are subject to such revision as may be thought proper before final promulgation in the accounting bulletins of the commission.

THE case numbers covered below are from A-565 to A-587, with certain omissions. Other installments will follow. The omitted numbers represent cases which either are not of sufficient importance to justify publication or involve questions upon which a definite conclusion has not been reached.

Q. (*A*-565). To what account should be charged the pay and expenses of a detective employed to recover stolen feed wire and to apprehend the thieves?

A. To account 23, "Miscellaneous electric line expenses."

Q. (*A*-566). To what account should be charged the excess of liabilities over assets acquired in connection with the purchase of a road?

A. The excess shall be considered as part of the purchase price and charged to account 527, "Cost of road purchased," from which it shall be cleared to the appropriate primary accounts as provided in the text of that account.

Q. (*A*-567). To what account should be charged the cost of water supplied to an automatic sprinkler system in car barns?

A. To account 24, "Buildings, fixtures and grounds."

Q. (*A*-568). A carrier's coal crane is occasionally used by others for unloading their material. To what account should be credited amounts received for such use?

A. To account 117, "Rent of buildings and other property."

Q. (*A*-570). To what account should be charged the pay of a watchman at a power plant, the operation of which has been suspended?

A. To account 52, "Power plant employees."

Q. (*A*-571). A carrier pays dues of its officers and other employees in various clubs, business organizations, and associations. What should be the accounting?

A. Dues of traffic associations are chargeable to account 82, "Miscellaneous traffic expenses." Dues of other railway associations are chargeable to account 89, "Miscellaneous general expenses." Dues paid to other organizations for employees not in connection with the general management of the company shall be charged to the accounts to which their pay is charged.

Q. (*A*-572). The tax on income of a given year is not payable until the succeeding year. In the accounts of which year should the charge be made?

A. The tax is chargeable and should be set up by accruals in the accounts of the year in which the income accrues.

Q. (*A*-573). To what account should be charged the loss, other than depreciation, on a passenger car converted to a service car?

A. Loss assignable to the period subsequent to July 1, 1914, shall be charged to account 41, "Equipment retired," and loss assignable to the period prior to that date shall be charged to profit and loss account 315, "Loss on road and equipment retired." (See Cases 183 and 315, Accounting Bulletin 14.)

Q. (*A*-575). A carrier acquires an option on a piece of property, the consideration for the option being an immediate partial payment and payment of interest on the remaining amount of the agreed purchase price. What is the correct accounting?

A. The amount paid for the option, together with the interest accrued, shall be charged to account 420, "Other unadjusted debits," and carried therein for the period the option is pending. No entry shall be made during that period for the full cost of the property to which the option pertains. If purchase is consummated the amounts charged to account 420 shall be transferred to the appropriate asset account. If purchase is abandoned the amount in suspense shall be charged to account 317, "Miscellaneous debits."

Q. (*A*-577). A carrier's operations of miscellaneous physical property show in some months a net income and in other months a net loss. What is the proper method of using accounts 205, "Net income from miscellaneous physical property," and 219, "Net loss on miscellaneous physical property," in connection with these operations?

A. Ledger accounts may be set up to show separately the revenues and expenses of the operations, and when periodical or annual income statements are made the net balance of the two accounts shall be assigned to account 205 or to 219, as may be appropriate.

Q. (*A*-578). To what account should be charged the net loss sustained on account of the destruction of foreign freight cars in the carrier's revenue service?

A. To account 31, "Freight, express and mail cars."

Q. (*A*-579). A carrier has installed coasting clocks—devices attached to cars for registering operation without power. What accounts should be charged with maintenance costs, supplies for operations and pay of clerks recording the results?

A. The cost of repairs and renewals is chargeable to account 33, "Electric equipment of cars"; the cost of motormen's keys to account 67, "Miscellaneous car service expenses"; and the cost of tape and ribbons for clock records to account 94, "Stationery and printing." Pay of clerks engaged on clock records, if employed in the general office, is chargeable to account 84, "Salaries and expenses of general office clerks," or to account 63, "Superintendence of transportation," if employed in other offices.

Q. (*A*-580). What disposition should be made of loss in connection with the retirement of property the cost of which is classable in accounts 536, "Shop equipment," 537, "Furniture," and 538, "Miscellaneous equipment?"

A. These accounts are grouped under general account II, "Equipment," and the retirement of property charged thereto shall be in accordance with the rules prescribed for the retirement of property chargeable to accounts 530 to 535, inclusive, as shown at the top of page 102 of the Uniform System of Accounts. The difference between the original cost of equipment and the salvage recovered shall be prorated on the basis of the life in service prior and subsequent to July 1, 1914, and the difference between the amount thus determined to be applicable to the period prior to July 1, 1914, and the amount of depreciation for such prior period for which accounting has been made, shall be adjusted through profit and loss account 315, "Loss on road and equipment retired." The difference between the amount determined to be applicable to the period subsequent to July 1, 1914, and the amount of depreciation which had been accrued for such period shall be adjusted through operating expense account 41, "Equipment retired."

Q. (*A*-583). A carrier purchases the power it uses and incidentally sells small quantities of the current purchased. To what account should the amount received from the sale of current be credited?

A. To revenue account 118, "Power."

Q. (*A*-584). To what account should be charged war taxes paid on transportation charges for material and supplies?

A. War taxes, when assumed as such, on express charges or on foreign line freight charges on company material shall be charged to account 215, "Taxes assignable to railway operations," except that these taxes when in connection with road and equipment projects, if assignable, shall be charged to account 549, "Taxes," in accordance with Note C to account 215. (See Cases 589 and 598 (a).)

Q. (*A*-586). What accounts should be charged with a bonus paid to all employees?

A. The amount of such bonuses shall be included in the same accounts as the wages or salaries of the employees to whom the bonuses are paid.

Q. (*A*-587). To what account should be charged the cost of compiling lists of employees subject to income tax, to be rendered to the Federal government?

A. The pay of clerks engaged on the work is chargeable to account 84, "Salaries and expenses of general office clerks." The cost of stationary supplies used is chargeable to account 94, "Stationery and printing." (See Case 80, Accounting Bulletin 14.)

$650,000 for Needed Improvements

Directors of the Cincinnati (Ohio) Street Railway have approved the plan to lend their credit to the extent of $650,000 to the Cincinnati (Ohio) Traction Company to enable the latter company, which leases the Cincinnati Street Railway, to make needed improvements.

The Cincinnati Street Railway has increased its directorate by electing Judge Rufus E. Smith and Charles F. Windisch members of the board. This makes a total of eight on the board. Samuel Assur was elected second vice-president, while Bayard Kilgour remains as president. Looking toward the early solution of the traction problem a committee composed of Judge Smith, C. W. Dupuis and Robert A. Taft, all members of the board of directors, was named to make special investigation of the traction situation.

This committee with the addition of the new members of the board and the appointment of Mr. Assur as vice-president are in line with the new policy to take an active interest in the developments of the railway situation in Cincinnati.

$15,500,000 Increase in Authorized Stock at Milwaukee

Holders of more than two-thirds of the outstanding stock of the Milwaukee Electric Railway & Light Company voted on May 25 to amend the articles of incorporation to provide for an increase of $15,500,000 in the company's authorized capital stock and to increase the number of directors from nine to twelve. The dividends on the $4,500,000 of 6 per cent non-cumulative preferred stock now outstanding will be cumulative from and after Jan. 31, 1921.

The authorized stock as increased will consist of $4,500,000 of 6 per cent preferred stock, $15,500,000 of preferred stock, issue of 1921, and $20,000,000 of common stock. There has previously been outstanding $4,500,000 of 6 per cent preferred stock and $9,850,000 of common stock. The new preferred stock will be cumulative at not more than 8 per cent and redeemable at not less than par nor more than 110 as fixed by the directors. It will share ratably with the present preferred stock in the rights to cumulative dividends and in the preference over the common stock in liquidation, but will be non-voting except in the event of default of dividends, differing in that respect from the existing 6 per cent preferred stock, which now has and will retain full voting rights.

Additional financing is proposed through the issue of new preferred stock. It is planned to sell $3,000,000 of the new preferred stock, issue of 1921, bearing dividends at 8 per cent and redeemable at $103 per share, to enable the company to obtain funds to retire floating debt incurred for extensions and to permit the company to invest in additional facilities required to furnish the necessary service in various communities.

At a subsequent meeting held on May 28 the following were added to the board: S. B. Way, vice-president and general manager of the company; Edwin Gruhl, vice-president of the company and of the North American Company, and F. L. Dame, New York.

City's Attitude Governs Reorganization Prospects

The annual report of the Philadelphia Company for the year ended Dec. 31, 1920, makes the following comments on the Pittsburgh situation:

> The Pittsburgh Railways remained in the hands of the courts and receivers throughout the year. They made considerable progress in rehabilitating tracks and equipment from earnings, but failed to pay all fixed charges that accrued, and the Philadelphia company was called upon to pay interest due on some of the guaranteed bonds.
>
> The petition of the Philadelphia Company to have returned to its treasury $495,000 which had been advanced the previous year for bond interest is still in the hands of the court. The same condition prevails as to some of the claims of the city of Pittsburgh.
>
> The receivers have clearly demonstrated that some form of financing for new money with which to rehabilitate the property must take place before any marked improvement can be shown in the betterment of the property and the service to the public, as sufficient money for this purpose cannot accrue through earnings. The receivers also report the necessity for immediately adding 150 new cars to the equipment. More than five years have now passed since any new cars were placed in service.

It is recited that some progress has been made toward reorganization, but the opinion is expressed that before a successful reorganization of the properties can take place a definite attitude toward the railway will have to be assumed by the city officials and officers of the municipalities served. This is necessary in order to establish a transportation system which will give adequate service to the public. Because of the physical condition of the properties the problem of successful rehabilitation is a difficult one.

Merger Differences Irreconcilable

Despite the fact that at one time the prospects appeared to be bright for reaching a basis of understanding upon which the Washington Railway & Electric Company and the Capitol Traction Company might be induced voluntarily to merge, all hope of such merger at this time appears now to have vanished. In fact the local Public Utilities Commission, before which possible details were discussed, has issued a statement to the effect that the differences between the companies "are so great as to be irreconcilable."

It is said now that the only remaining possibility for a union of the two railways rests with the committees of Congress. Even this, however, appears very remote, for the Washington *Post*, which has been following the negotiations at much length in its columns, says that "even there the drafting of legislation on the subject probably will prove as difficult a job as that faced by the commissioners in attempting to get the companies to unite voluntarily."

Interurban Saved from the Scrap Heap

Application has been made to the Public Service Commission by the reorganized Buffalo & Depew Railway, Buffalo, N. Y., for permission to operate the interurban line between Genesee Street at the city line of Buffalo to Cheektowaga, Depew and Lancaster. The new company which has taken over the line from the receiver is the Depew & Lancaster Railway Corporation. It is capitalized at $200,000. The purchase price was $6,250 plus taxes due to various towns and villages, aggregating about $40,000.

Action on the petition has been deferred temporarily. The commission's experts will first report their findings in an examination of the physical properties and approval also must be given for the sale of the line.

John J. Lenahan & Son, 53-61 Fulton Street, Buffalo, bid in the property. Instead of junking the road as was the original intention, Mr. Lenahan and his associates will rehabilitate the line and operate it in competition with the International Railway - Buffalo - Depew-Lancaster division.

It is reported the villages and towns along the line have agreed to waive the back taxes in return for an agreement from the new company to operate the railway for a period of at least three years.

Interstate Road Sold at Foreclosure

The property of the Northampton Traction Company, running between Easton, Pa., and Phillipsburg, N. J., has been sold for $430,000 to C. S. Newhall, Philadelphia, chairman of the bondholders' protective committee. Mr. Newhall also purchased the right, title and interest of the company in $100,000 of second mortgage bonds; $44,000 of first mortgage bonds; $81,500 of third mortgage bonds, all of which were deposited by the Northampton Traction Company as collateral security under a mortgage given by the Northampton, Easton & Washington Traction Company to the Bankers' Trust Company, New York, as trustee; $130,000 of second mortgage bonds of the Bangor & Portland Traction Company deposited as collateral security under agreement made with the Easton (Pa.) Trust Company, as trustee; $23,000 of bonds issued by the company under a fourth mortgage and pledged as collateral for the payment of certain loans due various banks; 2,600 shares of the capital stock of the Bangor & Portland Traction Company and 10,793 shares of the Northampton, Easton & Washington Traction Company.

Interurban Sold Under Foreclosure.—The Philadelphia & Eastern Electric Railway, operating between Doylestown and Easton, Pa., has been sold under the hammer for $200,000 to John E. Snyder, Lancaster, Pa., representing the bondholders. The line is approximately 34 miles long.

Commission Checking New Jersey Valuation Figures

The Board of Public Utility Commissions of New Jersey is now engaged in going over with its engineers records and other data used as a basis by Ford, Bacon & Davis in reaching their findings with respect to the valuation of the property of the Public Service Railway and the Trenton & Mercer County Traction Corporation. The board had previously ruled that without information of this kind it could not provide an opportunity for cross-examination on the appraisal.

The valuation by Ford, Bacon & Davis, made at an expense of $100,000 to the State, was started under a special legislative act which provided that the findings of the engineers selected by the special valuation commission which the act created should be accepted by the Public Service Commission without review as a basis for fixing rates. While the valuation was in progress, however, the act was amended by the new legislature to require the acceptance of the valuation by the Utility Commissioners only as presumptive evidence.

In consequence of this change the utility commissioners at recent public hearings called upon the engineers for the original documents upon which they based their findings as to values. At these hearings it was brought out that among other information upon which the engineers had drawn for their guidance was the appraisal of the Public Service Railway as made for that company by Dean Mortimer N. Cooley. Other hearings will be held after the engineers for the commission have had an opportunity to check unit figures used by the valuation engineers with those found by the engineers of the commission for certain property accounts.

Financial News Notes

Rails Will Be Taken Up.—The Fresno (Cal.) Interurban Railway is planning to dismantle its line. Automobile competition has made the operation of the electric railway practically impossible.

Receiver for Subsidiary.—Patrick A. Barry, Mt. Vernon, Ohio, has been appointed receiver of the Columbus, Newark & Zanesville Electric Railway, Springfield, Ohio, controlled by the Ohio Electric Railway, already in the hands of receivers. The appointment was made on the application of the Girard Trust Company, Philadelphia, which charges default of the railway in the payment of interest on $1,211,000 of twenty-year bonds issued in 1906. The trust company asks that the mortgage be foreclosed, the railway property sold and proceeds applied to the payment of the bonds.

Texas Property Sold.—The property of the Corpus Christi Railway & Light Company, Corpus Christi, Tex., was sold at public auction on May 27 by R. U. Culberson, receiver. The railway and the lighting plant were first offered jointly, but as there were no bidders the auctioneer separated the two and offered the railway first. This was purchased by Claud Pollard, Houston, acting in his own behalf, on a bid of $500. Mr. Pollard said the purchase is made preparatory to scrapping the line unless local men are willing to raise money to guarantee operation without loss or will lease the line and operate it themselves.

Railway Property to Be Sold.—The property of the United Traction & Electric Company, Providence, R. I., will be sold under a decree of foreclosure in Providence on June 24. It is believed that the property will be bought in for the United States Electric Railways, the successor company. This latter company recently petitioned the Public Utilities Commission for permission to issue about $21,000,000 in stocks and bonds. The commission will consider the proposition at a public hearing on June 14.

Power Plant Sold to Light Company.—Following approval of the Railroad Commission of California the San Diego Consolidated Gas & Electric Company has issued and sold to H. M. Byllesby & Company, Harris Trust & Savings Bank, and Blyth, Witter & Company an issue of $2,750,000 of first and refunding mortgage 6 per cent gold bonds, due March 1, 1939. Proceeds of the issue will provide needed improvements and extensions to the company's present gas and electric generating equipment, transmission and service facilities. A part of the improvement program provides for the purchase of the power house of the San Diego Electric Railway with 8,200 kw. of installed capacity and for the enlargement and improvement of this station.

Accumulated Deficit $163,688.—The gross revenue of the Memphis (Tenn.) Street Railway in April, 1921, was only $266,729, as compared with $271,156 in April, 1920, when the company was operating on a 6-cent fare. The number of revenue passengers decreased from 4,484,919 to 3,836,639. Although the wage scale now in effect is much higher than that in force a year ago, L. LeMay, secretary-treasurer of the company, says that the operating expense during the month just ended was only slightly in excess of that of April, 1920. The cost of coal and other supplies and equipment is much lower than during the same period last year. The April deficit was $8,067. This brings the total deficit in the fare index fund from July, 1920, to May 1, 1921, to $163,688.

Additional Issue Authorized. — The Transit Commission of New York recently issued an order permitting Lindley M. Garrison, receiver of the Brooklyn Rapid Transit Company, to issue an additional $3,000,000 in receiver's certificates. An extension of time was also allowed on $15,000,000 receiver's certificates from Aug. 1 to Feb. 1 next. Judge Mayer in the United States District Court signed the decree for maturity extension and in his decison reviewed the improvements undertaken by the company through the aid of receiver's certificates. Since August, 1919, he pointed out that 300 subway cars had been built, the reconstruction work on the Brighton Line between Church Avenue and Malbone Street had been completed and various terminals and power houses have been finished.

City Buys Trolley Liens.—New York City, through the Collector of Assessments and Arrears, recently bought at public sale franchise-tax liens on nineteen lines of the New York Railways and the Third Avenue Railway with a face value of $1,628,508. The railways still have three years to redeem the franchise by tax payments with interest. Protests were made against the sale. Among them was one from Job E. Hedges, receiver of the New York Railways, who contended that the taxes demanded exceeded those justly due. What disposition the city will make of the liens has not been disclosed.

Columbus Bonds Offered. — Stockholders of the Columbus Railway, Power & Light Company, Columbus, Ohio, have authorized the issuance of $2,700,000 in 5 per cent first refunding and extension bonds for the purpose of retiring a similar amount of general mortgage bonds bearing 6 per cent interest, issued in June, 1920. At that time, also, the company was authorized to issue $2,500,000 in refunding and extension bonds, which with the new issue brings the total of such bonds to $5,200,000. The new issue had been authorized by the State Public Utilities Commission a few days before. The stockholders voted to accept the offer of Harris, Forbes & Company, New York, N. Y. The bonds have since been offered for subscription.

$4,180,000 of Acquisition Bonds Authorized.—On May 24 the Western Pacific Railroad was authorized by the Interstate Commerce Commission to issue and sell at not less than 85 per cent of par $4,180,000 of first mortgage gold bonds to acquire the Sacramento Northern Railroad, an interurban electric railway in the vicinity of Sacramento, Cal. The Western Pacific also proposes in event of acquisition to construct certain extensions to the property at an estimated cost of $3,000,000, and is expected to apply to the commission within sixty days for authority to issue $3,000,000 of its first mortgage bonds for that purpose. Although authority was granted for issuance of the bonds for the declared purpose of acquiring the properties the commission made clear it had not finally passed on the question of acquisition. "The merits of such acquisition are not now in issue," the announcement said, "and we express no opinion on that question." A further hearing is to be held.

Traffic and Transportation

Readjustment in Dubuque—Lower Fares, Lower Wages

In view of the great reduction in patronage during the last six months on the lines of the Dubuque (Ia.) Electric Company, the management has found it necessary to cut the wages of its employees as the only possible way of reducing operating expenses. On May 4 the following modifications in rates of pay in cents per hour went into effect in the platform wage scale:

	New	Old
First six months	35	38
Next six months	38	44
Second year	41	50
Third year and thereafter	45	60

A copy of the bulletin listing the changes was posted at the carhouse and was also given to each employee individually. The day previous to the posting of the bulletin the notice was submitted to the Mayor, the City Manager and Aldermen, at whose instance a lower ticket rate was placed in effect for a trial period as another readjustment measure. The rate was changed from seven tickets for 50 cents to four tickets for 25 cents—the cash fare of 8 cents remaining the same.

In its statement the company said that it was unfortunate that the great bulk of the expense carried was represented by wages and that any material reduction in expenses could not be accomplished without a reduction in wages. Moreover, the company contended that it was extremely questionable whether revenues would be proportionately increased if the fare were higher, because riding, already at a low ebb, might be still further discouraged.

Reduced Fare Authorized—Rerouting Plans Under Way

The Indiana Public Service Commission has formally issued the order authorizing the Indianapolis (Ind.) Street Railway to return to the straight 5-cent fare with a 2-cent transfer. The likelihood of this ruling was referred to in the ELECTRIC RAILWAY JOURNAL for June 4. The new fare takes the place of a 6-cent cash fare, twenty tickets for $1, together with a 1-cent transfer. The lower fares will be tried out in the hope of reducing jitney bus competition, which has greatly affected the receipts of the railway.

Rerouting the line of the railway, which was one of the conditions upon which the Public Service Commission ordered a return to the 5-cent fare, will be effected gradually one line at a time. David E. Matthews, chief railroad inspector of the commission, has been placed in charge of the rerouting. He will meet with the City Council soon to consider the first change in routes. The rerouting is to be done in an effort to enable the company to check the inroads of the jitney bus. During the period until Aug. 1, while the rerouting plans are being worked out, the 5-cent fare and 2-cent transfer charge will be effective.

Officials of the railway have indicated that they will co-operate to the fullest extent with state and city officials in revising the routes to improve service. In addition to the rerouting of cars the commission will take up the question of the improvement of service during rush hours. In working out the rerouting plans the commission experts probably will consult with officials in other cities. It may even be found advisable, it is said, to call in engineers familiar with such problems to advise on the matters that arise.

Connecticut Roads Authorized to Run Buses

The Governor of Connecticut has affixed his signature to a bill authorizing electric railways to own and operate motor vehicles for hire. The text of the measure follows:

Sec. 1. Any street railway company may acquire, own and operate motor vehicles running upon a regular route and carrying passengers between the termini or over any intermediate portion of such route at a regular stipulated individual or per capita fare. Any company which shall exercise the authority conferred by the provisions of this act shall be subject to the supervision and control of the Public Utilities Commission to the same extent and in the same manner as with respect to the business of transporting passengers and property by means of street railway cars.

Sec. 2. This act shall take effect from its passage.

J. Moss Ives, receiver for the Danbury & Bethel Street Railway, announced in the Superior Court at Bridgeport on June 3 that his company would take advantage of the new law and try out the feasibility of operating buses in place of trolleys over portions of lines which have proved unprofitable.

City of New Orleans Asks for Further Evidence

The Commission Council of New Orleans, La., has made answer to Receiver O'Keefe of the New Orleans Railway & Light Company, in the injunction suit restraining the city from interfering with him in the collection of an 8-cent fare. It is alleged by the city that no proof has been tendered by the receiver that subsidiary corporations of the railways are bound by agreements under the parent concern and in the alternative the court is asked to compel the receiver to produce all contracts, agreements and leases between the railway and the subsidiaries. It is further alleged that the company has not been operated efficiently and economically.

Jitney Regulation Bill Vetoed in Wisconsin

Governor John J. Blaine of Wisconsin has vetoed the so-called Perry jitney bill. This measure would have placed all motor buses and jitneys operating in the state under the jurisdiction of the Wisconsin Railroad Commission and would, as it is claimed, have virtually put the motor bus lines in the state out of business. In his message explaining the veto Governor Blaine stated that his objection to the bill was that it undertook to regulate in a field "where free competition serves the public welfare best."

The Governor pointed out that the law as it now stands requires motor vehicles to furnish adequate service at reasonable rates. He is reported in part as follows:

> My objection to this bill is fundamental. Jitneys and buses may be operated by anyone, and, therefore, there is no opportunity to create a monopoly. It is quite different with respect to a street railway, an interurban railway, or a railroad. There is a limitation on the number of such roads that may occupy the field for transportation.
>
> Wisconsin has spent $42,000,000 on highways in the last ten years, and the people were led to believe that they would receive returns from such investment in better transportation, greater convenience, and in economy of service. The motor vehicles have come to stay; they are the beginning of a transportation system about which it is dangerous to prophesy. My objection, therefore, to this bill is that it undertakes to regulate in a field where free competition serves the public welfare best.

Mayor Seeks Reduction of Fares in Detroit

Action has been started by Mayor Couzens of Detroit, Mich., with a view to bringing about a reduction of fare on the city lines of the Detroit United Railway and having the company cash the rebate slips issued with tickets purchased during the past year. In a letter addressed to Allen F. Edwards, acting president of the Detroit United Railway, the Mayor asks that a conference be arranged for an early date to consider the matter of reducing the fare to 5 cents. Another letter was addressed by the Mayor to the Corporation Counsel asking him to arrange a conference with the company's attorneys regarding the refund of money by the company.

The basis for his action, according to the Mayor, is the fact that the audit of the company's books for the city indicates that the increased revenue resulting from the increase in fares from 5 cents to 6 cents cash, or nine tickets for 50 cents, has exceeded by more than $507,523 the amount used to offset the increase in wages granted to the railway employees.

In the letter to Mr. Edwards the Mayor cites the fact that practically a year has elapsed since the company was granted an increase in rate for the purpose of paying increased wages to the platform men and he states that in view of the fact that on May 1 the wages were reduced to the point where they were prior to last June, consideration should be given to the matter of reducing fares to the rate existing prior to June 9, 1920.

Six Cents in Los Angeles

Return of 7.4 Per Cent Allowed on Rate Base of $26,198,365—Zone Fare Opposed

Under the order of the Railroad Commission of California issued on June 1 the 5-cent fare is continued for Los Angeles. The "nickel" fare, however, is not for the casual rider. It is only for purchasers of ten rides. As indicated in the ELECTRIC RAILWAY JOURNAL for June 4, page 1058, the fare on the Los Angeles Railway will be 6 cents for those who do not buy "tokens" or tickets. Tokens or tickets are transferable. They are to be sold on the cars and at the company's offices.

$2,600,000 FOR BETTERMENTS

The service improvements contemplated by the commission require the purchase by the company of 132 additional cars to cost $1,400,000, construction of additional carhouses, shops and substations, and the making of other improvements to cost $2,600,000.

The company is ordered to establish a depreciation fund and $720,000 a year in monthly installments of $60,000 and is asked to enter into negotiations with the city of Los Angeles for the purpose of exchanging, on reasonable terms, its present limited franchises for an indeterminate re-settlement franchise covering all of the lines in operation within the city limits.

The order requires that monthly statements must be submitted by the company to the commission to show how the order of the commission has been carried out.

In discussing the zone system the commission said:

> It is apparent that there is a very widespread opposition to zone fares within the present 5-cent fare limits, and it is also true that there would be serious difficulties in fare collection if a zone system were adopted. In view of the conditions existing in Los Angeles, we are inclined to believe that zoning of the city should not be undertaken without further careful study and only as a last and inevitable remedy.

As to imposing a charge for transfers the commission said:

> We are satisfied such a charge would result in an unjustifiable discrimination between different users of the street railway and the discrimination would be particularly obnoxious under the peculiar conditions obtaining in Los Angeles, where a large percentage of transfer passengers are short-haul riders. There would also result from a transfer charge a discrimination between various business localities in the downtown district.

DECLINING COSTS A FACTOR

The commission declares that it is apparent that the company is not entitled to the full amount of additional revenue that would be produced by a flat increase to a 6-cent fare and that no burden should be placed on patrons unless entirely necessary and justified.

The company is allowed a return of 7.4 per cent on a rate base of $26,198,365. On this the commission said:

> In a time of declining costs and prices (having in mind the unavoidable uncertainties in estimates of this nature) it may confidently be expected that applicant will earn, under the rates suggested, and under economical and efficient management a full measure of the contemplated fair return. With the income from the rates fixed in this decision, the applicant will be in a position, we believe, to secure the necessary capital for new equipment, betterments, and extensions, and the commission will expect the betterment program be carried out.

Change in Ticket Rate.—Reductions of the ticket fare between Broad Ripple and Indianapolis was decided on by the Indiana Public Service Commission at a conference on May 4. The present rate for tickets is six for 50 cents. Under the new order ten tickets will be sold for 75 cents. The reduction in the ticket fare is slightly less than 1 cent on each ticket. Under the old rate one ticket cost 8⅓ cents, and under the new order the cost of one ticket will be 7½ cents. The cash fare of 10 cents between Broad Ripple and Indianapolis, with a 5-cent fare from Fifty-third Street, will remain unchanged under the modified order which will be issued by the commission. Notice of the change in ticket rates will be given to the public when the order is issued, officials of the commission said. The order establishing the present fares was approved by the commission on Dec. 17.

170 Applications for Bus Permits

Hearings Being Held Before Connecticut Public Service Commission to Fix Status of Bus

A new campaign for supremacy between Connecticut electric railways and jitney buses has begun with the series of hearings before the Public Utilities Commission on the petitions of bus line owners, rural and interurban, for the most part, for license to operate in competition with the electric railways. The commission has received 170 applications for such certificates from various parts of the State. Its power of regulation in this matter was conferred upon it in a law passed by the present Legislature. The issue has become clearly defined and urgent as is indicated in the statement of Lucius S. Storrs, president of the Connecticut Company, while at Putnam that "either the competitive bus service must be entirely eliminated or the trolley service discontinued."

IN ADDITION to the hearing at Putnam on May 25, sessions were held at Hartford on May 24 and at New Britain on May 27. Other hearings were scheduled as follows: Middletown on June 2 on petitions concerning bus lines between Essex and Middletown, Saybrook-Middletown and Ivoryton-Middletown; at Enfield on June 2, Thompsonville-Agawam, Mass.; at New Haven on June 2. Derby-New Haven (four lines), Derby-Ansonia (two lines); at Hartford on June 1, Waterbury-Hartford.

Richard T. Higgins and Charles C. Elwell of the commission conducted the hearing at Putnam, attended by some 150 persons. President Storrs read a statement in part as follows:

> The Connecticut Company is amply able, to render a full measure of service to these communities, but it must be apparent to all that all public expenditures for transportation must come to the Connecticut Company.
>
> Up to the present time we have been temporizing with the matter, but now that the bus is a medium of transportation upon which the communities can depend as long as those individuals that operate the buses are financially able to continue, or do not become tired of the work, it is time for the Connecticut Company frankly to state its position.
>
> It is a matter of indifference to us as to whether or not we continue to operate the lines between Central Village and points north to Putnam, but the competitive bus service must be eliminated or the trolley service discontinued.
>
> There is no prospect of material profits to the railway even though it is left alone in the field but the company recognizes the obligation to perform public service and is willing again to render a full measure of service if free from competition.

Eight witnesses testified as to the indispensability of the buses. General J. W. Atwood, L. H. Fuller of the local chamber of commerce and other citizens spoke in favor of the trolleys.

Thomas J. McGreevy, assistant comptroller of the Connecticut Company, said that on the lines north of Central Village the operating expenses exceeded the receipts by $37,206 for the year ended April 30, 1921.

At the hearing in Hartford Mayor Newton C. Brainard said that the presence of large buses on the city streets was most objectionable. Consideration was being given a petition for the continuance of a jitney line between the Capital and South Manchester over a route served by the electric railway. There were prominent citizens present who said there was need of both trolley and jitney service and others were unqualifiedly in favor either of one or the other. Competition over the Manchester-Hartford line has been of the keenest.

Nathaniel J. Scott, manager of the Connecticut Company's Hartford division, presented a chart to show what service the company had been rendering prior to August, 1920, and at the present time. The reduction in service, he explained, had been due to the decrease in the number of passengers. A count of passengers on Hartford-bound cars recently showed a maximum of twenty-three and a minimum of three. The seating capacity is fifty-six.

"Trolley cars are essential but they can't accommodate the public," declared Mayor Curtis of New Britain at the hearing in that city. He said that the Connecticut Company had not furnished additional service as the demand for it arose at times in the past when there was no jitney competition. It was his opinion that the company would derive larger profits on a lower rate of fare.

In New Britain the buses are run over routes within the city in direct competition with the electric railway.

The Hartford case concerns only entrance to the city as a terminus to an interurban line.

The Aldermen of Bridgeport have gone on record as believing that the jitney buses are a public necessity and convenience in many parts of Bridgeport and that the present routes for jitney buses should be maintained. Suggestions for jitney bus regulations in Bridgeport also were outlined in a report adopted by the Aldermen.

Work Divided by Commission

Because of the large number of applications for certificates to operate jitney buses in the State, the Connecticut Public Utilities Commission has found it necessary to divide the work. During the past week Commissioner R. T. Higgins has conducted hearings in Thompsonville, C. C. Elwell in New Haven and J. W. Alsop in Middletown.

Before the entire commission on June 1 at the state Capitol petitions were considered from persons desiring to operate buses between Hartford and New Britain and Hartford and Waterbury. Residents of towns lying between these cities said that they saw no advantage in having the jitney service.

The New York, New Haven & Hartford Railroad objected to the issuing of the certificates because the jitney men in Hartford and Waterbury made their headquarters near the railway stations and thus diverted passengers away from the railroad. He also said that the railroad was running eight trains daily between the two cities and thus was furnishing adequate service. The fare on the railroad is $1.21. The buses charge $1.25.

The commission endeavored at a hearing in New Haven on June 2 to determine the present condition of the traffic over the various bus lines radiating from that city, more particularly the New Haven-Derby route. There are about forty cars operating on the line at present, thirteen large buses and twenty-seven touring cars. The buses run every half hour and the touring cars every ten minutes. The trolleys maintain a half hour schedule for a greater part of the day.

It was estimated that each bus earns about $7,000 a year, which with a fare of 20 cents means a passenger traffic of approximately 35,000 persons a bus a year.

$7,000 a Year Earned per Bus

The New Haven-Derby Bus Corporation was incorporated a few weeks ago with a capital stock of $50,000 by nine bus owners who intend to operate ten large buses having a seating capacity of from twelve to sixteen. According to the plans of the incorporators, beginning July 15 buses will run every half hour from 6 a.m. to 12:30 p.m., every 15 minutes from 12:30 to 6 p.m. and every half hour from 6 p.m. to 12 p.m. The time between New Haven and Derby is about 25 minutes.

The owners of the touring cars operated between the cities were represented by P. J. O'Sullivan, Derby. They have already planned an association and operate about twice as many cars as the bus corporation. The touring car fare is 25 cents, or 5 cents less than on the trolley.

Attorney George D. Watrous, general counsel for the Connecticut Company, questioned all the witnesses to show that the trolley can easily accommodate all the traffic. It was found on May 31 that from Derby to New Haven beginning at 5 a.m. and ending at 11 p.m. the trolleys carried 741 and the jitneys 601 passengers. Outbound from New Haven for the same period the trolleys totalled 865 and the buses 703, showing that out of a total of 2,910 passengers the buses carried 1,304, or nearly 45 per cent. Attorney Robert J. Woodruff, in behalf of the buses, brought up the question of the increases in fare which have been made by the trolley. It was finally agreed by representatives of both the trolley and the buses to furnish financial statements for those particular lines during definite similar periods.

Commission Reserves Decision

Commissioner Elwell, together with Mr. Wadhams and Mr. Rudd, heard the testimony. Mr. Elwell examined each of the witnesses.

On June 7 in New Haven the commission heard evidence with respect to bus service between New Haven and Wallingford.

Seventeen per Cent Wage Reduction in Youngstown

A new wage agreement has been entered into between the trainmen and the Pennsylvania-Ohio Electric Company, the Youngstown Municipal Railway and associated companies operating city and interurban lines at Youngstown, Warren and Niles, Ohio, and New Castle and Sharon, Pa. The new scale is 48 cents an hour for the first three months of employment, 51 cents an hour for the next nine months and 56 cents an hour after one year, with 5 cents additional on all classifications for operators of one-man safety cars.

This is a reduction of 12 cents an hour in each classification and of 17.6 per cent on the base rate. The old scale was 60 cents an hour for the first three months of employment, 63 cents an hour for the next nine months and 68 cents an hour after one year, with the 5-cent differential for operators of safety cars.

The old scale expired at midnight on May 31, at which time no agreement had been reached. Operations and negotiations continued and the agreement was reached on June 2 and was ratified by the trainmen by a vote of 348 to 106, about 85 per cent of the men voting. The new agreement continues in force till June 1, 1922. It provides for minor changes in working conditions and removes restrictions on the use of one-man safety cars.

On June 4 a new agreement also was reached by the same companies with their linemen, who had been on strike since May 1. The new wage scale for these men is on the same percentage of reduction as that of the trainmen. The old scale had been on the base rate of $1 an hour. This was reduced to 82½ cents an hour. The linemen had demanded the renewal of the old rate.

Kansas City Residents Hard to Pacify

Weekly adjustment of jitney routes by the city jitney inspector has become necessary at Kansas City, Mo., to meet objections from property owners and the constantly decreasing number of streets available for jitney use is raising a serious situation with respect to routing. It is not always possible to select a route on which jitney operation might be profitable. Citizens have prepared petitions to the Mayor, asking that jitneys be routed away from their streets; and in many cases the Mayor has responded to the petitions by ordering the routes changed. In some instances the City Council has passed ordinances requiring the changing of jitney routes.

In other cases routes have been shortened so that now they are short-haul and jitneys on such routes are finding competition with the railway difficult at the 10-cent rate. In consequence there is a prospect that jitney tickets on such routes may be sold at two for 15 cents.

The chief harassment of city officials is from home owners who point to the hazards to children of jitney operation on residence streets. Downtown the difficulty has not yet been adequately met of so routing jitneys as to avoid serious congestion of normal traffic in busy hours.

Jitneys were recently by ordinance ruled off streets on which the Kansas City Railway operates.

Would Make Operating Ordinance More Explicit

Objection on the ground that it is not sufficiently explicit was made by Mayor John Galvin of Cincinnati to an ordinance submitted by the Cincinnati (Ohio) Traction Company, providing for a decrease in fares. The principal provisions of the ordinance, which was submitted as an amendment to the present ordinance, are as follows:

That school children ten years old and over shall pay 5-cent fare.

That those less than ten years shall ride as minors on half fare.

That payment of the Cincinnati Street Railway franchise tax of $350,000 a year be deferred for 1920 and 1921 until after Jan. 1, 1922.

The proposed ordinance also provided that when fares exceed 7½ cents the company be not required to make any payment into its reserve fund. Under the present ordinance the reserve fund must reach $650,000 before fares can be reduced.

The city officials, after considering the ordinance, asked that it be redrawn to make it more explicit, particularly as to when fares will be reduced.

Bus Men Determined to Fight

A hearing was scheduled for June 7 in the Common Pleas Court at Toledo, Ohio, on the petition for a permanent injunction restraining the city from enforcing the bus regulatory ordinance, which was to have gone into effect on June 1. The court recently granted a temporary restraining order which permitted the buses to operate during the week. The city attorneys claim that the municipality has still the right to regulate any kind of traffic and that the buses do not own any privilege of the streets.

At a recent meeting of fifty-five bus owners and operators the bus men said they would not take out licenses and provide indemnity bonds but would stand arrest and prosecution.

Commissioner W. E. Cann, when the measure was proposed in Council, pointed out that the Community Traction Company pays approximately $300 a car annually in taxes, street cleaning, snow sweeping, pavement repairs, and other ways, for the privilege of operating. Buses, heretofore, have been charged a license fee of $1 merely for police regulation.

Stage Rules Laid Down

At the hearing held at Olympia, Wash., recently on the tentative set of rules and regulations laid down by the auto transportation section of the Department of Public Works, a number of new provisions was set down for the regulation of stage and auto freight lines. The most important ruling made was the announcement that the department would hold that taxi and jitney companies could not carry passengers over lines for which certificates of convenience and necessity had been issued to stage companies. Representatives of the Seattle Taxi Company immediately announced that this was undoubtedly a point to be settled in court.

Considerable objection was raised to one clause in the rule regarding the use of emergency cars, and this brought out the fact that no car will be allowed to operate on any of the stage lines of the State unless they protect passengers by the bonding of the car with a surety company. This provision will also apply to emergency cars. At first the ruling was so drawn that before an emergency car could be placed on a run, it would be necessary to telegraph the department at Olympia and get permission of the head of the stage department there. This, however, was amended so that a record will be kept of the use of emergency cars, and a fee charged therefor, but only bonded cars will be used.

Ten hours of driving was decided upon as the maximum length of time in which a stage driver should work in any twenty-four hours, and eight hours of consecutive sleep was determined on as necessary in every twenty-four hours to keep him fit properly to protect the public. The new rules became effective on June 1.

Transportation News Notes

Seven Cents in Sioux City. — The Sioux City (Ia.) Service Company was recently granted permission to charge a 7-cent fare under a temporary injunction which restrains the city from enforcing the ordinance providing for a 6-cent fare. Refund certificates good for 1 cent each are being issued in case final judgment is against a 7-cent fare. The City Council recently stated its unwillingness to countenance any wage cut affecting employees. The company accordingly brought court action.

Fare Suit Dismissed. — The suit of Reuben Ruthenberg, attorney, to enjoin the Louisville (Ky.) Railway from collecting more than 5 cents was dismissed by Judge Kirby recently because the same questions involved in Attorney Ruthenberg's suit are pending in the United States Circuit Court of Appeals. It was Attorney Ruthenberg's plea that he acted in the capacity of a private citizen, while in the other suit the municipality was concerned. Judge Kirby indicated that it was the rule in Kentucky that the court taking first jurisdiction in a case should carry it to a conclusion.

Fare Rate Excessive. — Examiner Witters recently filed a report with the Interstate Commerce Commission maintaining that the 10-cent fare charged by the Louisville & Northern Railway & Lighting Company, New Albany, Ind., was unreasonable. The line runs between Louisville and New Albany and up to Oct. 31, 1920, operated on a 7-cent fare. Shortly after the inception of the 10-cent rate the city of New Albany, the Chamber of Commerce and several associations filed a protest with the Interstate Commerce Commission asking for a hearing. This hearing took place on Feb. 17 of this year before Mr. Witters.

Rehearing in Fares Refused.—The Board of City Commissioners of Dallas, Tex., has refused the application of the Dallas Railway for a rehearing of its petition for authority to increase fares from 6 cents to 7 cents in Dallas. The refusal to grant the 7-cent fare was based on a report by J. W. Everman, supervisor of public utilities, in which it was shown that the earnings of the Dallas Railway during April showed a net return of 7.275 per cent on its invested capital, while the franchise provisions call for a net return of 7 per cent. It is also claimed that, eliminating the earnings of the Dallas Interurban Building, which is 4 per cent, the Dallas Railway would show net earnings of 78.93 per cent during April. The action of the application for rehearing had been delayed because of the death of J. F. Strickland, president of the company. The 6-cent fare granted the company for a period of one year will expire on June 25, and the city commission has made no intimation as to whether this fare will be continued for another year. It is believed, however, that such an extension will be granted. Action on the matter of resort to the Federal court will likely await the election of a successor to Mr. Strickland.

Fare Increase Authorized.—Determining that the Salem & Pennsgrove Traction Company, Pennsgrove, N. J., under its present operating revenue, will not be able to meet the interest on its funded debt or even the taxes which will become due, the Public Utilities Commission has allowed the company to increase from 7 to 8 cents the rate of fare in each of its five zones. The company's line extends from a point in the Borough of Pennsgrove through the townships of Upper Penns Neck and Lower Penns Neck, in Salem County, a distance of 14.25 miles. The company was formed and the road constructed in 1915 entirely with private capital. When it was constructed there was in operation a large industrial plant at Carney's Point for the manufacture of war munitions and the road was required for the transportation of employees. During 1916 and 1917 the road was operated at a profit on a 5-cent fare, but in February of last year the commission permitted the company to charge 7 cents. Since the cessation of the war the industrial plant laid off hundreds of hands and the road lost money. Residents of the communities using the railway favor the continuance of operations and no objection is expected to the increased rate.

Saltair Road Raises Fare.—The Salt Lake, Garfield and Western Railroad, Salt Lake City, Utah, has been granted permission to increase its one-way fare from Saltair beach to Salt Lake City, in a recent decision of the Public Utilities Commission of Utah. The decision grants permission to increase the one-way fares during the Saltair beach resort season from 25 to 35 cents and the one-way half fare excursion from Saltair to Salt Lake from 15 cents to 20 cents. The decision particularly affects motorists who go to the resort by auto and return on the train. When the round trip fare was increased to 35 cents last year a subfare was published providing for a 25-cent excursion fare from the beach to Salt Lake. The decision now makes the one-way fare the same as that charged for the round trip from the city. The company claimed that it had sustained a loss from operating the road between the beach and the city during 1920 which amounted to $37,000. The increase granted, it is estimated, will increase the revenues by $6,000 during this year, but the company will sustain a deficit, according to testimony given before the commission. The increase will be made effective on ten days' notice filed with the commission. The commutation tickets at present are sold in books of thirty for $7.50 and books of 100 for $20.

Personal Mention

Mr. Beall Texas Electric Railway's New Head

Jack Beall was elected president Texas Electric Railway by directors on June 7. Mr. Beall, who has been one of the attorneys for the interurban for six years, is a brother-in-law of the late Col. J. F. Strickland, former head of the railway. N. A. McMillan, St. Louis, was elected chairman of the board of directors, a position which has just been created.

Operators Advanced to Take Charge of New Department

W. R. Alberger, vice-president and general manager of the San Francisco-Oakland Terminal Railways, Oakland, Cal., has announced several important changes in the duties and responsibilities of various members of his official staff.

George H. Harris, for the past seven years general superintendent of the company, has been appointed assistant to the general manager. The position of general superintendent is abolished. A portrait of Mr. Harris and an outline of his career appeared in the JOURNAL for March 19 following his election as president of the Pacific Railway Club.

In line with the company's policy of keeping abreast or even ahead of modern business methods a new department has been created, the duties of which will be to make an intensive study of all costs and results obtained from various methods of maintenance and operation. This department, which is a decided innovation in public utility management, will secure and compile into comprehensive and graphic reports, definite and conclusive data regarding all activities of the company, not only as to costs of different types of constructions and equipment and their maintenance and operation, but also as to revenues derived from all sources. Such information will serve as a guide to the management in its efforts to furnish to the public proper and efficient service.

S. H. Pickard is appointed manager to head this newly created department, while J. W. Brom, for several years a member of the general manager's office staff, will be associated with Mr. Pickard in the new organization.

F. R. Lloyd has been appointed purchasing agent, the position left vacant by Mr. Pickard's promotion. Mr. Lloyd has been assistant purchasing agent since 1914, with the exception of two years when he served in the army in France during the recent war.

A department of personnel has also been organized to handle all employment for the company and to supervise all training of employees, as well as all personnel work which may be undertaken. John S. Mills, formerly claim agent and assistant superintendent, is at the head of this work.

New Post for Mr. Weber

Former Power and Equipment Engineer Takes Mr. Grauten's Place on Kansas City Railways

The appointment of R. L. Weber as electrical engineer of the Kansas City Railways, succeeding S. H. Grauten, has been announced by the receivers. Mr. Weber came to the railways company in 1914, as engineer of equipment and power for the Board of Control, the bi-partisan supervisory board created by the new railways' franchise of 1914.

During the war, Mr. Weber served in the cruiser and transport force of the Atlantic fleet with duty on the transports *St. Paul* and *Lenape* and on the cruiser *Albany*. On his relief from service in May, 1919, he resumed his connection with the Board of Control, in Kansas City.

R. L. WEBER

Prior to the war Mr. Weber had directed the design and construction of the last two series of double-truck cars which have established an especially satisfactory record. Since the war, the activities of his department have been centered on power house improvements, and under his direction several effective measures have been carried out.

Mr. Weber's change from engineer of the Board of Control to electrical engineer of the Kansas City Railways is, in a measure, incident to the realignment of departments under the receivership.

With his other duties, Mr. Weber has for some years handled the technical features of power negotiations and cases before the Public Service Commission, and his intimate connection with these matters and the importance of power negotiations, pending and anticipated, are stated to have influenced the new appointment.

Mr. Weber is a graduate of Cornell University in the class of 1905. He is a member of the national electrical, mechanical and naval engineering societies. Before coming to the railways company, he had an extensive experience in the power field, where for several years he acted in responsible capacities on the design and construction of steam and hydro-electric properties. His electric railway experience includes connections with the Lehigh Valley Transit Company, the Kansas City, Clay County & St. Joseph Railway, and the Ironwood & Bessemer Railway & Light Company.

Mr. Cady Goes to Utica as Claim Agent

Herbert E. Cady, who succeeds Joseph S. Kubu as claim agent for the New York State Railways at Utica, began his railway duties in 1903 as a conductor on the Syracuse city lines. After a few years as a conductor, part of which time he was employed on the Syracuse-Utica third-rail line, he was appointed to the claim department force as an investigator.

He served as an investigator from 1907 until last year, when he was made assistant to Ansel D. Brown, claim agent for the Syracuse branch of the New York State Railways. He was appointed to succeed Mr. Kubu on May 16, much to the delight of his many friends.

Mr. Cady is a native of Chicago, but at an early age moved to Geneva, N. Y.

Frank L. Smith, Dwight, Ill., took office on April 11 as chairman of the Illinois Public Utilities Commission. At the same time he announced the appointment of William H. Culver, a former Chicago newspaper man, as his secretary. Mr. Smith was the unsuccessful rival of William B. McKinley, president of the Illinois Traction System, in the election for United States Senator last fall.

B. J. Yungbluth, supervisor purchasing and supplies, Philadelphia Rapid Transit Company during the absence of G A. DuCasse, who was temporarily assigned to other duties, on June 1 resumed his duties as a member of the co-ordinating staff. G. A. DuCasse, temporarily assigned to the staff of the vice-president of accounting and finance, has resumed his former duties as supervisor purchasing and supplies.

E. W. Lewis has resigned as assistant general manager of the Iowa Railway & Light Company, Cedar Rapids, Ia., and has entered the business field for himself, forming the firm of E. W. Lewis & Company, wholesalers of electrical supplies. He became connected with the Iowa Railway & Light Company as superintendent of transmission lines, and he also held other positions

with that company before becoming assistant general manager, the office he has just resigned. He was formerly with the Westinghouse Electric & Manufacturing Company, first in East Pittsburgh, Pa., and later in Baltimore, Md.

C. C. Chappelle, who has been representing the eastern security holders of the New Orleans Railway & Light Company, New Orleans, La., in the negotiations with the city looking toward a settlement of the problems confronting the company, is well known in electric railway circles. He was at one time one of the three members of the executive committee of the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo. From 1911 until 1914 he was vice-president and general manager of the Federal Light & Traction Company, New York. Previous to this and immediately after his graduation from Purdue University in 1895 most of Mr. Chappelle's associations were with the Westinghouse interests.

Lewis B. Stillwell, consulting engineer, has attained additional distinction. He has just been named a member of the board composed of six engineers to study the country's transportation systems and to suggest ways for bettering the earning power of the railroads. His associates on the board will be John F. Stevens, Col. F. A. Molitor, J. F. Wallace, W. L. Darling and W. W. Colpitts. The board will be known as the "Board of Economics and Engineering." The members will act in the interest of the National Association of Owners of Railroad Securities. Every one of the appointees is an expert railroad man of long experience and national reputation, and the selection of Mr. Stillwell as a member of this company is a tribute to him personally and to the electrical industry, with which his entire career has been associated.

L. H. McCray has been appointed assistant to C. A. Hall, general manager of the Eastern Pennsylvania Railway, Pottsville, Pa. Mr. McCray was formerly assistant manager of the New England District of the Emergency Fleet Corporation, a position he accepted after his resignation as general manager of the Atlantic Shore Railway, Sanford, Me. Mr. McCray began his railway work with the Winnebago Traction Company, Oshkosh, Wis., which he served in various capacities from 1904 to 1907, when he resigned as assistant foreman of the transportation department of the company to become superintendent of the Sterling, Dixon & Eastern Railway, Sterling, Ill. He continued with this company until March, 1908, when he resigned to accept the position of trainmaster and assistant general manager of the Atlantic Shore Line Railway. Later he was promoted to the superintendency of this road and in 1911 was elected general manager of the Atlantic Shore Railway, Kennebunkport, Me., which had succeeded the Atlantic Shore Line Railway.

Obituary

Dr. Edward B. Rosa

Dr. Edward Bennett Rosa, chief physicist of the United States Bureau of Standards, died suddenly in his office on May 17.

Dr. Rosa did very notable work in the scientific field and particularly in electrical research. As a pure physicist alone he by his accomplishments and studies won for himself a place of honor among foremost scientists of the day. Moreover, he was an executive, guiding carefully and intelligently the work of more than 100 technical assistants in the electrical division of the bureau, the department which had been built up and enlarged by him. The details of what is known now as the National Electric Safety Code were worked out in the bureau's electrical division under his supervision.

Some of the scientific work includes the redetermination of the ratio of the units of electrical measurement, the measurement of the electrochemical equivalent of silver, the invention of new methods for measuring capacity and inductance, calculations of electrical characteristics of coils, specifications of the international candle, and electrolysis research. In connection with the last-named study he has made investigations in a great many cities and proposed methods of mitigating electrolysis caused by stray railway currents.

Dr. Rosa was born in Rogersville, N. Y., in 1861, and was graduated from Wesleyan University, Middletown, Conn., in 1886. Five years later he received his doctor's degree from Johns Hopkins University. He returned to Wesleyan as a professor of physics, where he invented a number of measuring instruments, besides conducting important investigations in electrical measurement.

In 1901 he joined the Bureau of Standards as a physicist. He was a Fellow of the American Institute of Electrical Engineers, a former director of the Illuminating Engineering Society, and one of the most active members of the American Engineering Standards Committee.

Henry W. Beebe

Henry W. Beebe, supervisor of equipment of the Connecticut Company, New Haven, Conn., died on May 19. Mr. Beebe had been in poor health for about two years but had been on the job till the end, his final illness lasting about one month.

Mr. Beebe had been in the electric railway business from its start. He was a machinist by trade, starting as an apprentice with the New Haven Clock Company. He was later with the Ansonia Electric Company, manufacturers of telegraph instruments and other electrical appliances. In December, 1893, when the old Fair Haven and Westville Railroad started to electrify, he entered the shops of this company as a machinist, later becoming the general foreman of the road. This position corresponds to that of master mechanic today. When the consolidation was effected which resulted in the Connecticut Company, he became the master mechanic of the New Haven Division. On Oct. 1, 1915, he was made supervisor of equipment of the entire system.

He was a mechanical genius in things having to do with railway rolling stock and was an expert consultant, in which capacity he acted, principally, during the last two or three years. He was sixty-four years old when he died.

William M. Grote, prominently identified with the building of the interurban lines in the Spot River Valley of Illinois, died on May 15 at the age of seventy-one. These lines, 40 miles west of Chicago, have since become a part of the Aurora, Elgin & Chicago Railroad, Aurora, Ill. Mr. Grote had resided in Elgin, Ill., for the greater part of his life and had been for many years the leader in the business activities of that community. At the time of his death he was connected in an official capacity with several banks and business enterprises.

Theron R. Hull, superintendent of the Connecticut Company, New Haven, Conn., until his retirement from active pursuits some years ago, died on May 2 in his seventy-eighth year. His initial street transportation experience dated back to horse-car days. He was superintendent of the Shelton Avenue car line in New Haven and when the Winchester Street Railway absorbed this line Mr. Hull became superintendent of the system. With the advent of the electric car he remained in the service as superintendent after the Connecticut Company, then known as the Consolidated Company, took over all the rails and equipment of the other railway properties then operating in New Haven.

Karl G. Roebling, active head of John A. Roebling's Sons Company, died of apoplexy on May 29. He had been president since October, 1918, when he succeeded his uncle, the late Charles G. Roebling. Mr. Roebling was born July 7, 1873. He prepared for college at Lawrenceville and was graduated from Princeton in 1894. Upon the completion of his schooling he worked at the Roebling mill and was shifted from one department to another until he had become familiar with all phases of the work. The Roebling company has been brought into international fame by the building of the Brooklyn and Williamsburg bridges, the suspension type of construction having been installed by John A. Roebling, the founder of the business. Col. Washington A. Roebling, who has been elected president of the company to succeed his nephew, was the engineer in charge of the bridge construction.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Railway Material Prices in February, 1921 and 1919

Several Products Now Cost Less Than Two Years Ago—Average Price Shows 8 per Cent Increase

From time to time tables have appeared in these columns showing the comparative increase in peak prices of railway material over the pre-war level. Since the downward movement of commodities set in, however, data showing just how great the recession has been in the electric railway field has been incomplete. In this connection one of the large Canadian traction companies has compiled figures which are appended below, comparing prices of material purchased by it in February, 1921, and in 1919. The comparison is made on the basis of actual purchase cost. At the same time the percentage of price increase on these products in 1919 compared with pre-war prices is presented. From the two columns of figures a fair idea of where present-day prices stand can be gained, though it must be recalled that the market represented in most instances is Canada and not this country.

The list presents the latest figures available on any considerable number of items purchased recently, but of course during the three months since February prices in a number of lines have receded still further. The greatest recession over the 1919 cost is shown in trolley wire, with nearly 39 per cent, while linseed oil is a close second with about 36 per cent. White lead, rattan, carriage and machine bolts, dry batteries and cedar poles also show considerable decreases in cost. The price of coal it appears, represents a greater increase since 1919 than any other material listed, with about a 50 per cent increase for both hard and soft coal. Lubricating oil, track bolts, cement, headlights, sand, certain armature coils, brakeshoes and pinions follow next in the order named. The average cost of all the materials given below covering the two-year period past shows an increase of 7.77 per cent.

PERCENTAGE OF INCREASE

Material	Unit	1919 Over 1913	1921 Over 1919
Bases, trolley	Each	113 1	3 73
Batteries, dry	Each	105 0	é10 **56**
Bell cord, No. 9	Lb.	140 0	1 19
Bell cord, No. 7	Lb.	143 0	0 00
Bolts, carriage, 4x⅝-in	100	146 8	**6 02**
Bolts, machine, 6x⅝-in	100	135 5	**14 96**
Bolts, track, 3½x⅞-in	100 lb.	75 0	27 85
Brake shoes	Each	180 6	24 75
Bricks, fire	1,000	100 3	**6 24*
Brake hangers	Each	97 9	11 70
Coal, anthracite	Net ton	65 2	49 55
Coal, steam	Net ton	132 4	51 35
Coils, armature, 12A	Set	61 6	*24 93
Coils, armature, 101B2	Set	92 2	* 6 76
Commutators, 12A	Set	93 2	10 10
Copper wire (trolley)	Lb.	82 4	**38 71**
Cement	Bag	141 2	27 55
Gears, 12A	Each	305 3	9 38
Gear cases	Each	235 8	12 15
Grease motor	Lb.	100 6	6 66
Grease, curve	Gal.	25 9	11 77
Headlights	Each	47 4	27 39
Fittings, malleable iron	100 lb.	117 1	20 00
Oil, ammonia	Gal.	80 5	6 35
Oil, lubricating, black	Gal.	24 1	33 33
Oil, linseed	Gal.	171 4	**35 79**
Pinions, 38B	Each	245 1	22 93
Poles, cedar, 45 ft	Each	48 5	**8 50*
Poles, trolley, 12-ft	Each	139 2	10 40
Rattan, seating	Sq.ft.	71 9	**4 08**
Rattan, sweeper	Lb.	244 4	**29 03**
Rails, 72-lb	Gross ton	46 1	19 78
Sand	Load	140 0	25 00
Ties	Each	163 1	*10 00
Uniforms	Each	38 5	14 57
Wheels, car, 33 in	Each	79 6	2 85
Wheels, trolley	Each	91 0	11 52
Waste, white cotton	Lb.	105 9	**5 88**
White lead	Lb.	100 0	**12 59**

* Prices as of Dec., 1920; no material bought since this date.

é—Boldface indicates decrease.

Car Wheel Production Lowest in Years

Steam and Electric Road Buying Is at Minimum—Deliveries Are Prompt as Stocks of Raw and of Finished Material Are Fairly Good

A survey of the market among producers of chilled iron and rolled steel car wheels reveals virtually a uniform condition of light demand. Both steam and electric lines are buying the smallest number of wheels possible to meet their requirements, inquiries are scattered, and there are no large orders being placed. A representative producer normally turning out more than 1,000 chilled iron wheels daily reports that except for one or two steam roads there has been practically no business placed for the past six months.

An idea of the extent to which roads throughout the country are stocking wheels can be gained from the business of another manufacturer who is receiving orders for twenty to fifty wheels at one time at present, where the same orders formerly totaled 1,000 to 2,000 wheels. An optimistic note is sounded by a leading producer of rolled steel wheels, however, in reporting that the wheel tonnage holds up much better than other steel products, and that considering the present readjustment period through which we are passing, business is as large as could be expected.

Production, in view of the volume of buying, is down to low levels. Operation in extreme instances is nil, and some wheel manufacturers produce only when they accumulate sufficient orders to run plants for three or four days. Still others report a production as high as 40 to 60 per cent of capacity, but the general operating scale, it seems, is lower than it has been for many years. No trouble is experienced in making quick shipments, especially as competition is very keen at the present time. Foreign producers are making their influence felt too, as evidenced by a recent South American order for 10,000 steel wheels which was carried off by a German company in competition with British and American firms.

Stocks of raw and of finished material differ rather widely as some manufacturers in reducing their inventories carry only sufficient raw material to cover current orders and either no finished wheels at all or only enough to comply with contracts. For the most part, however, raw material stocks in this field are good, with here and there a producer who is overstocked. The same applies to the finished product, as some producers still have wheels carried over from the rush period of last year, but in general only a fair quantity are on hand.

The majority of producers, it seems, remain silent on the question of prices, but one of the leading manufacturers of chilled iron wheels is responsible for the statement that quotations are about 25 per cent below the peak and that future price developments are uncertain. Another view states that big price reductions cannot be made until plants are operated on a normal basis again. Nearly all wheel companies have reduced wages, though here and there one reports undiminished labor cost. The average decrease in wages has been from about 10 to 20 per cent, with an extreme of 25 per cent.

The industry appears to be about evenly divided over the business outlook in the car wheel market. Some producers see little or no prospect of any improvement in conditions this year, while others are optimistic in tone. This optimism is apparently based on the realization of lower railway labor costs and the expectation of freight rate reductions, which it is thought would encourage a gradual return of general business.

Electrification of Philippine Railroad

According to the *Bulletin of Government Commercial Agency in New York*, the Manila Railroad Company plans to develop the water power of the Agno River in central Luzon to supply electricity to operate the railroad. It is estimated that from 12,000 hp. to 15,000 hp. can be developed.

Uneven Conditions in Car Headlight Market

Survey of Situation Among Large Producers Reveals Up and Down Volume of Demand, Stocks and Production

A survey of the manufacturing situation among virtually all the large producers in this country of car headlights used by electric railways reveals uneven conditions of demand. One of the leading manufacturers reports that the volume of business in this line is good, and a couple of others state that though buying is confined largely to replacements, demand is within 80 per cent of last year and at a higher ratio than many other equipment lines. This favorable situation, unfortunately, is not general as a number of other headlight manufacturers are finding very little new business. Some of these state that present orders cover only replacements and repair parts, while some find that new equipment, especially safety cars, accounts for most of the business that is being placed.

Keen Competition for Orders Felt Among Producers

It would seem, on the whole, that the headlight market is by no means brisk, as evidenced by the keen competition for orders. This is reflected in the quality of service rendered to customers, as except for one producer who quotes four to six weeks' shipment on standard headlights, virtually every company is able to make immediate shipments. In the matter of stocks of the finished product, however, some variance is shown as a few producers are carrying a normally large supply but the majority are holding their inventory at as low a point as possible. On the other hand, large stocks of raw material seem to be the rule and low stocks the exception, though this feature is constantly tending more toward normal.

Very little uniformity to production is shown. Where stocks are large it is low, as also where few orders are being received, but where headlight stocks are low and a fair volume of current orders are received, operation keeps up accordingly. This accounts for the spread between production at 10 per cent of capacity in one instance and as high as 75 per cent in another. To accomplish this curtailment working forces have been cut in several instances, on an average of 20 to 40 per cent. A number of producers have reduced wages 10 to 15 per cent, but others report that they have made no flat reductions though bonuses and similar extras have been eliminated.

Prices Down 10 to 15 per Cent Since First of Year

Headlight prices have been reduced 10 to 15 per cent since the first of the year or the peak level, and the further tendency would seem to be still downward inasmuch as at least one producer has just made a further cut this month. The outlook for business the balance of this year in this line is generally thought to be none too bright. A quiet market is expected to prevail, though starting with the fall there is hope that demand will gradually increase and reach normalcy again by next spring.

Increase in Trolley Wire Price Is Not General

Two Producers Advance Base Price One-Half Cent per Pound, but Copper Is Again Weak

In line with the gradual firming of the copper market over the past few weeks, at least two producers of trolley wire have increased their base prices to the extent of ½ cent per pound. This is interesting in the light of the prevailing opinion that an increase in buying will very probably follow a stiff advance of prices.

That this increased demand has not developed, it is thought, is because the copper market does not consistently hold its gains and the advance in base prices by wire producers has not been general. Within the past two weeks spot electrolytic copper touched a high range of 13½ cents per pound, but it has since receded and can now be bought for 13⅜ cents.

At the present time, though base prices are quoted, they do not represent an absolute indication of prices for the reason that the market is so strongly competitive these prices are not strictly adhered to. Among several of the leading producers base quotations range in gradations of ¼ cent per pound from 15 to 16 cents. The market remains fully as quiet as it has been over the past few months. Electric railways are showing little activity and buying is mostly for maintenance, though it is said that an increase in the number of inquiries from the West is noted. The foreign market is flat and, taken all in all, the outlook seems to point to a very quiet summer.

Producers are reconciled to this, however, and are buying copper from hand to mouth for the most part. Production is down commensurate with buying, and in a number of instances plants are operated only as orders are received. Deliveries can be made promptly and on an average range from ten days to two weeks and even better. Producers of trolley wire other than bare copper, such as composition material, report a fair stock on hand that is sufficient to care for orders immediately.

Hopes are now being pinned to the fall months, as it is generally expected that September and October will see a material increase in business in this line. The basis of this belief apparently is the tremendous unfilled need for wire in the industry that is known to be existent.

Dry Cell Prices Are Reduced

Leading manufacturers of dry cells, including "Columbia," "Eveready" and "Red Seal" makes, reduced prices last week. The drop was about 16 per cent.

Rolling Stock

Elmira Water, Light & Railroad Company, Elmira, N. Y., has received the first of the eight safety cars that were ordered from the Osgood-Bradley Company during April. Delivery of the remainder is expected to follow at the rate of two per week.

The City of Miami, Fla., which has been without street car service following the total destruction of existing storage-battery equipment by fire last fall, is erecting steel lighting poles which are also being so equipped as to carry trolley span wires ultimately. Plans leading to the actual purchase of rolling stock, however, have not yet been formulated.

Hartford & Springfield Street Railway Company, Warehouse Point, Conn., has purchased two cars from the Waterbury - Milldale Tramway Company to make up for the loss of four cars which were destroyed by fire in the company's barns a few months ago. Only two cars were bought as additional open cars are being substituted for the others that were burned. The Waterbury company is letting its cars go to replace them with one-man cars.

Franchises

Pacific Electric Railway, Los Angeles, Cal. — A franchise has been granted to the Pacific Electric Railway to construct, maintain and operate a single track on Third Street and other highways in the City of Long Beach, Cal.

Track and Roadway

Portland Railway, Light & Power Company, Portland, Ore.—Officials of the Portland Railway, Light & Power Company have consented to move the tracks on Foster Road to the center of the roadway, the work involving an expenditure of $200,000, in order that other improvements may be made. Franklin T. Griffith, president of the company, explained that at no time had the company refused to move its tracks in accordance with the wishes of the city council; the company, however, did not wish to make the move until such time as it was certain that the improvement would be carried out. Officials of the company agreed to lay new tracks. They proposed that no pavements be laid between the tracks, and that certain important intersections be designated for hard surface. The rest of the roadbed will be built up with crushed rock and macadam, and the city officials have agreed to this plan. It will be necessary for the city to purchase the private right-of-way on which the street-car tracks are now located, the strip being 30 ft. wide and 6,000 ft. long, valued at about $8,000.

Washington & Old Dominion Railway, Washington, D. C.—The Washington & Old Dominion Railway has received permission to construct and operate a bridge across the Potomac River at a point suitable to the interests of navigation, at or near Point of Rocks, in Frederick, Md.

Pensacola (Fla.) Electric Company.—The Pensacola Street Railway is building a spur track to the baseball park, a distance of six blocks from the Kupfrian park main line.

Montreal (Que.) Tramway.—At the present time the company has extensions in contemplation amounting to about 15 miles of track within the city limits. As it is, the requirements demand a thousand tons of rails per year to provide against wear and tear, depreciation and breakages. In all there are about 1,500 men engaged in track work alone for the tramway company, whose summer program of a $1,500,000 expenditure gives assurance of a very considerably extended industrial activity. This $1,500,000, it was pointed out, does not include the company's own renewals and maintenance work, but covers only work necessitated by the repaving of streets by the city, a cause which necessitated most of the work viewed by the officials in a recent inspection.

Dallas-Terrell Interurban Railway, Dallas, Tex. — Construction work will start in earnest on the Dallas-Terrell Interurban line within the next sixty days, according to Richard Meriwether, Dallas, vice-president of the company. Grading work on a two mile stretch near Mesquite is going forward, and the company expects to award the main contract for completion of the line some time before July 1. The interurban committee at Terrell reports that all deals are about closed assuring right of way through Kaufman county. The awarding of the contract will be somewhat delayed on account of the death of J. F. Strickland, president of the new company organized to build this line.

Power Houses, Shops and Buildings

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.—The Terre Haute, Indianapolis & Eastern Traction Company will build a new terminal station in Terre Haute, Ind., this summer at a cost of $200,000.

Cincinnati (Ohio) Traction Company.—The Ohio Public Utilities Commission has approved a contract made early this year between the Union Gas and Electric Company and the Cincinnati Traction Company for furnishing electrical current to the latter company.

Toledo Railways & Light Company, Toledo, Ohio.—Toledo's new interurban station was opened to the public on June 1. It is located at the corner of Superior and Jackson Streets, opposite the old station.

Professional Note

Chester M. Clark, formerly head of the corporation department of Stone & Webster, Inc., and during the war secretary of the underlying company at Hog Island, and assistant to Matthew Brush, the president of that corporation, has been elected treasurer of Arthur D. Little, Inc., Cambridge 39, Mass.

Merton R. Sumner has been appointed chief engineer of Arthur D. Little, Inc., chemists, engineers and managers, Cambridge 39, Mass. Mr. Sumner was formerly chief engineer for New England of Fred T. Ley & Company, Inc., in charge of about 135 construction projects and more recently was chief engineer of the Fuller Industrial Engineering Corporation, a subsidiary of the George A. Fuller Company.

L. E. Gould, Chicago, has announced that he is planning to broaden his field to include the study of energy measurement problems for which his engineering staff is well adapted. Thus on any property he is prepared to select the type of cars which will best fit existing operating conditions from an energy conservation standpoint; to determine the comparative energy consumption of various types of motor equipment, different gear ratios, heater and other auxiliary circuits under service conditions; to make surveys on voltage drop, line loss and general characteristics of the distribution system preliminary to a rearrangement of feeder copper, and to measure the energy consumption of interurban cars or freight motors on city or foreign track, so as to give the correct rate of billing for energy consumption.

Trade Notes

Pressed Steel Car Company, Western Steel Car & Foundry Company have recently moved their offices to the Seaboard National Bank Building, seventh floor, 55 Broad Street, New York City.

The Howard-Geeseka Company, 802 Plymouth Building, Minneapolis, Minn., has been appointed sales representative of the Condit Electrical Mfg. Company, Boston, Mass., in the states of Minnesota, North and South Dakota, and the northern peninsula of Michigan.

Colonel Washington A. Roebling has been elected president of John A. Roebling's Sons Company, wire manufacturer at Trenton, N. J., to succeed his nephew, Karl G. Roebling, who died suddenly at his summer home at Spring Lake, N. J., on May 29. Colonel Roebling is 84 years old and has long been identified with bridge construction projects, the most notable of which was the Brooklyn Bridge.

The Stoker Manufacturers' Association will convene for its summer meeting at the Red Lion Inn at Stockbridge, Mass., June 14, 15 and 16. The program as outlined, besides taking in discussions on the handling of stoker business, publicity, advertising, etc., will take up the establishing of a research committee for certain lines of work, new uses of stokers and a discussion of the work of the recently created fuel sections of the professional section and the A. S. M. E. revision of the power test codes.

The Esterline-Angus Company is the new name of the former Esterline Company, Indianapolis, Ind. The original company was organized in 1900 by J. W. Esterline, and in 1910 D. J. Angus became associated with Mr. Esterline in a consulting engineering business. In 1917 he became a stockholder and director of the Esterline company. Two years ago these two men bought the interests of all other stockholders, and in view of their long association in both engineering and manufacturing work they have decided to change the name of the manufacturing company to that given above. There will be no change whatever in the general policy of the company, it is announced. Mr. Esterline will continue to be the executive in charge of sales promotion and advertising, and Mr. Angus will similarly direct production and engineering.

Mica Insulator Company, 68 Church Street., New York City, announces that it has won the suit brought last year against the Mica & Micanite Supplies Corporation, a subsidiary of an English concern, for infringement of the trade-mark "Micanite" which is used to identify the plaintiff's built-up mica insulation. Judge Knox of the District Court of the United States for the Southern District of New York, entered a decree ordering that the defendant corporation be enjoined from using the word "Micanite" in any way, even as a part of its corporate name.

New Advertising Literature

Bronze Products. — The American Brass Company, Waterbury, Conn., is distributing a sixty-four-page booklet covering its copper products, etc., including price lists.

Tobin Bronze.—The American Brass Company, Ansonia Branch, Ansonia, Conn., has issued a fifty-eight-page booklet describing its "Tobin bronze" and its uses, etc., with price lists.

Wire.—The Copper Clad Steel Company, Braddock P. O., Rankin, Pa., is distributing a leaflet showing loading tables and characteristics of its Aristos "Copperweld" wire.

Space Heaters.—Space heaters for commercial and domestic heating are discussed in a leaflet, 3442, just issued by the Westinghouse Electric & Manufacturing Company, East Pittsburgh.

Bus and Board Fittings.—The Erie Electrical Equipment Company, Inc., Johnstown, Pa., has issued supplementary bulletins on split porcelain insulators, wall and floor flanges and main castings for three-way and four-way pipe combinations.