

Electric Railway Journal

Published by the McGraw Publishing Company, Inc.
Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Vol. XLIII

NEW YORK, SATURDAY, FEBRUARY 14, 1914

No. 7

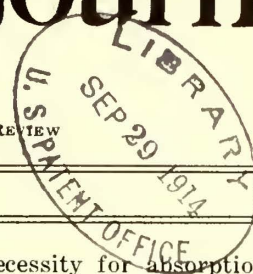
WHY NOT AN A. E. R. A. STANDARD JOURNAL BRASS? Among numerous communications, of which two are published elsewhere, commenting favorably and otherwise upon our editorial of Jan. 31, in which we recommended discarding the M. C. B. journal brass, there are several that call attention to the fact that we are attacking a time-honored standard of the steam railroads. Nothing could be further from the case, although it may be true that it was not specifically stated that we were not commenting upon steam railroad practice. This hardly seemed necessary. Ever since its inception this journal has been understood to represent the electric railways of the country, and any statement as to the insufficiency of the journal brass now used as a standard applied to their needs and to their needs only. Definite, tangible proof is now available to show the necessity on high-speed electric railways for a brass with ears, or wings, and having a practically full semi-circular cross-section. The fact that the existing standard is generally known as the M. C. B. type, since it was appropriated *in toto* from the Master Car Builders' Association, does not necessitate the conclusion, because we advise its abolition, that our recommendation covers steam railroad work or any other conditions than those mentioned in our editorial of Jan. 31. What we are advocating is the development of an A. E. R. A. standard brass.

BRAKESHOE PRESSURES EXTRAORDINARY The paper presented by S. W. Dudley at the last meeting of the American Society of Mechanical Engineers, published in abstract elsewhere in this issue, is a remarkably complete discussion on the entire subject of high-speed braking. Based, as it was, upon the Pennsylvania Railroad tests, the author was enabled to present authoritative data from which to develop formulas giving an astonishing insight into braking operation. Possibly the most extraordinary point brought out was that under good rail conditions a nominal braking pressure averaging 470 per cent for a speed of 60 m.p.h. was a theoretical possibility. Of course, as pointed out in the paper, this indicated nothing more than a highly interesting scientific fact, because by the same formula and factors it was shown, immediately afterward, that an extremely bad rail might cause the wheels to slide under a braking pressure of 81 per cent. However, the fact remains that brake design involves consideration of average, not extreme, weather conditions, and with the presentation of these theoretical possibilities the braking pressures far in excess of 100 per cent which are often demanded upon electric rail-

way cars through the necessity for absorption of the kinetic energy of rapidly rotating motors need cause no alarm about sliding wheels under normal rail conditions.

RÉSUMÉ OF RAIL-ROAD VALUATION PROBLEM Although C. A. Prouty, of the Railway Valuation Board, in his address before the United States Chamber of Commerce, which is published elsewhere in part in this issue, presented no conclusions of the board on doubtful valuation points, yet his outline of the work, of the time and expense required and of the benefits to be derived serves as an excellent starting point from which the interested layman and investor can follow the board's progress. Probably the most interesting statements are those regarding the basis of valuation and the purpose of the work. The completed valuation records will show the extent and the character of each railroad property, the cost of reproduction and the amount of depreciation, but the determination of these "physical" characteristics, according to Mr. Prouty, neither completes the work of the board nor establishes the proper values. The board is required by the valuation act to ascertain also the amount and sources of investment, to note the earnings—in short, to study the complete corporate and financial history of the properties. The establishment of rates is not a question merely of valuation, for, as the speaker says, all the points mentioned must be considered as factors. The physical valuation is, in fact, only the beginning of the solution of the rate-making problem, and when it is considered that this is now only in its inception the procedure of rate establishment from the valuation data to be obtained can hardly be said to be in even a formative stage.

ERRORS IN BUILDING DESIGN Occasionally in visiting a shop or carhouse one hears just complaints from the master mechanic or his men about some error in building design which interferes with the best performance of their work. These errors are not those of general features, like heating and lighting, but in details which the most clever engineer or draftsman cannot foresee if he depends merely upon his own knowledge of the business. In one instance the cars have to be taken outside of the building because the necessary location of the aisle sprinklers makes it impossible to turn a trolley pole around. Had the question of clearances received more thought in connection with the radial swing of trolley poles, this inconvenience would have been avoided. In a second instance the paint shop could not be used as



such because the draftsman had designed it on the assumption that men who paint the sides of the cars have highly compressible bodies. In a third instance a carhouse was built with a great central archway, but the architect's sense of symmetry was so much greater than his knowledge of local car widths that the archways on either side have never remained anything more than ornaments. It would be easy to quote other cases like these, but enough have been given to point a moral. Few companies would dream of buying longer cars until they had made a study of clearances along their lines; but how often is a carhouse or shop designed without regard to the knowledge of the conditions in use possessed by the foreman of the maintenance department? The business of the engineer-architect is to design the most appropriate form of structure and to select the most economical building materials, but his work is not done until every specialist whose work will be carried on in the building has had the opportunity to point out his individual needs.

SHORT-TERM FINANCING AND EQUIPMENT TRUST CERTIFICATES

In a general review of corporation financing during 1913 published in the issue for Jan. 2 of the *Wall Street Journal* and presented in abstract in our issue of Jan. 10 the most striking feature was the great increase in the use of short-term notes as a financing medium. The statement showed a decrease of nearly \$300,000,000 in bonds, a decrease of about \$194,000,000 in stocks and an increase of \$236,000,000 in notes over 1911, figures that are highly illuminating. Not less interesting, too, is the fact that the popularity of the note issues was as greatly in evidence with the public utilities as with the steam railroads and industrials.

Short-term financing has sometimes been criticised on the ground that it is a weak-kneed temporizing expedient that may be used further to increase the capitalization of a company when extended bond issues would never receive authorization. We believe, however, that this method of financing is no more likely to be abused than any other, and that it does possess a well-defined economic basis for its usage. The great demand for capital which in recent years has converged on the principal money markets of the world has in a marked degree raised the interest rate. At the same time, there has been a constant decline in the purchasing power of money, evidenced, for example, by the "high cost of living," and incident to this decline there has been an increasing tendency on the part of investors to shift their investments to those paying higher returns than before, even at the risk of a somewhat lessened security. Coexistent with this search for higher interest-bearing securities there has been a perfectly human desire so to invest that the expiration of the time limit of the investment would not see the return of the original sum highly depreciated as regards its power of exchange. If an investor believed that the future would constantly bring a further decrease in the purchasing power of money, he would prefer a short investment with the

chance of later re-investing his money elsewhere rather than a long-continued investment at a fixed rate of return. Indeed, it has been stated as an axiom that in just so far as an investor looks upon the decline in the exchangeability value of money as a factor likely to be continuously felt, just so much on his part will there be a preference for short-term securities. During 1913, for example, these securities were utilized, in the electric railway field, by the Massachusetts Electric Companies, the Cities Service Companies, the Middle West Utilities Company, the Public Service Company of Northern Illinois, the Birmingham-Tuscaloosa Railway & Utilities Company and the Interborough-Metropolitan Company, the total issue being \$104,732,500. It must be confessed, however, that belief in the stability of and the preference for short-term securities, as proved by action thereunder, has been manifested in the past in a greater degree by steam railroads than by electric railways even when their relative capitalizations are taken into account.

Thus far we have been concerned with the comparative worth of short-term notes and longer investment instruments. In considering the relative intrinsic value of the various types of short-term notes, however, such as mortgage notes, collateral trusts, debenture notes, equipment trust certificates, etc., the investor must leave behind the question of convertibility and consider the security of principal and the rate of return. In regard to these two points the equipment trust certificate is near the top, if not at the top of the list. But in spite of the fact that steam railroads in 1913 and years previous utilized this instrument of credit extensively, it is only very recently that its high comparative value has received general recognition in the electric railway field.

As the name implies, the equipment trust obligation is issued to pay for the rolling stock of a company. The legal title to this equipment is held, through an intermediary trust company, for the benefit of the note-holders. The attractiveness of this security, of course, depends to a certain extent upon the maintenance of the supporting assets, but the transportation company obligates itself to keep the equipment in full repair and to furnish sworn statements at regular intervals as to its condition. The Investment Bankers' Association now has under way a standardization of these periodic reports which can only add to the strength of equipment notes. It is true that these securities are essentially chattel mortgages and operate to pledge a semi-fixed asset under a short-term obligation that must be met at all hazards, even in the face of other impending fixed charges. A modicum of prudence must assuredly be exercised in regard to the number of such securities issued, but this clear-cut choice of paying the notes or losing the equipment is exactly what constitutes the appeal of these securities to the investor. This appeal is spreading, too. At present the Van Tuyl commission in New York State is even considering a plan for making equipment trust certificates legal investments for savings banks. When one considers, however, that to an almost perfect safety there is added

a yield considerably better than that on most ordinary mortgage bonds, it seems that this class of securities could well be used more widely than in the past to attract investors in the electric railway field.

OVERHEAD CHARGES FOR POWER

A correspondent in this week's issue criticises a statement contained in a recent article on electrolysis, published in this paper, that the energy wasted in inefficient return feeders could be assumed to cost the company 1 cent per kw-hr. He says, in effect, that the amount of energy involved, as compared with the total amount generated, is so small that it is impossible to conceive of a case where greater power capacity or more attendance would be required on this account in the power stations and substations. For this reason the only additional cost to the company is that of the extra coal burned, amounting, perhaps, to only one-third of the 1 cent mentioned in the article.

The point brought up by the writer is, of course, not peculiar to the generation of power. It applies equally to manufacturing or other lines of business. Whether all small increases of output should carry their proportion of the overhead charges in individual cases may perhaps be open to argument. In general, however, the hypothesis that any charge can escape its share of the overhead burden is incorrect and constitutes, as we have often pointed out, a dangerous fallacy. In railway repair shops, for instance, it is not uncommon to find that the manufacture of a certain line of supplies is being carried on because the management apparently believes that the cost of the supplies need carry no overhead charges. The argument is used that the space is there, that no additional supervision and very little additional power are required, and that consequently the only cost is that of the materials and labor directly required. The inevitable and logical sequence of the acceptance of this idea is that the manufacture of other supplies may be added, also without overhead charges, until the repair work is crowded out of the shop.

Again, in the case of car weights cited by our correspondent, where he claims that a reduction of 100 lb in the weight of a single car would make no difference in the energy consumption, the acceptance of his statement involves, logically, the acceptance of a corollary that no saving accrues from a weight reduction of 500 lb., or 2000 lb., or 10,000 lb. If the weight reduction on only one car does not effect a saving, neither will it do so on ten cars, nor on 100 cars, nor on 1000 cars.

The only answer to this reasoning is, of course, in favor of the general rule that each portion of the work or output, from an accounting standpoint, should carry its own overhead charges. Of course, we do not mean that with a 1 per cent increase in output an actual increase in power station capacity is necessary. For this reason, in individual cases dealing with amounts of power which are always petty, we believe that the contention of our correspondent is sound. At the same time, in defence of Dr. Rosa's original statement, it is well to remember that the power considered by him is

measured on the d.c. side so that the assumed unit price of 1 cent per kw-hr. is conservatively low.

LABOR AGREEMENTS

One of the recent labor agreements—that of the Boston Elevated Railway—contains a clause which is novel, so far as we know. The agreement in general provides for an "open shop." That is to say, the company agrees not to discriminate against any employee because of his affiliation with the union, and the union recognizes the right of any employee to decline to join the organization or to resign from it at any time. The novel feature consists of a clause by which the company agrees that if a member of the union decides to resign and yet remain in the employ of the company he must send in his resignation in writing and pay all of his back dues. This clause has been criticised on the ground that it practically makes the company the collecting agent of the union, while in its defense it is claimed that the rule about the method of resigning is no more than that enforced by practically every club or mutual benefit organization with membership dues. The usual form of "open shop" labor agreement does not contain any clause of this nature, whereas the usual form of "closed shop" agreement requires all men in the employ of the company to become and remain members of the union. This question illustrates the difficulties which a company encounters in its dealings with labor unions.

If union agreements contained clauses of reciprocal advantage and if each party to the contract could be penalized if it did not live up to its terms, there would be less objection to them. In practically all cases, however, the advantages are all on one side; that is to say, they limit the railway but not the employees. We have been charged with opposition to the principle of labor unions. This charge is unfounded. We are opposed only to one-sided contracts. If, for instance, a union agreement meant better men, better service and better discipline as a consideration for the contract, the situation would have a different aspect. Then it is conceivable that a company would often find it advantageous to make such a contract and consequently would do so voluntarily.

Practically, however, the only arguments presented to a company now to induce it to sign an agreement of this kind are threats of interference with the operation of its cars and destruction of its property if it does not do so. Then, after the contract is signed, it becomes practically enforceable only against the company and not against the union. Such a contract, if made between two individuals, would be void at law because made under coercion and for lack of consideration, and we consider a contract of this kind is equally pernicious when made between organizations. Ex-president Eliot of Harvard emphasizes these points in a letter made public this week and says that the habitual use of violence by unions to attain their ends and their disregard of contracts cannot but be detrimental to labor in the end.

Sand from Tidewater to Rail in Boston

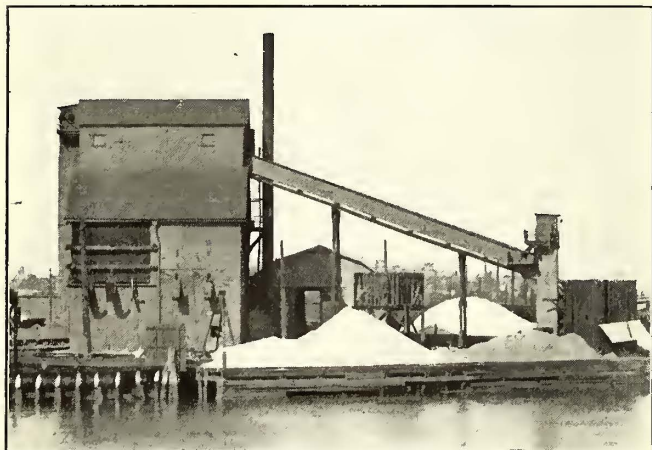
This Article Describes the Method of Obtaining and Handling Sand for the Boston Elevated Railway, as Well as the Operating Equipment, Rules and Report Forms Used

BY EDWARD DANA, ASSISTANT SUPERINTENDENT SURFACE LINES BOSTON ELEVATED RAILWAY

In cities in the northern part of the United States, where during the year wide ranges of temperature occur, bad rail conditions are found to exist during the colder months because of frosts, mud, snow and ice, and falling leaves. In the summer, too, the application of

pressed in other terms. Last year the sand deposited on the rails of the Boston Elevated Railway was equal to the amount which would be contained in a cube 100 ft. in height. It would have covered a single track 4 ft. 6 in. wide for a distance of half a mile with a wall of sand 8 ft. high. The annual cost of cleaning and sanding the track in Boston amounts to \$76,896.

Recently, in order better to take care of such an expenditure, the Boston Elevated Railway has perfected more modern arrangements for obtaining and handling this large amount of sand. The sand is secured by suction from deep water in Ipswich Bay and is carried by steam barges to a plant costing \$24,000 in the George Street yard in Charlestown, located at tidewater on the Mystic River. This service requires two vessels, and



Boston Elevated Railway—Sand-Unloading Plant in Charlestown, Showing Bucket Elevator and Inclined Belt Conveyor Housing

various oils to lay the dirt also causes slippery rails, with the result that the problem is really one of the year around. The result of such conditions has been an ever-increasing use of sand as a protective measure both to assist careful motormen and to prevent careless motormen from having collisions.



Boston Elevated Railway—Interior of Circular Division Storage Station, Showing Overhead Crane, Vertical Bucket Elevator and Horizontal Belt Conveyor and Pocket Over Circular Car Track



Boston Elevated Railway—Sand-Unloading Plant, Showing Dry Sand Spouts and Loading Track for Cars

In Boston, in particular, the amount of sand used for such purposes during the comparatively short period of eight years has increased from 17,985 cu. yd. in 1905 to 34,871 cu. yd. in 1913, or nearly 100 per cent. The amount of sand required can be better realized if ex-

trips are made every day in good weather and once in three or four days under stormy conditions.

Upon its arrival at Boston, the sand is unloaded by the barge's grab bucket into an elevated pocket on the wharf, from which it runs by gravity into a bucket elevator. This in turn deposits it on an inclined belt conveyor, rising 52 ft. above the wharf level. From this belt conveyor the sand passes through a rotary screen into an overhead wet-sand bin, and thence by gravity through a rotary drier and along a bucket elevator into the dry-sand bin. From this bin the sand can be spouted into cars for direct use on the track or for conveyance to other storage plants. The plant has a capacity of 500 cu. yd. of wet sand and 500 cu. yd. of dry screened sand.

Supply cars averaging seven trips daily are operated from this plant to division storage stations, of which there are at present two. One of these is a circular brick building 116 ft. 5 in. in diameter, originally a gas holder building, with a track running around the inside of the building at a height of 6 ft. 10 in. above the

depressed floor. The supply cars merely run into the building and unload by gravity. After the outer part of the building has been filled to such a point that these cars can no longer be unloaded in this way, an overhead crane 44 ft. above the floor, pivoted in the center, with the outer end running on a rail supported by the walls of the building, picks up the sand by means of a vertical bucket elevator and carries it on a horizontal belt conveyor to the center of the building.

Form 3451-5m-8-12

BOSTON ELEVATED RAILWAY CO.
SAND CAR DAY CARD.

Date 191

Motorman No.

Trolleyman

Carhouse Div.

Out	In	Car No.	ROUTE [Note Streets Sanded]

Fig. 1—Boston Elevated Railway—Day Card Used by Operators of Sand Cars

This vertical elevator is also used to load sand for use on the tracks. It is able to travel along the overhead crane bridge, reclaim the sand from any point and by means of the belt conveyor, which is reversible, deposit it in pockets over the circular car track. From these pockets the sand is loaded directly by gravity into the sand cars. Four of these cars can be loaded at once and that number is always kept filled for immediate use. At present the company has thirty sand cars, which are 20-ft. passenger cars adapted to this use, as shown by the accompanying illustration. Their capacity is 6 cu. yd., sufficient for about 100 miles of track.

Whenever the tracks become slippery, owing to weather conditions or other reasons, the sand cars are sent out. It is the practice under severe weather conditions to operate them over the steep grades early in the morning before the regular service is started. Moreover, whenever a city sprinkler pours oil upon the streets, a sand car follows in order to undo the danger caused to the operating condition of the rail. Inspectors' duties require them to keep on alert watch for all bad conditions and to report them to the division headquarters. Motormen, too, upon arrival at the carhouses are expected to make such reports. When such notices

Over certain sections, especially in the downtown business section where traffic is heaviest, a sand car becomes cumbersome and loses its efficiency. Under such conditions one-man sand wagons are employed. By this means it is possible to sand the rails very effectively, as the wagon can be constantly pulling in and out of the track. The company has twelve sand

Form 3393-1-12-1m

BOSTON ELEVATED RAILWAY CO.
Heater Signals Displayed. Weather and Rail Conditions
Supt. of Day

Date 191

Period	Division 1		Division 2		Division 3		Division 4		Division 5		Division 6	
	Reported	Sig.	Reported	Sig.	Reported	Sig.	Reported	Sig.	Reported	Sig.	Reported	Sig.
Period 1 First Car to 9 a. m.												
Period 2 9 a. m. to 3 p. m.												
Period 3 3 p. m. to 6:30 p. m.												
Period 4 6:30 p. m. to Last Car												

Signal 1 Above 32° Fahr. Signal 2 Between 30° and 32° Fahr. Signal 3 Below 30° Fahr.

Temp.	Wind	Weather and Rail	Temp.	Wind	Weather and Rail	Temp.	Wind	Weather and Rail
6 a. m.			11 a. m.			4 p. m.		
7 "			12 "			5 "		
8 "			1 "			6 "		
9 "			2 "			7 "		
10 "			3 "			8 "		

Fig. 3—Boston Elevated Railway—Record of Sand Car and Wagon Operation Kept by Superintendent of Day

wagons of the type shown by the accompanying illustration. The capacity of each is 1 cu. yd. These wagons require frequent loading points, and in order to provide sufficient sand for them as well as for use

	1912	Car Hours	Car Miles
July	786	786	7,171
August	723	723	5,774
September	1,893	1,893	15,144
October	3,136	3,136	24,088
November	2,014	2,014	16,112
December	1,379	1,379	11,032
1913			
January	2,244	2,244	17,952
February	1,949	1,949	15,592
March	1,541	1,541	12,328
April	670	670	5,360
May	628	628	5,024
June	812	812	6,496
Total	17,775	17,775	142,073

by street inspectors with pails, there are kept filled by the general supply cars 109 street boxes.

Besides these facilities for sanding the track each of the company's twenty-four carhouses has an adequate sand bin. Then, too, all box cars are equipped with boxes of a capacity of approximately 1 1/3 cu. ft. These are maintained and filled by the carhouse force and are operated by foot pressure by motormen. Sand is also

Form 3422-F-11-12-2500.

BOSTON ELEVATED RAILWAY COMPANY

Date 191

SAND CAR OPERATION Serial No. Div.

Temp	Wind	Weather and Rail	Heaters Time Changed	Signal	Time Out	Time In	Carhouse	DISTRICT COVERED
5 a.m.			PERIOD 1					
6			First Car to					
7			9 A. M.					
8								

Fig. 2—Boston Elevated Railway—Record of Sand Car Operation Kept at Division Headquarters

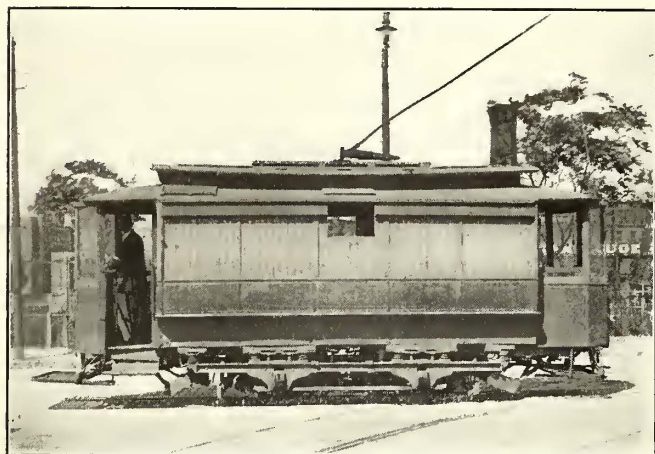
are received a yellow flag is immediately displayed at the carhouses, and notices warning all motormen of the conditions existing are written upon blackboards provided for the purpose.

The variation in the use of sand cars during the several months is shown in the table on this page.

carried, of course, in the hopper of individual passenger cars and on open cars in pails provided for the purpose, and the motormen are held responsible for testing the operation of the sand mechanism and knowing at the beginning of a trip that the hopper or pail is filled.

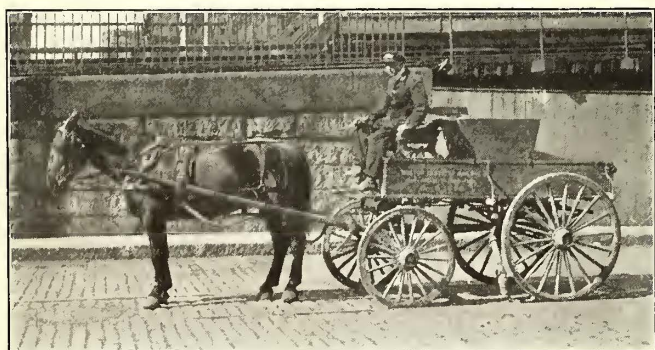
In order to keep an accurate record for future refer-

ence in case of accidents, etc., the 4½-in. x 6¾-in. day card reproduced herewith is used by men on sand cars. The division headquarters also keep records of operation on form No. 3422, 6½ in. x 12 in., and report this to the superintendent of the day at the company's main office. Here the information is entered on form No.



Boston Elevated Railway—6-Yd. Sand Car

3393, 6½ in. x 12 in., which enables the officials to keep in touch with all the sanding work done. This form, a section of the face of which is shown herewith, contains columns for the nine divisions of the company and also spaces for recording data concerning temperature, wind and weather and rail conditions from 5 a. m. until 4 a. m. the following morning. The reverse side of the



Boston Elevated Railway—Sand Wagon, Capacity 1 Cu. Yd., for Use in Downtown Business Section

record is used for data as to the operation of sand cars or wagons, with reference to time out, in, district covered and division number. When bad rail conditions occur in one division the superintendent of the day is in a position to warn other divisions to watch more carefully, and in this way the whole system has the benefit of the earliest knowledge.

The Metropolitan Street Railway Company, Kansas City, Mo., has put into use a coal bunker constructed to allow its coal supply to be kept partly submerged in order to retain its burning qualities, 20 per cent of which are said to be lost by exposure to the open air. The bunker just completed is of concrete, with a capacity of 30,000 tons. Twenty-inch pipes allow the bunker to be flooded or drained, as the operator wishes. The baths also improve the quality of the coal by carrying away much of the foreign matter, such as dirt, sulphur and wood, and prevent fires from combustion. If as successful as expected, other bunkers of the same type will be built.

FUNDAMENTAL PRECEPTS IN SAFETY WORK AND PERSONAL EFFICIENCY

The following is a portion of an address delivered Jan. 14, 15 and 16 to the trainmen of the Cleveland, Southwestern & Columbus Railway by E. F. Schneider, general manager. Several of Mr. Schneider's previous addresses on "Safety First" have appeared in these columns. In these remarks he takes up what might be called the general ethics of safety work and directions for personal efficiency on the part of employees. After stating that platform accidents had increased during 1913, Mr. Schneider continued in part as follows:

"It is time for us to form new resolutions for 1914. It is time for us calmly and dispassionately to bury all feelings of the past and take an optimistic view of the future in order that we, through whose agency nationwide influences have been brought to bear not only to ameliorate but also to prevent the enormous waste of life and limb, may see the realization of our finest dreams, the clearly discernible march of civilization toward the universal brotherhood of all men. This is the goal toward which we are all striving. We may differ in our opinion as to the detailed methods for attaining this end, but the best thought and the best minds of all agree that it is founded and can be founded only upon one great principle, the Golden Rule—'Do ye unto others as ye would have others do unto you.'

"This rule, the sentiment of which is so beautiful, but obedience to which is so difficult, should be the guide of our daily lives. I have sought to be guided by this rule, and I hope that the employees of our company are doing likewise. If you obey this rule, you will have more consideration for the man who works beside you. You will not loaf when approaching a meeting point, for you will try earnestly to get there first so that you can be of help to the other fellow. Under the perfect working of this rule, there will be no need of claim agents, for you will ever have before you the possibility of saving some poor fellow-creature from harm.

"It cannot be said that the Golden Rule is in complete operation under existing conditions. Man's inhumanity to man is daily exemplified. We need but to look around us to see numerous instances where the savage in man gains ascendancy, and as a result a heart is crushed, a spirit is broken, a selfish wish is gratified—in short, something is done for temporary gratification of a narrow-minded self, often at the expense of a weaker one. And where can you find man's inhumanity to man more strongly exhibited than in the railroad world? Railroads kill a man every sixty-seven minutes and injure one every nine minutes. Startling figures, and all the more so when you remember that a large majority of these fatalities and accidents can be avoided. I once estimated that the accidents avoidable to railroad men composed 85 per cent of the total, and these figures are becoming truer every day. A recent estimate in a railroad article placed the accidents avoidable by the railroad men at 75 per cent of the total; that is, 75 per cent of all railroad accidents are caused by nothing more or less than the negligence and carelessness of railroad men themselves. This toll levied upon society by the employees of companies whose object is the serving of mankind and the aiding of the progressive influences of civilization by transporting passengers, mail, express and freight is worthy of nothing except the severest condemnation. You have possibly heard of the old sea captain's official report regarding the natives he met on some out-of-the-way islands: 'Manners, none; customs, beastly.' The same thing can be said of ourselves, too; for we have no manners, and our customs are beastly

just as long as we collect the heavy toll we do from the ranks of the toiling multitude who place themselves in our care.

"There is but one temple in the universe, and that is the body of man." So runs an inscription on the wall in the Library of Congress at Washington. This sentiment was originally written more than 100 years ago by Novalis, a German writer, who, on account of the frailty of his body, died at an early age. With all the sadness that was ever his, with the ever-present desire for relief from earthly troubles, Novalis yet realized the almost divine trusteeship of the soul guarding the body of man, and with the ecstasy of an inspired soul he gave to us those words denoting his feeling of responsibility for even the frail body given to him.

"Novalis simply expressed the feeling that all of us should have in our hearts concerning the human body. We are individually accountable for the use we make of the temple of our bodies and their proper care. But the sacredness in which we should hold our own bodies is increased many fold when we think of the bodies of others intrusted to our care. These should be guarded most zealously and delivered safely to their destination, and only when you have gone through the day without injury to the temple intrusted to you and with proper care of your own bodies can you lie down to a repose truly earned.

"One of the reasons why men do not avoid accidents as they should is that they are not thoroughly imbued with the spirit of their jobs. Get on good terms with your job. You will always work better for something you like. Other men like to deal with and associate with a man who thoroughly enjoys his work. A great many men do not succeed because they dislike their work; they are always wanting to try something else. This unrest is particularly disastrous to railroad men. Those dissatisfied ideas are the ones you have in mind when you get lost in a fog, when you run off a derailer, when you pass a meeting point, when you run into the rear of the first section, when you fail to signal the motorman for the passenger's stop in time, when you fail to know your rear platform is clear before giving the go-ahead signal, when you fail to help some poor woman with arms full of children and bundles off the car, when you do not think of helping the old or the crippled. You do not have these mental lapses because you do not want to help others, but because you are not on good terms with your job. Get into your mind the fact that this is a big, dignified job, just as good a job as you thought it was when you were trying to get it. Appreciate your job and appreciate it now. I venture to say that you men are earning more money than nine-tenths of the people you are serving, so that you need offer no excuses for being railway men. Writers have often tried to explain the 'secret of success,' but the fact is that the reasons for it are neither secret nor new. To become more successful you must simply become more efficient. Do the little things better. Do your work so that you will require less supervision. Aim ever to better the work you are doing, for by so doing you are bettering yourself. Remember that the thoughts you think, the words you speak and the deeds you perform are making you either better or worse. You can be what you will to be.

"Look upon yourself as a manufacturer in business with yourself. Regard yourself as a maker and seller of service, and ever bend your thought and your energies toward the improvement of your product. Just as the wise manufacturer never wilfully does anything to injure his machinery, just so you must preserve proper conditions in your plant; you must, soul and body. Eat and drink only that which will nourish your body, entertain only those thoughts and feelings that will enrich

your mind and soul. By so doing you will build up a service factory that will find its products in constant demand, for the world is hungry for 'quality of service.'

"We all blame others for our shortcomings when the trouble lies within us. Whatever we are the world will be to us. Every day we get the reflection of our own natures. If we are cross, it is reflected to us. If we are surly, we get in life's mirror the same picture returned to us. If we are diplomatic, if we are kind, if we are courteous, if we are careful, if we are honest, if we are helpful, if we are cheerful, if we are forgiving, if we are blind to the faults of others, if we are always striving to do our best, not only will we better our own character through being helpful to others, but also the good done will some time return to us in multiplied form.

"The 'Boy Scout' movement, which has attracted much attention, has inculcated certain principles which are most worthy and beneficial to growing boys. They are contained in the 'Scout law,' and I wish that railway men had a similar law. What better testimonial could be given of a railway man than to say that he fulfils every condition of this paraphrase of the 'Scout law'?"

"A railroad man is trusty, loyal, helpful, friendly, courteous, kind, obedient, cheerful, thrifty, brave, clean and reverent."

ELECTRIFICATION OF SUBURBAN LINES OF THE LONDON & NORTHWESTERN RAILWAY

The system of conductor-rails adopted for the electrification of the London & Northwestern suburban lines in England is the same as that on the District and Metropolitan railways. There are insulated third and fourth rails, the positive rail being on the outside of the track rails and the negative in the center between them. The conductor rails are of special low-carbon soft steel weighing 105 lb. per yard, and are supported on porcelain insulators of the usual pattern, attached to the ties by malleable-iron clips. Each rail joint is bonded by four copper bonds of the flexible strip type, the four bonds having a sectional area of 1.4 sq. in.

Work in connection with the conversion of the suburban lines of the London & Northwestern Railway to electric traction is now entering a new phase. The construction of the power house buildings at Stonebridge Park is approaching completion, and the first units of the generating plant will be installed during the next few weeks. For the electric service which will soon be in operation between Willesden High Level and Earl's Court a supply of current will be purchased, but it is hoped that the Stonebridge Park station will be furnishing current to the whole of the Euston, Broad Street, Watford and Earl's Court lines included in the conversion scheme by the end of 1914. The power plant at Stonebridge Park will comprise five turbine-driven three-phase alternators having an aggregate normal full-load capacity of 25,000 kw and capable of developing 31,000 kw at the two-hour overload rating. The alternators will generate direct current at 11,000 volts at a frequency of twenty-five cycles per second. The turbines and condensers are being made by the British Westinghouse Electric & Manufacturing Company and the main alternators by the Siemens Brothers Dynamo Works. The boiler house plant will consist of twenty Babcock & Wilcox water-tube boilers, with automatic stokers and Green economizers. The boilers will be arranged in two rows parallel to the turbine room, each row having a separate stack.

A project has been approved for the construction of an electric railway, partly underground, in the town and district of Genoa, Italy.

A Single-Truck Convertible Car for New York Suburbs

This Car Is 34 Ft. 11½ In. Long and Among Other Features Is Notable for the Use of a Non-Oscillating Truck, a New Type of Skeleton T-Iron and Channel Framing and Unusual Proportions of Side Sashes—It Is Equipped with Air Brakes and Automatic Starting and Accelerating Devices

The Union Railway, New York, which operates an extensive network in the borough of the Bronx, New York, and in the suburban sections north of that borough, has lately placed in service one single-truck car of the type shown in the accompanying half-tones and drawing. This company's other cars are either of double-truck longitudinal seat or open-bench design, and the present car is the outcome of a belief that a non-oscillating single-truck car with cross seats and suitable for both closed and open service is much more

head line to the other. These channels also form the framing of the duct for the exhaust ventilators. The roof itself is formed entirely out of agasote. The T-member along each side of the car has two functions, namely, to stiffen the car framing and to separate the removable lower sash from the small upwardly sliding sash. The installation of an upper sash about 10 in. high is novel in American practice, but it is advantageous in making the convertible car more flexible to meet sudden and short changes to warm weather. In



Long Single-Truck Car—Car for Union Railway Suburban Routes in Trial Service on the 125th Street Line of the Third Avenue Railway

satisfactory and economical for the medium traffic conditions in the territory served. The new cars seat forty-two passengers in a combination of corner longitudinal seats and 34-in. cross-seats with 25-in. aisle, although it is but 34 ft. 11½ in. over the bumpers and 22 ft. 11½ in. over the body. The standard closed cars of 28-ft. body length with longitudinal seats accommodate only thirty-six passengers. Part of the new car's large seating capacity is due to the use of a bench at the motorman's end and of a single seat on the devil-strip side at the conductor's end.

FRAMING

The framing is one of the most interesting features as this has helped to produce a car weighing only 24,000 lb., or 571 lb. per passenger. This weight would be less on future cars as the present one is equipped with old-style motors. The floor framing is a standard combination of commercial angles and I-beams, the variations from common practice beginning above the floor line. The posts and carlines are T-irons which are formed as complete arches at intervals of 2 ft. 5 in. Along the center of the arch the structure is braced by a pair of riveted channels which run from one bulk-

summer the lower panels will be replaced by screens. Other framing features of the car are the use of T-members to strengthen the platform from the dash to the corner posts, side sills of 3/16-in. x 15-in. plate, 1/16-in. gage steel to form roof pockets for the top sash and agasote flooring on a Keystone foundation.

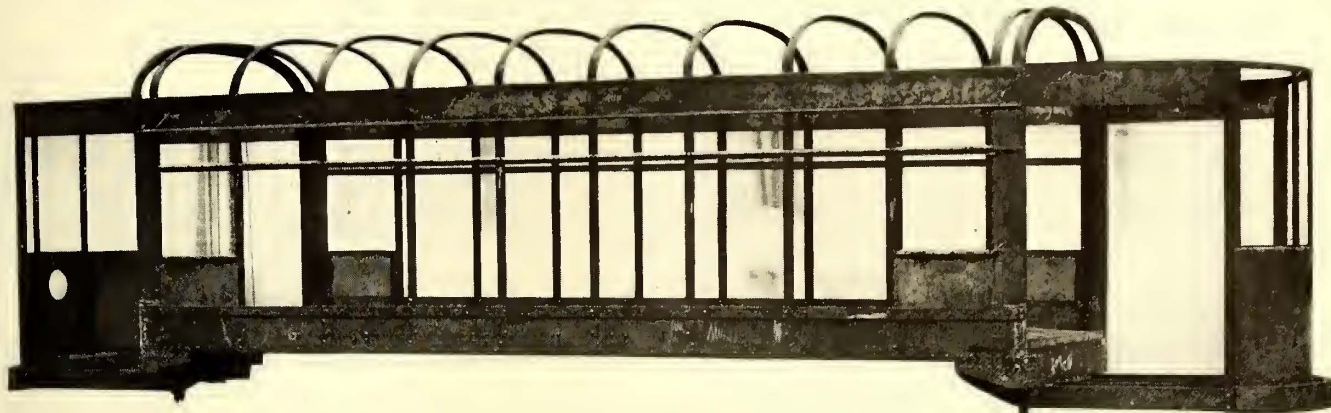
TRUCK AND EQUIPMENT FOR TRACTION

The truck is a modification of the Brill No. 21-E type of 8-ft. wheelbase and 21 ft. over all. The journals have spiral springs while the ends of the truck have long semi-elliptic springs to avoid oscillation. Inside brake rigging is used to give ample space outside the truck for the air brake and control equipments which are installed under opposite ends of the car. Two Westinghouse 68 motors are in use temporarily, but the rest of the operating equipment is modern and includes Westinghouse type 24-A control and National air brakes. The absence of the ordinary K controller gives the platform at least 12 in. more elbow room than others of the same length. The fact that no dividing rails are used on the platforms also adds to their spaciousness. This single-truck car is the only one in the New York metropolitan district which is equipped with air brakes.

SOME OPERATING FEATURES

Although the car is mounted on a truck with wheels of 33-in. diameter, the moderate step heights of 13 in., 11 in. and 10 in. from top of rail to bulkhead line have been obtained by building the floor with a ramp of 3 in. in the 7-ft. 6-in. length between the bulkhead line and

tively short, push-buttons have been set only in the panels at the ends so that passengers will be out of their seats and near either exit before they signal for a stop. This feature will eliminate the loss of time which arises when a departing passenger must work his way through a crowded car after he has signaled from



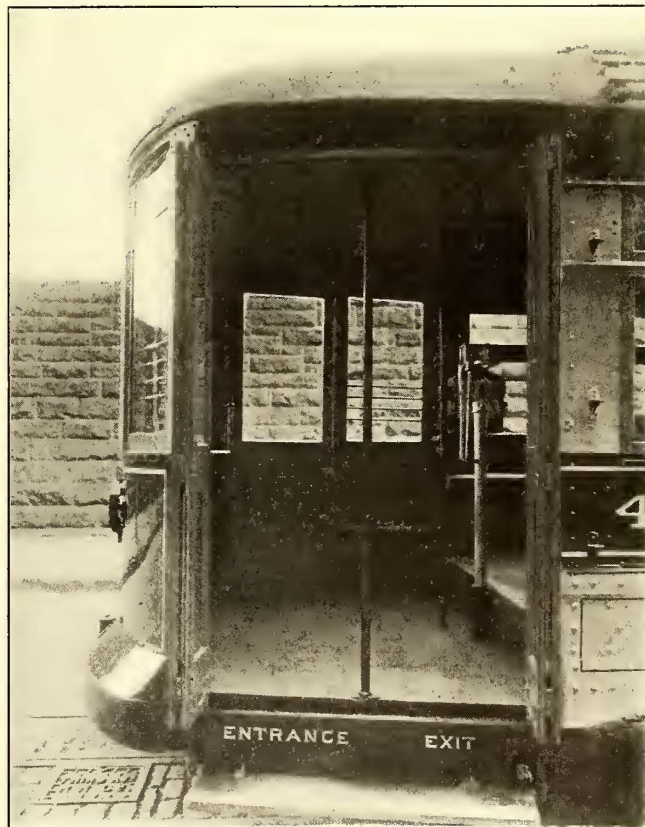
Long Single-Truck Car—Steel Framing Layout of Union Railway's First Car

the center line of the journal boxes. The passenger-handling arrangements are of the standard pay-within type with two pairs of hand-operated folding doors at the conductor's end and a single sliding exit door at the motorman's end. As the conductor is not anxious to operate the doors any more than he can help, he will

his seat. A new feature of the stanchion at the conductor's station is a disk and rod which can be made to slide in a pipe slot overhead. The movement of this device causes the current to be cut off and sets the air brakes at emergency. The control equipment of the motorman embodies such safety features as the dead-



Long Single-Truck Car—Contactor Control Equipment and Disk of Emergency Valve in Pipe at Conductor's Stand



Long Single-Truck Car—Conductor's Platform, Showing Folding Doors and Corner Seat Blocking Sliding Exit Door

take advantage of his commanding position to encourage the use of the front exit by calling "Front way out, please," whenever he sees that passengers are ready to leave. The passenger will more readily comply with this suggestion because he does not have to open a body door to get to the platform. As the car is compara-

man's handle and automatic acceleration. In addition, the car cannot be started until all the doors are closed. The last device is a contact and relay, contrived by Mr. McWhirter, which prevents starting on any notch but the first. Thus this single-truck car is also unique in having automatic starting and accelerating features.

LIGHTING AND MISCELLANEOUS EQUIPMENT

The lighting system is of modern character, for instead of the usual naked lamps five 60-watt tungsten units have been placed in Macbeth-Evans "Alba" shades along the center line of the car as illustrated. This semi-indirect system gives a well-diffused illumination which is enhanced by the cheerful interior finish of



Long Single-Truck Car—Semi-Indirect Lighting, Exhaust Ventilators and Short Movable Upper Sash

white. The tungsten lamps form one series circuit, the second being made up of five 2-cp carbon lamps, which are used for the destination signs and headlights. In case a tungsten lamp burns out, equivalent resistance can be cut in by turning the nearest snap switch. These switches are placed in the ceiling within the exhaust register. The company estimates that the

also, a Johnson registering type box is used for fare collection, the interior of the car is free from all kinds of register cords, bars and rods. The electric heaters are of Consolidated cross-seat type. The thermostat control and the ventilators were furnished by the Railway Utility Company, Chicago. The exterior view of the car shows that destination signs are used at the sides in addition to the customary vestibule indicators.

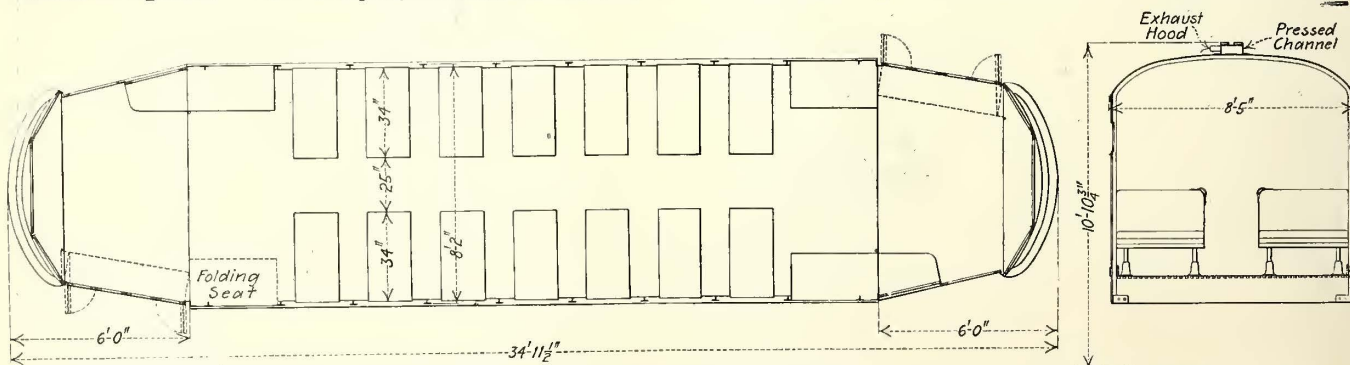
This car was designed by and built under the supervision of J. S. McWhirter, superintendent of equipment Union and Third Avenue Railways. Mr. McWhirter now has patents pending to cover the several new features described. The company now has under construction an additional car of this type, but it will differ in having a Brill "Radiax" truck of long wheelbase and 24-in. wheels to permit the use of small high-speed motors. These changes will be made to eliminate the first or folding step.

PENNSYLVANIA RAILROAD HONOR ROLL

The Pennsylvania Railroad in announcing on Jan. 31 the names of its employees who have been placed upon the roll of honor, having reached the age of seventy years, made public the fact that during the past thirteen years it has paid out in pensions the sum of \$9,500,000. During that time 7800 men have been placed on the roll of honor. Of that number 3765 have died and on Jan. 1, 1914, there were 4037 employees still on the roll. Of the \$9,500,000 paid out by the Pennsylvania Railroad System in pensions, \$7,174,129 had been expended by the lines east of Pittsburgh and \$2,326,370 by the lines west of Pittsburgh. Among those retired on Jan. 1 was Margaret Ferguson, an employee on the New York Division, who had served the company thirty years and four months. Twenty-seven women are now on the roll of honor. Their average length of active service was twenty-eight years and one month.

That the Illinois Traction System is alive to every source of publicity is illustrated by its use of an enormous sign on the ridgepole of its shops. This sign is 260 ft. long, and its main portion is occupied by the words "Illinois Traction System Shop." At one end is a smaller statement reading "Express service at freight rates," at the other "Use the road of good service."

The Victorian legislative assembly has passed four bills authorizing the construction of new electric tram-



Long Single-Truck Car—Plan Showing Seating and Door Arrangement, and Cross-Section Showing Exhaust Duct and Hoods in Roof

lighting cost of these cars is but three-eighths of that of a twenty-five 16-cp carbon lamp outfit, such as is used on other cars.

The straps, which are installed only alongside of the corner seats, are fitted with "Rico" sanitary sleeving and are riveted directly to the exposed carlines. Since,

ways around Melbourne, viz., the Brunswick and Coburg, the South Melbourne, the Camberwell, Hawthorn and Richmond, and the Kew lines. The costs are estimated at \$175,320, \$292,200, \$306,810 and \$340,900 respectively for the complete schemes, which will add greatly to transit facilities in their district.

Private Versus Public Ownership of Steam Railroads

A Review of Samuel O. Dunn's Book on "Government Ownership of Railways"—Mr. Dunn Shows that State Ownership Is Not a Financial Success in Countries with Democratic Government, and that State-Owned Railways, Even if Successful, Do Not Give General Satisfaction to the Public

In his new work, "Government Ownership of Railways," Samuel O. Dunn, editor of the *Railway Age Gazette*, has presented a clear, sane and fair study of a subject which, by friend and foe alike, has often been discussed with too much recklessness and asperity. After studying the great but well-digested mass of data presented by Mr. Dunn, no one can honestly say that one form of ownership is invariably better than the other when the problem is considered from the proper standpoint of the general welfare. Before discussing the book it is necessary to have a clear idea of the apparent scope which the author has given to the meaning of the term "government ownership." He appears to have in mind that kind of public ownership which is commonly and contemptuously designated by the Marxian socialist as bourgeois, or middle-class, ownership. Mr. Dunn's arguments are therefore addressed to property owners and taxpayers who appreciate business reasoning. He realizes, however, that his discussion does not cover all aspects, for in the chapter on "Condition of Labor" he says: "The reasoning in favor of socialism as a means of improving the condition of the working class in general is supported by entirely different premises from reasoning intended to show that government ownership of any particular concern or class of concerns would benefit working people in general." We may amplify this point by stating that advocates of nationalization fall into four classes, namely, the small capitalist, the socialist, the syndicalist and the communistic anarchist. The first would simply transfer the present railways to the State bodily and manage them much as at present, except that lower rates would be granted; the second would, under universal co-operation, make the railways as toll-free as public highways, but he would have a highly centralized management; the third would treat the railways as a money-making property democratically managed by the employees, while the fourth believes that each section could be managed by the communes through which it passed. It is to be noted as a sharp distinction that of these four classes only the first proposes to purchase at a fair price; the other three plan to seize the railways with little or no compensation, even to the living generation of owners. It is needless to say that comparisons of fixed charges, earnings and profits will not affect the belief of doctrinaires who consider public ownership only from the standpoint of Utopia. As yet, however, this aspect of the question is not a big factor in American politics.

To begin with the book itself: Under "The Question in the United States," Mr. Dunn is decidedly pessimistic as to the outcome of the present tendency toward regulation. It is to him the case of the devil and the deep sea. If liberty to regulate fails, the public will want to cure it with the greater liberty of ownership; if regulation is successful, the public has every reason to feel that actual ownership would be more so. One of the most startling developments noted by Mr. Dunn is that public ownership advocates may soon be found among railway officials and stockholders—the first because regulation "restricts their freedom of action" and the second because regulation limits their profits. We have heard more than one railway man express the opinion

that he would feel happier on a State-owned railway with unlimited funds for every department. Again, many stockholders who have seen their holdings depreciate rapidly within the last three years would gladly exchange them to-day for guaranteed government 3 per cents.

Under "Relation of Railways to the State" and "Causes of Government Ownership," Mr. Dunn shows the vastly different ways in which each national railway system has developed. He regards Anglo-Saxon individualism as the main reason why England built its railways without State help, but we are inclined to believe that the abounding wealth of English trade and manufacture in the thirties and later was at least an equally potent factor. There is no lack of individualism among the non-Saxon Greeks and Italians in the United States to-day. As the English roads received the least aid from the State, so have they also been the least hampered by regulation. Yet even in England government ownership is not considered "wholly improbable."

France is apparently the best country for contrasting the two types of ownership, because both public and private lines exist there side by side, and the present public management of the Western State Railways can be compared with their previous private management. As Mr. Dunn shows later, the change was not for the better of the State, of the public or even of the employees. In Germany and Italy ownership of most lines has passed to the State. Although the first railways of both countries were built when each was but a group of separate principalities, the Germans have succeeded in building up a highly profitable system, while the Italian State Railways are unprofitable and give a notably bad service. In general, State ownership preponderates in the other countries of Europe. It must be emphasized, however, that in no case were the motives for nationalization of the kind which are brought forward in the United States to-day. The motive was the military one, as in Germany; the fear of foreign owners, as in Switzerland; competition from private lines, as in Belgium, or the inability of a private road to meet its obligations, as in France.

In "Cost of Capital" Mr. Dunn states his belief that the United States government "can borrow more cheaply than any corporation, and probably more cheaply than any other government." We are likely to see a concrete example of this in the proposed Alaskan Railways. One eminent authority, Mr. Ingersoll, has estimated that the government will be able to sell the bonds for so much more than any private capitalist that the reduction in fixed charges will probably be great enough to make the difference between success and bankruptcy. However, the proposed Alaskan issue amounts to but \$40,000,000, and one may question whether the government could issue on equally favorable terms the fifteen to twenty billions of dollars of bonds which would be needed to acquire all of the railroads of the United States. Again, the author points out that when a private road cannot "make good" and receivers are appointed to scale down securities only the owners suffer, but in a State-owned system all failures to meet fixed charges must come from

the general revenues and so be a tax on all the people. The charge of overcapitalization is also taken up and shown to be groundless on various bases of calculation, including the capitalization of operating income as worked out for the Interstate Commerce Commission by Prof. H. C. Adams in 1904.

In treating of "Organization and Official Personnel," Mr. Dunn shows clearly the probability that a saving of 17½ per cent in cost of capital would be wiped out by an increase of only 7 per cent in operating cost. The question, therefore, is whether the public management would be more or less efficient. The most important point brought out in this discussion is that our present form of government does not permit the creation of an administrative department which would be free from political interference. On the Prussian-Hessian State Railways permanent employment and promotion on merit are a matter of course. On the other hand, in this country the post office has been used so long for political rewards that the appointment to the New York postmastership of a man who had come up from the ranks was hailed as a miracle. If, after all the years of a public postal service, postmasters are not yet appointed according to merit, what results may be expected from the selection of railway managers on a political basis? If the railways were subject to Congressional control, we should see the same extravagant favoritism which is now shown toward different sections of the country in river and harbor appropriations. In short, the pork barrel would swell to the dimensions of the Heidelberger tun. The only hope for efficiency in government work is in a quasi-military organization like that under which the Panama Canal was constructed. Who believes that a disciplinarian like Colonel Goethals would have been permitted to "stay on the job" if he had depended upon the suffrage of his men?

The following chapter in Mr. Dunn's book deals with "Effects of Consolidation Under Government Ownership on Economy of Management." We agree with Mr. Dunn that the sum saved by lopping off a few executive heads here and there would be a ridiculously small part of the total expense, but we would go further and assert that there is a limit to the amount of territory that one man can supervise ably. Many American railroads are already so big that few economies would result from further standardization, and standardization when applied to too wide a diversity of conditions is a loss instead of a gain. More could be saved by eliminating duplicate train service, by consolidating ticket offices and terminals, by re-routing and by abolishing the publicity expense due to competition. In short, the government might do what the railways tend to do themselves—when the government permits. Savings of this character have been made on the Prussian-Hessian State Railways, but on other State-owned lines, notably in France, the operating expenses have largely increased, thus showing how greatly the results depend on the political conditions.

Succeeding chapters take up such features as economy of management, adequacy, quality and safety of service, rate questions, financial results, condition of labor and political effects. The uncontrovertible statements in these chapters will prove a great surprise to those who imagine that State-owned railways can be or are run successfully on principles different from those which govern a privately owned railway. The most successful State-owned roads also have to encounter complaints about car shortage, preferential rates, crowding, etc. In short, all existing State roads are operated to make money, and consequently they come no nearer to pleasing everybody than does any private road. Furthermore, in a democratic country, they run the risk of being so much less efficient that the

government not only loses the taxes which the private roads would pay, but also has the additional burden of greater fixed and operating charges.

Of course, it is not possible to make any very satisfactory comparisons of passenger and freight rates in Europe and in America owing to great differences in density of travel, length of average run, weight of train and other causes. It is shown, however, that American railroads tend to keep down the freight rates, thereby benefiting indirectly all the people, whereas roads like the Prussian-Hessian State Railways maintain a high freight rate but give very low passenger rates to the poorer classes. Much has been made of these low fares in Germany by our State ownership advocates, but we doubt whether the average American would care to ride in a third-class compartment, let alone the fourth-class compartment. The second-class and first-class fares do not differ materially from those for like service in the United States.

It is frequently assumed by labor unions that nationalization would be greatly to their benefit, but experience shows the contrary. In Prussia unions are absolutely forbidden; in other countries, as recently in France, strikes are quickly broken by the expedient of calling the strikers to military duty. In fact, when the railways are privately owned the men always have the opportunity of using any prejudice which the public may have against the management, but when the railways are owned by the State the public looks upon a railway strike as something akin to treason. It is difficult to compare the wages of countries with different standards of living, but it is a fact that the American trainman lives far better and occupies a higher relative standing in the community than his European brethren. From what has been said, one thing is certainly evident, namely, that political practices and ideals in the United States will have to undergo a wonderful change before public ownership of railways has any possibility of financial success.

RATING THE MAN HIGHER UP

In an address before the Efficiency Society, Roger W. Babson urged his hearers not to devote all of their attention to increasing the efficiency of employees but to give some thought to the man higher up. "I believe," he said, "that the greatest inefficiency exists to-day among the boards of directors of our various corporations. Most of these men are indifferent and attend meetings only for their fees, if they attend at all. Moreover, many of them hold their positions simply because of inherited property and are utterly unfitted for their work. In fact, I believe that a knowledge of these conditions on the part of organized labor is one of the reasons for its objection to being 'rated' and 'efficiency-engineered.' In other words, it is much better to begin at the center and work out than to try to begin at the outer edges and work in. Of course, I recognize that efficiency engineers who should recommend that the president be fired, that a new treasurer be employed and a new board of directors be chosen would have to starve for a good many years, but if efficiency engineers are honest, this is the advice they will often give."

The Public Service Commission for the First District, acting for the city of New York, has leased from the New York Dock Company a parcel of land at the south-west corner of Furman and Fulton Streets, Brooklyn, to be used as the site for the power house to be erected for the construction of the two proposed rapid transit tunnels under the East River in the lower part of the city, namely, the Whitehall-Montague Street tunnel and the Old Slip-Clark Street tunnel.

Wittenbergplatz-Dahlem Extension of Berlin Subways

This Extension Through High-Grade Residential Territory Was Opened on Oct. 12, 1913, and Is Notable for the Artistic Construction of the Stations and Stairways

The Berlin Elevated & Underground Railway opened for public service on Oct. 12, 1913, its extension from Wittenbergplatz in Berlin to the fashionable suburb of Dahlem. The cost of constructing this section was borne by the municipalities of Charlottenburg, Wilmersdorf and Dahlem, each of which voted the sum of \$625,000, in addition to which about \$500,000 was contributed by the owners of contiguous real estate. All of the towns named are in the high-grade residential territory west of Berlin which hitherto has been

lem (not illustrated) are finished to resemble private houses rather than public buildings. The Dahlem section is the only one which is in an open cut, the remainder being shallow subway construction. Examples of the stations on the underground sections are shown in the accompanying views. All of the buildings are very ornate with sculptured granite or sandstone, metal portals and elaborate electric fixtures.

Of the illustrations reproduced, perhaps the most interesting is the entrance to the Wittenbergplatz sta-



Berlin Subway Extension—Heidelbergplatz Station, Vault Construction with Suspended Lighting Fixtures

served only by the Charlottenburg extension of the railway company's trunk line. The right-of-way of the new line is the property of the communities named, and in accordance with the franchise conditions various operating appurtenances will revert to them after a term of years.

No expense was spared in the design and construction of the stations and station entrances, the strongest incentives being local pride and the desire to attract population, aside from the love for artistic structures so characteristic of modern Germany.

The Dahlem section is the farthest out of the city and is one of the few communities near Berlin where villas are constructed in place of large apartment houses. Therefore the exterior of the stations at Dah-

tion in Charlottenburg at the junction with the main line. The picture was taken before all of the debris had been cleared away but shows clearly enough that the building is prominently set off by its location in a small park or gore and that additional perspective is furnished by the very wide streets around it. Directly behind the building are the sodded tracks of the Grosse Berliner Strassenbahn. The interior of the same station illustrates the majolica tiling and the lighting scheme. Two fully glazed ticket offices are provided. The tiling near one ticket office carries a very large map of Berlin while the tiling on the side wall carries a plan of the station platforms with arrows to indicate the western and eastern sides. A post in the center of the station carries directions to the nearest

adjoining streets and also a sign which presents the names of the stops in each direction. When this station was used originally as a way station on the parent

ceived, for example, from the diverse designs adopted for the Heidelbergerplatz and Hohenzollernplatz portals. The eagles at the latter station are, of course,



Berlin Subway Extension—Street Level Entrance to Junction Station at Wittenbergplatz



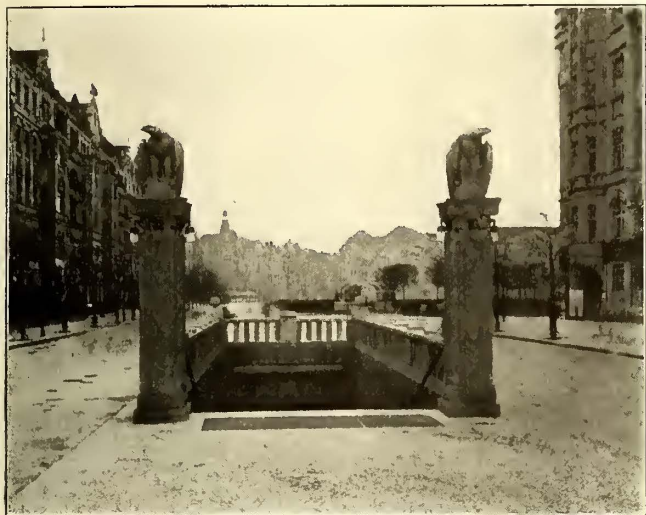
Berlin Subway Extension—Street Level Entrance to Junction Station at Wittenbergplatz

line it had side platforms only, but now it has six tracks and four platforms, two of which are of the island type. No two stations are alike as may be con-

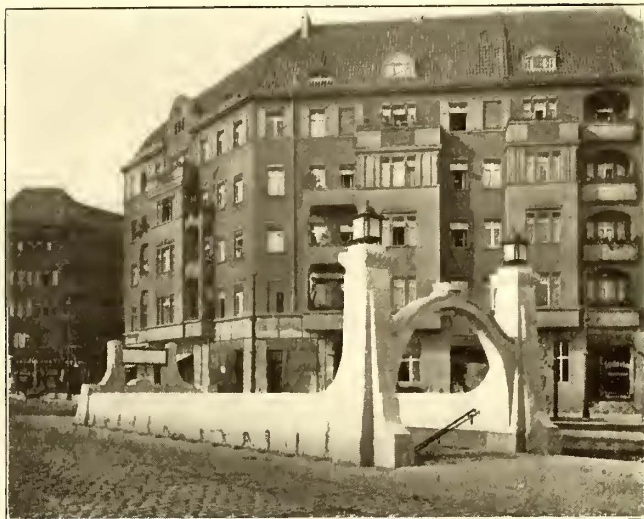
symbolic of the Hohenzollerns, the family of the German Emperor. The same diversity in design is also common to the interiors of the stations, all of which

are finished in a different architectural and color scheme. Thus, there is a strong contrast between the plain doric columns and flat roof of the Breitenbachplatz station and the massive vaulted design at Heidelbergerplatz. The lighting fixtures also differ. The view of the Breitenbachplatz interior was taken at a

ond-class and third-class compartments, zone-fare operation, etc. To permit the eventual operation of eight-car trains, all stations on the new line have island platforms 360 ft. long. At four stations double-loop tracks are provided for through and shuttle service trains. The first train from the Dahlem terminal at Fehrbel-



Berlin Subway Extension—Portal Carrying the Eagles of the Imperial Family



Berlin Subway Extension—Stairway with Crown on Arch, Harmonizing with Those on Adjacent Trolley Poles



Berlin Subway Extension—Breitenbachplatz Station Built with Doric Columns and Flat Ceiling

point which shows the daylight gratings generally installed in these stations.

The track and third-rail construction of this subway section does not differ materially from that of the main line of the Berlin Elevated & Underground Railway. The rolling stock is also of standard design with sec-

linerplatz to Berlin leaves at 5:15 a. m. and the last train in is due at 1:30 a. m. The shuttle service begins at 6 a. m. and ends at 1 a. m. Within the Wilmersdorf territory the service is two and one-half minutes, in the intermediate territory toward Dahlem six minutes, and to the end of the line twelve minutes. The total

length of the line, embracing nine stations, is 6.2 miles. All of the work was carried out by the Siemens & Halske Company, Berlin, except that the tunnels and cuts at Dahlem were made by Haberman & Guckes, Kiel.

PRESENT STATUS OF RAPID TRANSIT IN BERLIN

As the original triangular grade crossing of the Berlin Elevated & Underground Railway has been altered into a transfer station with different levels, only one link, namely, from this station to Wittenbergplatz, must be constructed to permit this company's system to be operated as two separate trunk lines from west to center and from west to east respectively. Both lines would have two branches, the former from Wittenbergplatz to Charlottenburg and Wilmersdorf, the latter from Nollendorfplatz (subterranean double-story station still to be built in the missing link) to Kurfürstendamm and the existing Schöneberg line. Negotiations are going to extend the Kurfürstendamm line to Halensee, the Charlottenburg line to Spandau and the Nordring line to Pankow. Other rapid transit lines in course of construction are the Friedrichstrasse subway belonging to the city of Berlin and the Gesundbrunnen-Neukölln line of the Allgemeine Elektrizitäts Gesellschaft. A map of the Berlin rapid transit lines in use or under construction was published in the *ELECTRIC RAILWAY JOURNAL* for Sept. 6, 1913.

UNITED STATES MAIL SERVICE ON ELECTRIC LINES

The annual report of Joseph Stewart, Second Assistant Postmaster-General, covering the year ended June 30, 1913, gives the following information as to service and expenditure on electric and cable car routes:

Number of routes	569
Length of routes, miles.....	7,641.12
Annual travel, miles	12,369,969.40
Annual rate of expenditure.....	\$716,195.04
Average rate of cost per mile of length.....	\$93.72
Average rate of cost per mile traveled, cents.....	5.79
Average number of trips per week.....	15.56

A comparison with the previous year shows the following changes: Increase in number of routes, twelve, or 2.154 per cent; increase in length of routes, 168.22 miles, or 2.251 per cent; increase in annual travel, 130,331.36 miles, or 1.065 per cent; increase in annual rate of expenditure, \$29,639.27, or 4.317 per cent; increase in average rate of cost per mile of length, \$1.85, or 2.013 per cent; increase in average rate of cost per mile traveled, 0.18 cent, or 3.208 per cent; decrease in average number of trips per week, 0.19 cent, or 1.206 per cent.

The appropriation for the fiscal year was \$728,000; the amount expended to Sept. 30, 1913, was \$695,388.56, leaving a balance of \$32,611.44, out of which unsettled accounts must be paid. The appropriation for the fiscal year 1914 is \$847,400.

The annual rate of expenditure was: July 1, 1913, \$722,172.13; Sept. 30, 1913, \$720,056.83.

The sum estimated as necessary for the fiscal year ending June 30, 1915, is \$756,000, being \$91,400, or 10.78 per cent less than the appropriation for the previous year.

The annual rate of expenditure for electric and cable car service authorized at the various rates provided by law was on June 30, 1913, as follows:

At 3 cents a mile.....	\$204,781.35
At 4 cents a mile.....	30,039.00
Under special provision.....	6,704.21
At railroad rates	48,583.07
At schedule rates other than 3 and 4 cents a mile.....	38,859.72
At apartment and independent car regular rates.....	43,206.30
At apartment and independent car maximum rates.....	337,692.02
At special-agreement rates less than regular rates.....	6,329.37
	<hr/> \$716,195.04

Mr. Stewart says in his report: "The appropriation act for the fiscal year 1914 continued the provision in connection with the items for electric and cable cars authorizing the expenditure of not exceeding \$100,000 of the appropriation for regulation screen or motor wagon service, which may be substituted in lieu of electric and cable car service. This could not otherwise be done on account of the fact that the appropriation for regulation screen-wagon service is generally no more than sufficient to care for existing contract obligations and increases in service which are foreseen. It has not been found necessary to make use of this authority, but it is a valuable alternative to enable provision for service in cases where the demands of electric car companies in the performance of the service in the large cities cannot be met, and it should therefore be continued."

ELECTRIC RAILWAY EXHIBITS AND TRANSPORTATION FACILITIES AT SAN FRANCISCO EXPOSITION

Work on the buildings of the Panama-Pacific International Exposition at San Francisco in 1915 is being pushed forward rapidly. The official classification of exhibit departments shows that exhibits relating to railways will appear partly among the transportation exhibits and partly among the machinery exhibits.

The Transportation Palace, covering $7\frac{1}{4}$ acres, and several smaller adjacent buildings will show all possible methods of conveyance, including steam and electric locomotives, repair shops, passenger handling, publicity, accident prevention, train dispatching and, in short, every department of railway activity. The machinery exhibits will include that part of railway equipment which is common to other industries, such as power house outfits, illuminants, machine tools and various forms of electrical apparatus other than strictly railway material. A feature of special interest will be a display of internal combustion motors up to 500-hp.

A standard-gage railroad about 12 miles long has been completed from the docks into the exposition grounds, immediately adjacent, and spur tracks will provide easy approach to all of the main exhibit palaces and to other important points throughout the entire exposition reservation. This main-line track will not be torn up on the opening of the exposition, but it will be buried, traversed by the footpaths and roads of the exposition and uncovered again when the doors of the exposition are closed Dec. 4, 1915, thus providing against the necessity of rebuilding the line and avoiding its exposure, to the scenic disadvantage of the landscape garden scheme.

Another element which is peculiar to the exposition arises from the fact that there is no physical connection between the grounds and any railroad (except, of course, the exposition's terminal line already described), and in order that carloads of building material not arriving by water, and later on exhibits which come by rail, could be delivered direct, a freight ferry slip has been constructed. Car barges operated by railway companies whose terminals are across the bay in Oakland are already landing at this slip. Some are equipped with their own motor power, and others are moved by steam tugboats.

Transportation of visitors within the grounds will be provided by (1) forty-passenger gasoline motor buses, already ordered, of which about fifty will be used; (2) a steam-operated narrow-gage, intramural railway with trains run on about a two-minute headway; (3) automobile chairs, run by storage battery, about 150 being planned for, and (4) push chairs and jinrickishas, about 150 of each.

New Southern Pacific Line in Oregon

This Line, Known as the Portland, Eugene & Eastern Railway, Has Just Put in Operation 109 Miles of Track and Will Comprise When Completed 350 Miles—The Trolley Voltage Is 1500

Jan. 18 saw the initiation of interurban service on the first unit of the Southern Pacific Company's electrification in the Willamette Valley of western Oregon, constructed and operated as the Portland, Eugene & Eastern Railway, of which Robert E. Strahorn is president. On Saturday, Jan. 17, the Portland Commercial

The part of the Willamette Valley line just placed in service is known as the "McMinnville Loop" and covers 109 miles of track. It came into being by the conversion from steam to electric power of the old Yamhill and West Side divisions of the Southern Pacific system in Oregon.



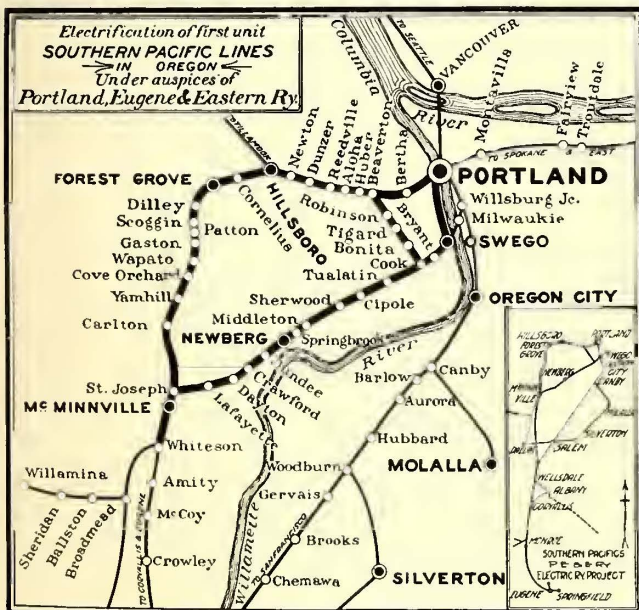
Portland, Eugene & Eastern—New Passenger Station at McMinnville

Club, a noted organization of the Northwest, baptized, christened or consecrated the service by operating a chartered train over the new electric loop, carrying railroad officials, city officials, prominent citizens and

The Union Depot in Portland is the terminal of the system. From that point trains pass south through the city along Fourth Street, one of the important business thoroughfares. At Fourth and Jefferson Streets the Yamhill division of the loop is diverted to the west bank of the Willamette River and parallels that stream to Oswego, thence to St. Joseph junction. The West Side line continues along Fourth Street to Hillsboro, Forest Grove and St. Joseph junction. Thence one line of track continues south to Whiteson junction, 4 miles south of McMinnville, where temporary terminal yards have been established. Operations are now in charge of Southern Pacific officials, D. W. Campbell being the general superintendent, John M. Scott general passenger agent and H. A. Hinshaw general freight agent. Service began with the operation of thirty-six trains in and out of Portland every twenty-four hours.

Outside of the city of Portland the new interurban serves a population of 45,000 and a district which in 1913 produced a crop valued at \$16,000,000. The territory contains 223,000 acres of land under cultivation and 286,000 acres of non-cultivated arable land, while the average of its bank deposits is \$4,300,000. Much of the soil is the famous "beaver dam" land of western Oregon, largely devoted to gardening and small fruit raising. Many of the larger dairies supplying Portland will be served by this line.

When completed, the Portland, Eugene & Eastern Railway will have a compact system of 350 miles in the Willamette Valley, a district 50 miles in width and 125 miles in length, a rolling valley of great fertility. A map of the entire system and of the Oregon Electric Railway, which also operates in this valley, was published on page 1051 of the *ELECTRIC RAILWAY JOURNAL* for June 14, 1913. The completion of these plans requires that all of the steam lines of the Southern Pacific



Portland, Eugene & Eastern—Map of Present Lines

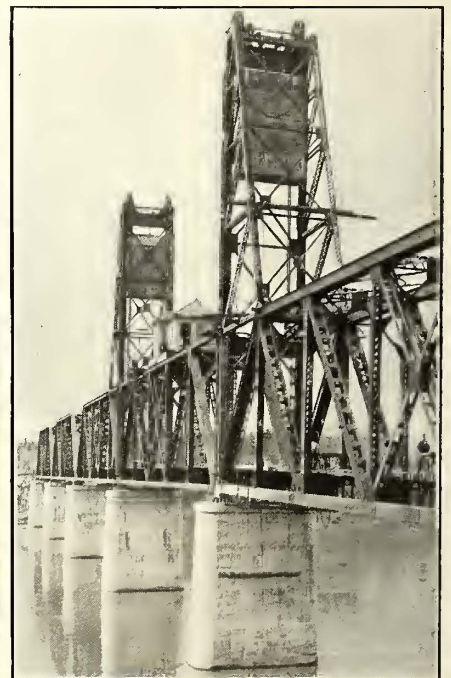
(Scale is approximately 16 miles to 1 in.)

newspaper men from the towns served by the new road as its guests. Brass bands and oratory concerning the era of development which is expected to follow the beginning of the rapid transit service welcomed the train at every stop.

Company except the main line shall be taken over and electrified. A number of independent railways will then have been absorbed and a number of new lines constructed. The company now owns and operates the street car system at Salem, the State capital, that at Eugene and that at Albany, and will construct a new street car system at Corvallis, all to be operated in connection with its interurban system. At Salem and Eugene large central passenger stations are to be constructed on blocks of ground which the company has purchased in the center of the cities, and these stations will be terminal and transfer points for interurban and city service.

Among the other properties acquired as portions of the Portland, Eugene & Eastern system are the West Side and Yamhill divisions of the Southern Pacific between Portland and Corvallis; the Salem, Falls City & Western Railway; the Sheridan & Willamina Railway; the Corvallis & Alsea Railway, and the Willamette Falls Railway, the latter being the first electric interurban

land Railway, Light & Power Company at Milwaukee, Ore., at 60,000 volts, three-phase, sixty cycles. This energy is then transmitted over the railway company's transmission line to Oswego substation, which is a combined transformer station and substation. In this substation are installed two 1000-kw, three-phase transformers, which transform the energy from 60,000 volts to 13,200 volts. Leaving Oswego substation, there are two 13,200-volt transmission lines, one feeding the Forest Grove substation and the other feeding the Dundee substation. The 13,200-volt transmission line is of No. 0 seven-strand, hard-drawn copper with a 3-ft. spacing and arranged with all three wires in the same plane on the cross-arm. The Forest Grove and Dundee substations are reinforced concrete, fireproof buildings, and each contains two synchronous motor-generator sets of 500-kw capacity. The motor portion of the set consists of a synchronous motor wound for 13,200 volts and operating directly on the transmission line voltage. The generator of the set is a 500-kw, 1500-1575-volt direct-



Portland, Eugene & Eastern—Standard Steel Passenger Car and Drawbridge Across Willamette River at Salem

line ever constructed in the Northwest. A new line has been constructed between Monroe and Eugene, 23 miles, and another between Canby and Molalla, 11 miles, while a 15-mile connection between the Salem, Falls City & Western and the Springfield branch gives a complete cross-valley line near the center of the district for the assembling of shipments south of Portland. A new main line for the operation of electric service is to parallel the main line steam track of the Southern Pacific between Portland and Salem, much of the right-of-way for which has been acquired.

In the construction of new tracks, rebuilding, relaying steel with heavy material and electrification the Portland, Eugene & Eastern Railway has invested \$7,130,000, inclusive of a new bridge at Salem.

POWER DISTRIBUTION

The territory immediately adjacent to Portland and comprising what is known as the "McMinnville Loop," being lines from Portland to McMinnville via Forest Grove and from Portland to St. Joseph via Oswego and Newberg, also the Beaverton cut-off from Beaverton to Cook, are served by three substations at Oswego, Forest Grove and Dundee. Energy is received from the Port-

current interpole machine. There is also a 125-volt exciter.

In addition to the motor-generator sets, each substation contains the usual complement of oil switches, switchboards and the other necessary control apparatus. A small storage battery is provided for furnishing control current for the operating of the oil switches and for emergency station lighting. Each substation is provided with tank electrolytic lightning arresters both on the incoming transmission lines and in the outgoing 1500-volt feeders.

The Oswego substation, in addition to being a transformer substation, also contains two 500-kw synchronous motor-generator sets, with provision in the building for a third set when load conditions shall demand this extra unit. These sets are similar to the ones installed at Forest Grove and Dundee substations. There will eventually be nine substations in all. The other substations are to be at Eugene, Lake Creek, Corvallis, Salem, McCoy and Hubbard. The distance between substations varies from 22 to 25 miles. These six substations will be somewhat similar to the ones already described. The motor-generators for the substations were supplied by the General Electric Company, where-

as the transformers, switchboards and 13,000-volt switches were furnished by the Westinghouse Electric & Manufacturing Company.

The trolley emf, as before mentioned, will be 1500 volts, direct current. The trolley construction will be what is known as the catenary type with standard spans of 60 ft., 90 ft., 120 ft. and 150 ft., the 150-ft. spans being used on tangents and the shorter spans on curves of varying degrees. Between Oswego and Dundee and between Oswego and Forest Grove the 13,200-volt transmission line is carried on the trolley poles.

The catenary construction consists of a No. 000 grooved copper trolley carried by a 7/16-in. galvanized steel messenger cable of 15,000-lb. breaking strength, the messenger cable being supported on insulators carried on angle-iron bracket arms attached to the poles.

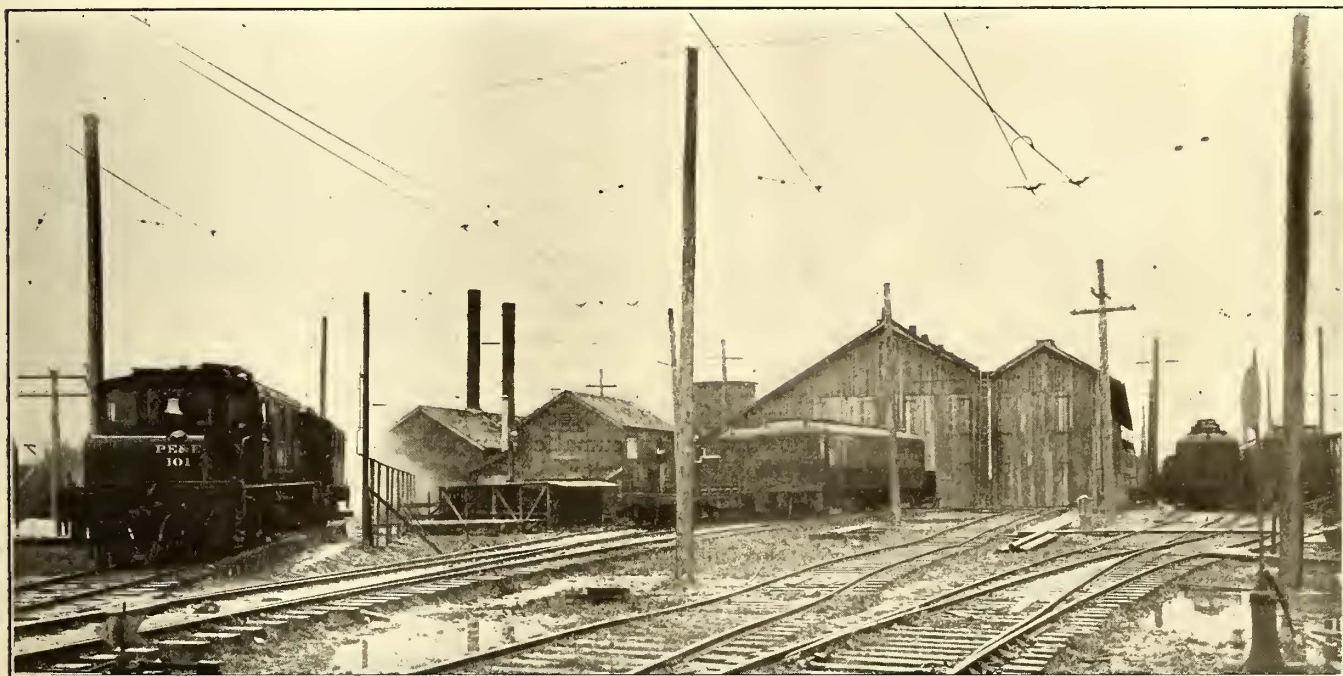
A high grade of cedar poles with 9-in. tops has been used for this work and all pole butts are treated.

On the "McMinnville Loop" lines a 336,420-circ. mil

motor cars and trailers together. The roller pantograph trolley is used and a dynamotor compressor provides pneumatic power for the pantograph operation. All pantographs can be placed in contact with the trolley wire simultaneously by the motorman operating an air-control switch in the cab of the leading car of the train. The lighting and control circuits on the cars are arranged for 600 volts and obtain their power from a dynamotor which also operates the air compressor for the brake system.

The cars are equipped with four-motor equipment, each motor being wound for 750 volts but insulated for 1500 volts. The motors are connected two in series when operating on 1500-volt circuits, but by means of a commutating switch the connections are changed so that when operating on the 600-volt city lines of the railway company each motor may be thrown directly across the trolley circuit. The motors and control are General Electric.

All of the cars were built by the Pullman Com-



Portland, Eugene & Eastern—Car Shops at Beaverton, Ore.

aluminum feeder cable parallels the trolley circuit. Below McMinnville the feeder is 636,000-circ. mil aluminum.

The lines throughout are paralleled by two telephone circuits, one telephone circuit being used exclusively for telephone train dispatching. This circuit is of No. 9 hard-drawn copper. The other telephone circuit is the substation and emergency circuit, tying together all substations and emergency line headquarters. This circuit will be of No. 9 copper-clad steel wire.

A telephone selector system is installed with selective calling apparatus in the principal stations and with nine telephone sets, one at each siding.

ROLLING STOCK

The cars are of steel construction throughout, approximately 56 ft. in length and seating sixty passengers. They have the arch type of roof and are of various classes, some being straight passenger and smoking cars, others combination baggage, passenger and smoker, and others baggage and express cars. They are mounted on Baldwin trucks. All cars are arranged for multiple-unit operation with automatic control, the trains to consist either of straight motor cars or

pany. Altogether there are thirteen straight passenger motor cars, eleven passenger trail cars, seventeen combination passenger and baggage cars and five combination express and baggage cars.

For freight service there are provided a number of 1500-volt, 60-ton electric locomotives supplied by the Westinghouse Company and equipped with apparatus and motors somewhat similar to that provided for the passenger coaches.

The railway company operates city street car systems in Eugene, Salem and Albany. Operation in the city of Portland will also be on 600-volt current, so that the car equipment is designed for operation on both 600 volts and 1500 volts.

Both St. Louis and Kansas City had street car robberies during the past week. Two negroes held up a street car in the theater section of St. Louis and fled with the conductor's money, but were captured later, after a battle with policemen. Two robbers in Kansas City held up a Fifth Street car at the end of the line and escaped with \$12.45 in change after knocking down and severely injuring the conductor before the motorman had time to come to his assistance.

Air Brake Performance on Modern Trains*

The Author, Who Is Assistant Chief Engineer Westinghouse Air Brake Company, Presents Conclusions Drawn from the Results Obtained from a Series of Tests with Different Types of Brakes on High-Speed Trains on the Pennsylvania Railroad

BY S. W. DUDLEY

During the spring of 1913 the Pennsylvania Railroad, in conjunction with the Westinghouse Air Brake Company, instituted on the West Jersey & Seashore Railroad a thoroughly scientific and comprehensive investigation of the different factors affecting the operation of brakes on railroad passenger trains. Only brief mention of the general conclusions to be drawn from the tests will be made in this paper, but the detailed results are available in the official report of the tests compiled by the test department of the Pennsylvania Railroad, copies being obtainable on request from the Westinghouse Air Brake Company.

The investigation included tests of the standard PM type of pneumatic brake designed for high-speed trains and provided with quick-action triple valve and a reducing or blow-off valve that retains the maximum cylinder pressure practically constant for a period of time and then by an accelerating blow-down reduces the brake cylinder pressure as the stopping point is approached, the reduction compensating for the increased effectiveness of the brakes as the speed diminishes, due to the increased friction coefficient.

The tests also included consideration of the improved system known as the UC type of electro-pneumatic brake with which the brakes on each car are electrically controlled from the head of the train, the air for emergency application and for a graduated release being supplied from an emergency reservoir on each car which is charged from the train pipe. This system permits an effective emergency application after a service application has been made and, as shown by the tests, can be operated pneumatically in trains partly equipped with the standard pneumatic brake of the PM type.

In the tests it was found that in service applications with the improved or UC equipment greater flexibility of operation is provided. That is, the braking power per pound of brake pipe reduction is lower, thus giving the operator a greater time in which to use judgment when manipulating the brakes. At the same time, however, the maximum braking power obtainable in a full service application is higher. A more sensitive and prompt release of the brake is insured, tending to improve the releasing action of all brakes in the same train of mixed old and new equipments. The action of the old and the new equipments mixed in the same train is harmonious and free from rough slack action or shock both in service and emergency operation of the brakes.

With the new equipment operating either electrically or pneumatically, there is always available a quick-acting and fully effective emergency brake. This is not the case with the old equipment, in which the relation of the service and emergency functions is such that a quick-acting application cannot be obtained after a service application of any consequence. The following average results indicate the degree to which this difference has an effect on the length of stop.

Considering the ordinary full service stop from 60 m.p.h. with both brakes (say 2000 ft. or 2200 ft.) as

100 per cent, the attempt to make an emergency application with the old equipment does not produce any shorter stop than if only a full service application were made. With the improved apparatus operating pneumatically, an emergency application following a partial service application will shorten the stop about 14 per cent and after a full service application about 10 per cent. With the electro-pneumatic brake these figures are respectively 23 per cent and 15 per cent, a very considerable improvement.

The attainment of full service braking power on the entire train with the UC equipment operating pneumatically was sixteen seconds, 33 per cent longer than with the PM equipment because of the smaller size reservoirs used for greater flexibility. Full service braking power was obtained in nine seconds with the electro-pneumatic brake but without sacrificing desirable flexibility because of the increased sensitiveness of control when operating the brakes electrically. The time of transmission of serial quick action through the brake pipe is practically the same with both UC and PM equipments.

The time to obtain full emergency braking power with the PM equipment on the entire train was 8 seconds; with the UC equipment operating pneumatically 3.5 seconds, or 56 per cent shorter; with the electro-pneumatic equipment 2.25 seconds, or 72 per cent shorter.

The gain in emergency stopping power of the electric pneumatic equipment over the PM equipment results from: (a) the shorter time occupied in applying the brakes; (b) a higher brake cylinder pressure obtained; (c) the holding of the pressure as obtained, without blow-down, as with the high-speed reducing valve of the PM equipment.

Designating the time of equivalent instantaneous application of retarding force by t , and the braking power, corresponding to the brake cylinder pressure obtained, by P , the values of t for emergency applications with the PM equipment twelve-car train range from 2 to 2.5 seconds; for the UC pneumatic from 2 to 2.5 seconds, and for the electro-pneumatic from 0.7 to 0.85 second.

The observed average value of P with the PM equipment (for a nominal 113 per cent braking power on the cars) ranges from 95 per cent to 100 per cent. With the UC pneumatic equipment and electro-pneumatic equipment nominal emergency braking powers of 90 per cent, 125 per cent, 150 per cent and 180 per cent were used, which, owing to locomotive effect, become for the complete train 90 per cent, 117 per cent, 137 per cent and 160 per cent respectively.

With the electro-pneumatic brake a uniform increase in percentage of braking power results in a substantially uniform decrease in length of train stop. An increase of 5 per cent in braking power reduces the length of stop about 2 per cent within the range of braking powers tested.

The available rail adhesion varies through wide limits, or from 15 per cent in the case of a frosty rail early in the morning to 30 per cent for a clean, dry rail at midday.

*Abstract of a paper presented before the American Society of Mechanical Engineers in New York on Feb. 10, 1914.

WHEEL SLIDING

The amount of wheel sliding depends more on the rail and weather conditions than on the percentage of braking power. Some sliding was experienced with braking powers as low as 90 per cent and 113 per cent where rail conditions were unfavorable, but 180 per cent braking power did not cause wheel sliding with good rail conditions.

The effect of excessive wheel sliding was to make the length of the stop about 12 per cent greater than similar stops without wheel sliding.

A brake power low enough to eliminate the possibility of wheel sliding on a bad rail results in longer stops than could be considered satisfactory for general service. Since good rail conditions prevail a large part of the time, the preferable emergency braking power is that which, considering the installation conditions, will stop trains at all times in as short a distance as can be accomplished without trouble from wheel sliding in such cases as are to be anticipated when emergency stops have to be made under unfavorable rail conditions. Advantage might be taken of this fact to use a higher braking power in summer than could be used in the winter with the same degree of freedom from objectionable wheel sliding.

From a calculation based upon the opposing forces on the wheel when sliding is about to commence it can be shown that a nominal braking power—that is, pressure on the brakeshoe as calculated from the pressure in the brake cylinder and neglecting the friction or binding of the brake rigging—may, under good conditions, be as high as 470 per cent of the load on the wheel without causing sliding. This, of course, is beyond the range of the tests which furnished the data from which the calculations were derived, and consequently the result signifies nothing more than that, under the conditions assumed above, an extremely high nominal braking power would be necessary in order to cause the wheels to slide. As a matter of fact, tests at about 400 per cent nominal braking power are on record in which practically no sliding occurred.

However, under as poor rail conditions as could well be imagined, the allowable percentage of braking power works out to 81 per cent. As a matter of fact, some wheel sliding was obtained during the tests with 85 per cent to 90 per cent braking power when very bad rail conditions prevailed. For practical purposes a conservative value for the coefficient of rail friction would be 15 per cent. If a nominal braking power of 150 per cent is used with as bad a rail condition as is represented by the extremely low value for coefficient of rail friction of 15 per cent, the mean retarding force developed by the brakeshoe is still 14 per cent less than the adhesion of the wheel to the rail.

The amount of wheel flattening when sliding occurs depends upon the weight upon the wheels, the materials in the wheels and rails and the condition of the rail surface. The rail surface may be such that relatively long slides will produce flat spots of a size requiring prompt attention.

BRAKE RIGGING

An efficient design of brake rigging must be produced before the advantages of improved air brakes or brakeshoes can be fully utilized. The use of the clasp type of brake rigging eliminates unbalanced braking forces on the wheels and so avoids the undesirable and troublesome journal and truck reactions that come from the use of heavy braking pressures on but one side of the wheel. This has an important effect not only on freedom from journal troubles but also in enabling the wheel to follow freely vertical inequalities of

the track. The clasp brake also improves the brakeshoe condition materially, both as to wear and variability of performance.

Although the clasp brake rigging will produce better stops than a single shoe brake rigging equally well designed (other conditions being equal), its advantage in this direction is of less importance than in the improved truck, journal and shoe conditions mentioned above.

The tests indicated that at least 85 per cent transmission efficiency could be obtained with either single shoe or clasp brake rigging.

BRAKESHOES

The brakeshoe bearing was the most difficult factor to control and at the same time the most potent in producing variations in brake performance.

The tests established the possibility of a variation of 15 per cent to 20 per cent in length of stops from 60 m.p.h. with all factors except brakeshoe condition remaining substantially constant. Continued stopping with moderate braking pressures produced a constantly improving brakeshoe condition and shorter stops. This is evidence that with reasonable attention to brakeshoe maintenance the condition of the shoes on cars in ordinary road service is likely to be more favorable to making short emergency stops than during a series of tests in which the brakeshoes are worked severely.

The difference in the efficiency of the clasp and single shoe rigging may offset the gain which might be expected from difference in coefficient of friction, and vice versa. Consequently, as neither of these factors could be observed uninfluenced by the other, a satisfactory comparison of the mean coefficient of friction under different rigging conditions, or of different types of rigging or air-brake apparatus under variable shoe conditions in road tests, is impossible.

High braking powers from high initial speeds result in a great heating of the working surface of the shoe and a rapid abrasion. This effect is most marked under severe braking conditions such as obtained when heavy cars equipped with one brakeshoe per wheel are stopped.

Shoes of the same type and hardness had a high rate of wear per unit of energy absorbed when a low coefficient of friction was developed and, conversely, a lower rate of wear when a higher coefficient of friction was developed.

Both the road and the laboratory tests confirmed previous tests and conclusions from analysis that the temperature of the working metal is the determining influence in coefficient of brakeshoe friction. The other factors that may be involved become effective chiefly as they affect the change of temperature of the working metal.

The general performance of the shoes as observed during the road tests formed the basis of the program established for laboratory tests, which resulted in the following deductions: (a) The generation of the retarding forces and consequent absorption of the energy of the moving train is dependent upon but a very small quantity of brakeshoe metal. (b) The actual bearing area rather than the total face area of the shoe is the important factor in brakeshoe performance. (c) The magnitude of the bearing area changes throughout the stop and is greatest near the end of the stop. (d) The bearing area shifts continuously from one portion of the surface to another during the stop. (e) The principal factor in producing high friction for any given braking condition is the frequent shifting of the bearing area from the heated to the cooler spots over the face of the shoe. (f) Slotted shoes or shoes that are

cracked are more flexible than solid shoes and the bearing area shifts more readily than in the case of solid shoes. (g) With shoes of the same type and approximately the same hardness, the wear per unit of work done is less with the slotted shoe than with the solid shoe. The stops with slotted shoes were always shorter and the mean coefficient of friction higher than with solid shoes. (h) The shifting of the bearing area will tend to be more rapid if the size provides more available area for shoe bearing. (i) The greater the pressure per square inch of bearing area, the lower will be the mean coefficient of friction. (j) Flanged shoes provide more available area for bearing than unflanged shoes, shortening the stops 12 per cent over results obtained with unflanged shoes. (k) The use of two shoes instead of one per wheel will result in a higher coefficient of friction and less wear per unit of work done. (l) A comparison of the values of mean coefficient of friction for standard and for clasp brake conditions indicates a decided advantage for the clasp brake throughout the entire range of braking powers. The gain in favor of the clasp brake with slotted shoes amounts to about 40 per cent at a braking power of 180 per cent and 100 per cent at a braking power of 40 per cent, an average gain for the whole range of braking powers of about 70 per cent.

From a brakeshoe standpoint the advantage of using two shoes instead of one shoe per wheel may be summed up as follows: First, the clasp brakeshoe is associated with but one-half the wheel load and consequently has but one-half as much energy to absorb. Second, the clasp brakeshoe is working at only one-half the shoe pressure at which the standard shoe must work under the same braking power. Third, the available work area is doubled for the same amount of energy to be absorbed.

A possible source of disadvantage when using two shoes per wheel is that a warped or poorly bearing shoe is subjected to less pressure tending to force it into a good contact with the wheel. For this reason, though the available shoe area is doubled when using clasp brakes, the actual amount of working metal throughout the stop may be less than a single shoe, which is less capable of resisting the tendency of the heavier pressure to cause a better fit of shoe to wheel.

This, with an especially good shoe condition due to previous moderate pressure tests in each case, is an explanation why three of the 60-m.p.h., 150-per-cent-braking-power, electro-pneumatic stops with the train with single-shoe brakes were shorter by 50 ft. than the best stops of either of the trains equipped with clasp brakes.

On the other hand, the disadvantage and greater variability of the single-shoe brake is evidenced in the fact that, under the same conditions as cited above, two stops with this train were longer than the longest stops without material wheel sliding made with either of the two clasp-brake equipments.

VARIOUS TYPES OF BRAKESHOES

With plain, solid shoes the durability will be increased 41.1 per cent under clasp-brake conditions as compared with that under single-shoe conditions. With plain, slotted shoes the durability will be increased 33.5 per cent under clasp-brake conditions as compared with that under single-shoe conditions. The superior durability of the plain, slotted shoe as compared with the plain, solid shoe amounts to 11.7 per cent under single-shoe brake conditions and 5.9 per cent under clasp-brake conditions.

The wear of the flanged, solid shoes per unit of work done is 19 per cent less than for plain, solid shoes, and

for flanged, slotted shoes 26 per cent less than for plain, slotted shoes, or 30 per cent less than plain, solid shoes. The wear of plain, slotted shoes per unit of work done is 5.4 per cent less than the wear of plain, solid shoes, and the wear of the flanged, slotted shoes is 13.2 per cent less than the wear of flanged, solid shoes.

For the same amount of work done flanged, solid shoes cost 16 per cent less than plain, solid shoes, and flanged, slotted shoes cost 23 per cent less than plain, slotted shoes, or 27 per cent less than plain, solid shoes. Approximately 135 per cent more stops will be required to wear out the flanged, solid shoe than will be required to wear out the plain, solid shoe; 158 per cent more stops to wear out the flanged, slotted shoe than the plain, slotted shoe, and 171 per cent more stops to wear out the flanged, slotted shoe than the plain, solid shoe.

For any given braking condition with cast-iron brakeshoes the indications are that the best relation will exist between shoe wear and mean coefficient of friction when the Brinell hardness of the cast iron is about 190. Machine and road tests show a difference in stopping distance for the same type of shoe under the same braking conditions.

The effect of the difference in wheel surface conditions is one of the leading factors which go to make up the difference between machine and road tests. The difference in braking performance can be established and the factor expressing this difference be applied to laboratory results to predict the performance of a car or train.

LENGTH OF STOP

The stops and observed performance of the air brake, brake rigging and brakeshoe are in agreement with the relation generally assumed to exist between the speed and other variables mentioned and resultant length of stop. This relation for straight, level track, neglecting air and internal friction, on the one hand, and the rotative energy of the wheels and axles, on the other hand, is:

$$S_t = 1.467 Vt + \frac{V^2}{30 Pef}$$

in which the terms have the following significance and range of values according to conditions:

S_t = length of stop to be expected in feet.

V = initial speed of train in miles per hour.

t = time in seconds at the beginning of the stop during which the brakes are to be considered as having no effect, to allow for the time element in the application of the brakes. For a twelve-car train this ranges from 2.0 to 2.5 with the PM brake and from 0.70 to 0.85 with the UC brake.

P = nominal per cent braking power corresponding to the average cylinder pressure existing for that portion of the stop after the brake is considered to be fully applied. With a single car or several similar cars, stopping without the locomotive attached, the value of P can be obtained from an average of all brake cylinder indicator cards or taken from one typical brake cylinder

TABLE SHOWING VALUES OF COEFFICIENT OF BRAKESHOE FRICTION BASED ON NOMINAL BRAKING POWER

Kind of Brake Rigging—Type of Brakeshoe	Speed, M.P.H.	Braking Power	Value of $e \times f$			
			Clasp Brake		Single Shoe*	
			Plain	Flanged	Plain	Flanged
30.....	{	125	0.141	0.169	0.108	0.112
		150	0.129	0.154	0.099	0.103
		180	0.118	0.141	0.090	0.094
60.....	{	125	0.103	0.122	0.074	0.090
		150	0.094	0.112	0.068	0.082
		180	0.086	0.102	0.062	0.075
80.....	{	125	0.092	0.109	0.070	0.074
		150	0.084	0.100	0.064	0.068
		180	0.077	0.092	0.059	0.062

*Value of data uncertain owing to non-uniform brakeshoe conditions.

card, provided that all cylinder pressures and foundation brake installations are subsequently alike.

ef = product of efficiency of brake rigging and mean coefficient of brakeshoe friction, in which e varies with the type and installation of brake rigging and with the percentage of braking power, though the latter effect can be but slight throughout the range of ordinary emergency braking powers; f varies with the kind and initial condition of the brakeshoe bearing surface, the initial speed and the various influences affecting the conditions of the bearing surface during the stop.

As no satisfactory separate determination of e and f was found possible, the combined factor $e \times f$ is given in the accompanying table, the values being representative of the best performance that might reasonably be expected under conditions comparable with those of this test.

THE VALUATION OF RAILROADS*

BY C. A. PROUTY, DIRECTOR OF RAILROAD VALUATIONS

Considered in its broad aspect, the subject of the valuation now beginning under the direction of the Interstate Commerce Commission naturally divides itself into three heads: first, the thing to be done; second, the time and expense required, and, third, the benefit to be derived.

The commission is required to ascertain and report the cost of reproducing new the railroad and other property of every railroad in the United States and the cost of reproduction less depreciation. As a preliminary step, every railway must furnish maps and plans, and when the valuation work is completed there will be found in the office of the commission at Washington an accurate map and inventory of the property of every railroad engaged in interstate commerce as of June 30, 1914, together with maps and plans showing all later additions to the property.

The valuation work is often referred to as a "physical valuation" of railroads and most people probably understand that the cost of reproduction with or without depreciation determines the value of the railroad, so that, having ascertained and reported these facts, the duty of the commission has been discharged. This is by no means true. At the present time the holding of the United States Supreme Court is that cost of reproduction new or cost of reproduction less depreciation is only a factor entering into the final question of value. Many other things have been enumerated by the board as bearing upon the value of the property. The valuation act itself requires the commission to ascertain and report the cost of construction, the amount of money invested in the property and the sources thereof; in short, to give a complete corporate and financial inventory of the property and from all these facts to determine the value of the property itself. Concerning the question of whether the cost of reproduction or the money investment will be the controlling factor in the cost of reproduction I express no opinion. I simply state that the commission is required not merely to ascertain the cost of reproduction but to state the value of the property, and in attempting to do this many delicate and difficult problems, such as those of developmental expenses, appreciation and the like, will have to be solved.

While it is somewhat hazardous to make an estimate of the time required for the completion of the valuation work, the field survey ought to be concluded in from four to six years from July 1, 1914. It is hoped

that the accounting and other work will keep pace with the field service. As regards the cost on the basis of the experience of state commissions, \$15 per mile will be sufficient to cover the engineering part of the work and \$10 per mile the accounting and other features. This will aggregate for the entire 250,000 miles between \$6,000,000 and \$7,000,000. On the basis of the experience of railroads, however, which have conducted valuations at a cost of from \$40 to \$80 per mile, it seems that it will cost at least \$50 a mile to complete the work, or at least \$12,000,000. This is a large sum, but it cannot exceed over one-tenth or one-twentieth of 1 per cent of the value ascertained—an insignificant amount in proportion to the magnitude of the thing dealt with. Moreover, the difference that the resulting valuation may make in the rates to the public or the railroads may well be for each year five times the entire cost of the valuation itself.

One of the first benefits of the valuation work is that incidentally conferred upon the investing public. It is the duty of the government within reasonable limits to see that a would-be investor is not hoodwinked in the making of his investment and that the value of his investment is not improperly destroyed. When an investor can know from reliable sources, such as a valuation report, the exact character of his investment, cost of reproduction, state of efficiency, etc., there has been injected into railroad securities an element of certainty and permanency that does not now exist.

To the general apprehension the object of this valuation is to determine what rates railroads should be allowed to charge for their services. The relative functions of the legislative and judicial branches in the fixing of rates are not yet clearly defined. All just men can see that the return should be substantially the same as that obtainable from private investment having the same incidents. Manifestly it is not a difficult thing to determine the rate of return. There still remains, however, the valuation upon which this rate is to be computed, and until that valuation is known it is impossible to determine what income the property is entitled to earn and to fix the just charge against the public.

It is much more difficult to solve the problem of rate establishment for railroads than for other kinds of public utilities on account of the fact that competitive conditions, such as cross-country competition and the like, largely control the railroads so that the rates of one are necessarily bound up with those of another. It is impossible to shake a single railroad free from every other and fix its charges upon the basis of a fair return upon its fair value as could be done in the case of a gas or water plant. It is evident, therefore, that if a commission should select a road most advantageously situated, whose business is the largest and upon which the conditions of operation are the most favorable, and should adjust its rates to yield a return of 6 per cent upon its value, every other railroad in competition would receive less than a 6 per cent return and some might receive nothing. On the other hand, if a road laboring under the greatest disadvantage was to be selected, its competitors would receive an undue return upon their investment. Theoretically, it might be possible to take up this slack caused by uniform through rates by an adjustment of rates upon local business, but the effect of this would be to concentrate business into certain localities, whereas the aim should be so to adjust transportation charges as to secure a general diffusion of values and business. The problem of establishing railway rates will not be solved by valuation, but it will be enormously simplified.

The greatest immediate value of the valuation work seems to lie in the fact that from the state of the public

*Abstract of address delivered before the second annual meeting of the Chamber of Commerce of the United States of America, held in Washington Feb. 1, 1914.

mind valuation information is necessary. The work will give some accurate data on the questions whether railroads as a whole are enormously overcapitalized or whether certain individual railroads may not have improved their property out of earnings without corresponding increases in their capital accounts. None of the important railroad questions of the day, such as those concerning the St. Louis & San Francisco system, the Boston & Maine and the New Haven, can be justly dealt with until the exact values of these properties are known. For this reason it is important that the valuation work be pressed to a completion in the most expeditious and most trustworthy manner possible.

BUSINESS TRAINING FOR THE ENGINEER*

BY ALEX. C. HUMPHREYS, PRESIDENT STEVENS INSTITUTE OF TECHNOLOGY

If an engineer is called upon to examine the value of a manufacturing property and in connection with this examination there are presented to him a ledger trial balance, a profit and loss statement and a statement of assets and liabilities, it goes without saying that he must understand how these statements are produced and how they are related to each other in order to make an authoritative report. This he cannot do without a knowledge of at least the principles of accounting. It may be said that the engineer's responsibility is confined to the strictly engineering side of the proposition and that he can be associated with an accountant to take care of this other work. Under such a condition, however, the accountant must have a sufficient knowledge of the practical or engineering side of the business to insure that the report as a whole shall be conclusive, and this puts the engineer in an undesired subordinate position.

There is no doubt that a knowledge of accounting is one aspect of business training that is essential to the engineer. Particularly is this true when there arises the question of differentiating between repairs or renewals and extensions or improvements. If, under the heading of repairs or renewals, extensions or improvements are charged too liberally to operation, the capital accounts do not reflect the true value of the property. On the other hand, if repairs and renewals are charged to extensions, the statement of profits is misleading and the capital accounts are unwarrantably expanded. The ability to discriminate between these items is a necessary qualification in the engineer-manager, especially in his work before public service commissions.

It is also necessary to know the principles of accounting in order to understand the valuation of properties, particularly the one difficult element of depreciation contained in such calculations. No man can be in a position to meet effectively the arguments of others in regard to depreciation, estimated and actual, unless he has a knowledge of the principles of accountancy. It seems to be almost impossible for the man who has little or no knowledge of such principles to appreciate that there is a sharp distinction always to be drawn between estimated depreciation and actual depreciation. Not a few engineers have helped to create the confusion that now exists with regard to the difference between these views of depreciation. Periodic depreciation that accrues—namely, the cost of the final renewal of plant or part of plant which is to be displaced either through the operation of physical decay, obsolescence

or inadequacy—should be covered by estimates as far as possible, so that the burden of the loss can be more evenly spread over the years of service of the plant or portion of plant to be renewed. The cost is bound to fall on the business sooner or later, but to enable the determination year by year of what are the actual profits as differentiated from the profits apparent on the surface there must be taken into account all accruing losses and gains, especially the former. Otherwise there may be paid out as profit that which has not been earned, and a financial burden may be accumulated that cannot be met when the day arrives for the final renewal of the plant or of part of it. This accruing loss for the final renewal of plant in addition to the current losses for maintenance is sometimes known as estimated depreciation, but it is my opinion that the word "depreciation" should not be employed in the case of such estimates but that the term "final renewals" should be used instead.

The word "depreciation" should be reserved to refer only to actual depreciation, the calculation of which becomes necessary particularly in valuation work. In valuing a plant the appraisers know the present demands made by the business; they are able to determine whether the plant is adequate or inadequate as to capacity and whether its condition shows obsolescence. In trying to determine the present actual condition of the plant, therefore, with the plant and business records available, no dependence should be placed upon an estimate made perhaps years before (or as of some previous year) as to what would be the condition of the plant in years to come. The actual facts can be determined only by an adequate examination of the plant by those competent as constructors, as operators and as administrators, and the actual amount of depreciation will hardly be the same as the amount shown by the estimated final renewals reserve.

The engineer should also understand overhead charges, for too often he fails to include these in his estimates. By some the items of omissions and contingencies are considered as overhead charges. I consider them items of construction, for while these items of cost cannot be estimated accurately, there will surely be items of cost under these two headings. There never was yet constructed a plant of any size which, when it was finished, did not contain parts not included in the original estimate. Furthermore, preparation must be made for contingencies in connection with almost any construction of magnitude. Hence, whether omissions and contingencies are included as overhead charges or not, they must be provided for, and the engineer should understand the methods for so doing.

There are other items which must be included in the final cost. They may be summarized briefly as follows: preliminary expenses and surveys, interest and taxes during construction, engineering and inspection, business organization during construction, fire and casualty insurance, cost of development and cost of financing. The engineer may claim that he is not responsible for some of these items of cost, but in such a case he must confine himself advisedly to certain specified items of cost. He cannot safely ignore the total cost if he is acting as a general adviser.

The engineer should certainly possess sufficient accounting knowledge to analyze data as presented to him in connection with propositions involving construction or operation or both. He should also be informed as to general business methods and practices, so that he may avoid the pitfalls that surround him on every hand and secure competent legal advice in cases where he recognizes his own incompetence. The students at Stevens Institute not only have to take up the business features

*Abstract of paper presented before Philadelphia Sections of the American Institute of Electrical Engineers and the American Society of Mechanical Engineers, at a meeting held on Feb. 9, 1914.

of engineering practice as a serious study, but before they can graduate they have to pass an adequate examination in the elements of accountancy, depreciation, the accountancy of depreciation, analysis of data, specifications, estimates, contracts and appraisals. They also have special lectures on the law of contracts, patent law, employers' liability and workmen's compensation, shop costs, the elements of banking and the like. During the fifteen years that this plan has been operating many of the alumni, who as students took up this work under protest, have acknowledged their obligations for being forced to take such work. No such course can give the engineer the complete equipment in the business side of engineering; but a similar remark can be made as to any curriculum. It assists a great deal, however, and through the beginning grasp of business affairs the students are much better qualified to apply their special engineering training.

TRAIN OPERATION IN MONTREAL

The Montreal Tramway Company has just begun the operation of trains on St. Catherine Street, the principal shopping thoroughfare of Montreal. These trains are composed of one motor car 44 ft. 9 in. over all and one trailer 44 ft. over all. An interesting operating



Montreal Tramway Company—New Two-Car Train

feature is that all entrance is by way of the rear platform of the motor car and the front platform of the trailer, thereby saving time in loading and also facilitating teamwork between the neighboring conductors on the prepayment platforms. Exits on the motor car, which is of the single-end type, are provided at the front and rear in accordance with the Montreal company's standard practice. The exit of the trailer car is at the front platform only. The vestibule doors of both cars are wired in series in order to give the motorman a light signal when all of the doors are closed. The motor car, of course, can be operated separately during the lighter hours of the day. It differs from the previous type of the Montreal company in having a fully inclosed rear vestibule instead of an open rear vestibule with bulkhead doors. A description of the principal equipment on these cars was printed on page 939 of the issue of this paper for Oct. 25, 1913.

RAILWAY CO-OPERATIVE STORES IN NEW YORK

The first six months of operation of the three co-operative employees' stores of the Interborough Rapid Transit Company and the New York Railways, which are respectively at 816-818 Eighth Avenue, 152d Street and Eighth Avenue, and Ninety-eighth Street and Lexington Avenue, has, in the opinion of the officials of these companies, shown the wisdom of their installation. Although no definite figures have been compiled, the progress of the stores is well shown by the steady increase in the volume of sales.

As stated in the ELECTRIC RAILWAY JOURNAL of July 12, 1913, these stores possess no philanthropic or charitable features; neither are they conducted for profit. The railways have simply placed at the command of their employees their extensive credit to be used in the collective buying of foodstuffs in large quantities at wholesale prices, and these foodstuffs are retailed to the employees at wholesale prices plus the exact cost—no more, no less—of delivering the same over the counter. Up to the present time the installation of the stores has meant a 20 per cent reduction in the average price of foodstuffs to the employees. It is the ambition of the companies, however, further to reduce the selling cost by buying in larger quantities, and for this reason they desire even a greater increase in gross sales than has been evidenced in the past.

The article of greatest consumption in the store is fresh meats, which run up to 55 per cent of the gross sales. Next come groceries with 25 per cent, and of the remaining 20 per cent dairy products form the largest part. It has been found that there is not much call for certain vegetables, such as lettuce, celery, etc., but that there is a considerable demand for beets, carrots and the like. The original scope of the stores has been broadened to include toilet articles and candy in response to requests from employees.

The following list shows the range of current prices in the stores:

Bulk or Package Goods	
Quaker oats	\$0.08
"None Such" mince meat	0.08
Franco-American "Ready Maid" soups, per can	0.07
Large No. 3 tins solid ripe tomatoes, finest packed, three cans for	0.25
"Jersey Giant" tomatoes (extra tall can), per can	0.12
Procter & Gamble's Crisco, per can	0.22
Van Camp's sugar corn, per can	0.10
Star milk, per can	0.10
Fancy new packed early June peas, per can	0.12
New mixed nuts, per lb	0.19
All National Biscuit Company goods:	
\$0.05 packages	0.04
0.10 packages	0.09
Spratt's dog cakes, per package	0.09
Schepp's coconut, per package	0.07
Maillard's cocoa, ½ lb.	0.20
Huyler's cocoa, ½ lb.	0.19
California asparagus tips	0.11
"White Rose" tea, ½ lb.	0.26
Coffee, per lb	0.20
Goods Put Up in Glass	
Sunbeam cider vinegar (attractive jars)	0.09
"Lion Brand" P. R. molasses (glass jars)	0.11
"Sunbeam" flavoring extracts	0.09 and 0.14
"Lion Brand" jams	0.09
Dairy Specials	
Armour's "Empire Brand" butterine, per lb	0.22
Imported Roquefort cheese, "Regal Brand," per lb	0.35
Young American cheese, per lb	0.22
Toilet Goods	
Supercream shaving soap, per box	0.05
Stork castile soap, per cake	0.08
Pure castile soap, per cake	0.07
Smelling salts, per bottle	0.20
Cold cream (large jars), per jar	0.39
Candies	
Turkish paste, per lb	0.19
Pan-American chocolates, per lb	0.25
Royal gum drops, per lb	0.11
Assorted chocolate creams, per lb	0.12

As an added attraction the companies have adopted the practice of offering a special article for sale. Prac-

tically every week a circular describing the special offer is published and posted on all bulletin boards of the companies. During the recent holiday season the stores, for example, sold the finest turkeys, ducks and geese at prices comparatively low. Special gift boxes were also made up for sale in the candy and toilet articles departments.

One of the difficulties encountered in the operation of the stores is the fact that about 80 per cent of the weekly purchases are made on Friday and Saturday. This is due partly to a natural inclination to do the heaviest trading for the week-end period and partly to the fact that the pay day of the companies comes at the end of the week. This excessive trade on Friday and Saturday necessitates the employment of a larger fixed force of clerks than would be required if the purchases were distributed more evenly throughout the week, and thus tends to increase the selling cost. While on account of the date of paying the men it will be impossible to obviate this heavy pressure of purchases on the last two days of the working week, it is believed that a special appeal made to the buyers, with emphasis laid on the effect of such a practice on the selling cost, will reduce this practice to as great an extent as is possible under existing conditions.

Practically all the purchasing is done by the wives of the employees. The percentage of women customers predominated from the opening of the stores, but with the recent granting of passes to the wives of employees over all the companies' lines the proportion of men buyers has decreased even more. This free transportation privilege has also had a marked effect on the gross sales of the stores, for more women at a distance from the stores have thereby found it advantageous to buy their foodstuffs there.

With the beginning of 1914 D. W. Ross, vice-president of the Interborough Rapid Transit Company and New York Railways, issued a circular to the employees in part as follows: "As these stores are your stores and our first and only aim is to run them as you would have them run, it is only right that we consult and advise with you as to the general outcome of their operation. To enable us to accomplish this result not only requires your fullest co-operation but demands that you make known to the management those things in and about the stores which please or displease. This refers not only to the character of goods on sale, but to the general conduct of the stores, including the efficiency of, and treatment accorded you by, the employees of such stores. We expect the clerks to accord you the same courteous treatment that is expected of you in dealing with the public, and we purpose that this shall be the case, but none of us can always be present personally at each sale, and for this reason we want you, as a matter of justice, not only to yourself and fellow employees but to those directly charged with the responsibility of operating these stores, to make known to them everything coming under your observation, no matter how trivial it may seem, which, in your mind, detracts from the general attractiveness of the stores, both as to physical appearance and general treatment accorded its patrons. Any suggestions or recommendations you may have to make looking toward this end are earnestly solicited."

As a result of this appeal Mr. Ross has received many letters, all of which are highly congratulatory as regards both the quality and prices of goods offered and the service rendered. Several suggestions have been received, some of which, such as setting aside certain hours on Saturday for men buyers only and delivering all goods to the employees' homes, are manifestly neither practicable nor desirable. Other suggestions, such as that providing for the withdrawal of

employees from other departments to help out in the week-end rush and thus rendering unnecessary the maintenance of a large sales force idle during the first of the week, are very practicable and indicate how the employees are co-operating industriously with the officials for the attainment of the lowest selling cost possible.

ARBITRATION AWARD FOR INDIANAPOLIS TRACTION & TERMINAL COMPANY

The decision of the Public Service Commission of Indiana in arbitration of the grievances of the employees of the Indianapolis Traction & Terminal Company was made public on the afternoon of Wednesday, Feb. 11. The award contains the provisions listed below:

The wage scale for motormen and conductors is, first year 21 cents per hour, second year 23 cents, third year 24 cents, fourth year 25 cents and fifth year 26 cents, and 27 cents thereafter. An increase of 5 per cent was granted to other employees of the company not in car service. The decision is binding for a period of three years.

No extra pay is allowed for overtime. A minimum of \$45 per month is provided for extra men. Motormen and conductors are required to be off one Sunday in each month, thus reducing their earning capacity by 3 per cent. The company is not required to recognize the union nor to employ union men but may not discriminate against any employee who may belong to the union.

All runs are to be completed within sixteen hours and no run is to have more than twelve hours' platform time for any one employee. Each employee in car service is to have eight hours off duty in each period of twenty-four hours.

Employees are to be paid for the time occupied in going to take runs at points other than the carhouses after they have reported at the carhouses. Men engaged in sweeper and snow-plow work are to be provided with meals by the company.

Hearings are to be held twice each month by the superintendent of the company and once a month the president is to hear appeals from suspended or discharged employees. Matters which cannot be satisfactorily adjusted between officials and employees and which are of a serious nature may be submitted to an impartial board of arbitration chosen as follows: One member is to be selected by the judge of the federal Circuit Court, one by the chief justice of the Indiana Supreme Court and one by the chief justice of the Appellate Court of Indiana.

The report of the findings of the commission contains about forty-two typewritten pages of decisions while forty additional pages are devoted to citations and references supporting the decisions arrived at by the commission.

The Illinois Traction System in its interurban shops at Decatur is now changing the quadruple equipments on ten of its motor cars from motors of 75 hp to GE-222 Form G motors of 140 hp at 600 volts. Each motor car weighs 90,000 lb. and in a typical schedule hauls two 70,000-lb. trailers. The trains are made up as follows: The head car as the passenger and baggage car is equipped with motors; the second car is a straight passenger coach, and the third is a parlor observation car. Sometimes these motor cars have to pull two sleeping cars. The schedule called for is 30 m.p.h., including stops averaging one every 2 miles. A typical run is 175 miles long.

COMMUNICATIONS

M. C. B. BRASS UNSUITABLE FOR HIGH BRAKESHOE PRESSURES

L. B. STILLWELL, CONSULTING ENGINEER
NEW YORK, Feb. 11, 1914.

To the Editors:

In your issue of Jan. 31 there appears an editorial announcing that "The M. C. B. Brass Should Be Discarded." This is somewhat startling, as the appliance in question has done, and still is doing, honorable service under conditions for which it is suited.

While your criticism of the use of this type of brass on the trailer trucks of the Westchester cars, to which you refer, is entirely warranted, I think that in placing the matter before your readers you should have given an explanation of the conditions which caused the unsatisfactory behavior of the brass, namely, the use of heavy brakeshoe pressure with single brakeshoes, hung high for the purpose of increased brake efficiency and with the desire to retain easy riding qualities during braking.

If the same M. C. B. brasses had been used with clasp brakes, providing two shoes per wheel, probably no trouble would have been experienced. The horizontal pressure exerted against the journals by the action of simple brakes has, of course, a tendency to force the journal from its seat on the brass, as illustrated in the photograph you reproduce. The use of two shoes per wheel, as with the clasp-brake system, overcomes this tendency to displace the journal.

Had your editorial been entitled "The M. C. B. Brass Unsuitable for Use with High Brakeshoe Pressure," I am sure that many of your readers would have received a more comprehensive first impression. However, I fully concur in your opinion that the subject of form of journal brass for high-speed electric service should receive suitable attention from the A. E. R. E. A. committee on equipment.

F. M. BRINCKERHOFF

THE CLASP BRAKE VERSUS THE SEMICIRCULAR JOURNAL BRASS

NEW YORK, Feb. 10, 1914.

To the Editors:

I have read, with considerable interest, your article on the "Maintenance of Mechanical Equipment on the New York, Westchester & Boston Railway," and also your editorial headed "The M. C. B. Brass Should Be Discarded." I am interested particularly in the latter and I desire to take issue with you on the general proposition that the M. C. B. brass should be done away with. This conclusion of yours is based, as I understand it, on the difficulty met with on the New York, Westchester & Boston Railway, as illustrated by the photographs on page 220. I think it is too hard to lay all this trouble on the brass. It is a good deal like the father buying a second-hand coat for his boy which, when tried on, was found to be too large. It was returned to the merchant and the difficulty was stated, but the merchant replied: "Why! The coat is not too large. The boy is too small!" Not that the case is a parallel one, but the conclusion is just as reasonable as yours.

In the first place, the M. C. B. brass was never designed for use as a brakeshoe, and it makes a very expensive appliance to be used in this capacity. The illustration referred to is a magnificent example, as it gives an exaggerated illustration of what is happening

in a greater or less degree to all M. C. B. brasses where the brakes are applied to one side of the wheel; and it would seem to the writer that the use of a special brass as noted on the photograph to the right (page 220) is only a makeshift, because the cause is in no way removed. This method should not be considered good practice as it is only a tentative expedient.

It seems to the writer that it would be much better engineering to go to the seat of the difficulty and remove the cause; and it is quite evident that the cause is the application of the brake on one side of the wheel. Obviously the clasp brake would entirely remove the difficulty and would prove of enough advantage in many other respects to warrant the expense of its installation. When such a clear-cut and well-defined case is so manifest it seems very much like begging the question to interpose any "homeopathic" expedient.

The same difficulty has quite recently developed in the trunk-line service of a steam road where the newer type of high-speed brake has been applied to heavy steel cars. Before the cause was definitely located, the only apparent remedy was to change from 5-in. x 9-in. to 5½-in. x 10-in. journals. The larger journal and M. C. B. brass obviated most of the difficulty of heating which had been manifest in the same cars, under the same conditions, when the 5-in. x 9-in. journal was used. Later, this same road began to use the clasp brake, and with clasp brakes on this same type of cars there has been no trouble from heating whatever with a 5-in. x 9-in. axle and appurtenances.

L. R. POMEROY, Consulting Engineer.

CHARGES FOR POWER IN ELECTROLYSIS REPORT

PHILADELPHIA, Feb. 5, 1914.

To the Editors:

The writer has read with considerable interest the article in your issue of Jan. 31 relative to the Bureau of Standards' method of electrolysis elimination as proposed for Springfield, Ohio. While he does not wish to offer any criticism as to the methods proposed, he does wish to call attention to the method of calculating the value of energy saved by the system. This has been assumed at 1 cent per kw-hr. without stating just what is included in the assumed cost. This is a very common figure used in such calculations; but a figure about one-third of this amount is more nearly correct, and even less than 1/3 cent under some conditions ought to be used.

The power station of a road with which the writer has been associated shows a cost per kw-hr. of about 1.1 cents. It is a compound condensing, d.c. plant using high-grade coal costing \$1.60 per ton. The cost of power includes 10 per cent interest and depreciation. Roughly speaking, the cost is made up of 3 to 3½ mills for fuel, a similar amount for wages, oil, repairs, etc., and the balance for interest. Now, unless the decreased output of a station is of a comparatively high percentage of the total previous output, the only saving of moment is in the coal pile, and the other costs are practically stationary except as shaded off in fractions. The only possible real saving is somewhere close to 1/3 cent per kw-hr., varying with the individual plants.

The amount proposed to be saved in the article in question is considerably less than 1000 kw-hr. per day, but, assuming this figure, it would be 50 kw-hr. per hour, which would involve less than 200 lb. of coal for its production. If the coal consumption of a plant could be so handled that exactly the correct amount required could be placed in the boiler just as it actually is required, such a saving could be figured on with safety, but when the personal equation of the firemen is con-

sidered as well as other features it is a question if half the amount of coal can be saved. In other words, the saving is purely theoretical and it is a question just how much of the expected saving in coal will really be found at the end of the day. In any event, any allowance in excess of 1/3 cent per kw-hr. is highly questionable.

A similar condition exists as to the cost of hauling a pound of material in a car. We find that the commonly accepted sum of 5 cents per lb. is correct for our road, but it would be absurd to say, because we eliminated 100 lb. from an individual car, that we would have \$5 less cost in the power plant for the year, that is, cost that can actually be found under such classification. It is only when the saving in consumption runs into a large percentage of the output that it can be counted upon.

Such figures have appeared so often in calculations that it is time to call a halt before we deceive ourselves and are led astray hunting for savings that do not exist.

ELECTRICAL ENGINEER.

APPOINTMENTS TO COMMITTEES

Several additional appointments to committees of the affiliated associations of the American Electric Railway Association have been announced.

Chairman C. S. Kimball of the way committee of the Engineering Association has appointed the following sub-committees of that committee: Proper foundation for tracks in paved streets, R. C. Cram, C. H. Clark and E. H. Berry; use of T-rail in paved streets, E. H. Berry, W. F. Graves and J. B. Tinnon; pavement for use in connection with girder and high T-rails, H. F. Merker, C. H. Clark and C. S. Kimball; alloyed steel rails, G. W. Gennett, Jr., E. P. Roundey and H. F. Merker.

Chairman H. H. Adams of the committee on standards of the Engineering Association has appointed the following sub-committees: Style, Norman Litchfield, E. R. Hill and C. S. Kimball; engineering manual, Martin Schreiber, F. B. H. Paine and F. R. Phillips.

President Hegarty of the Transportation & Traffic Association has appointed H. C. Donecker chairman of the committee on uniform definitions.

President Glover of the Accountants' Association has appointed H. B. Cavanaugh a member of the committee on interline accounting and John L. Conover, Jr., a member of the committee on education.

DEPRECIATION AS AFFECTING VALUATION AND FAIR RETURN

A discussion on the paper by John W. Alvord on "The Depreciation of Public Utility Properties as Affecting Their Valuation and Fair Return," presented before the American Society of Civil Engineers, is published in the January *Proceedings* of the society. Of the contributions abstracted below all but the one by Mr. Floy were by letter.

W. J. Wilgus said that whether or not a depreciation fund is actually set aside would seem to be immaterial. What the public is interested in is the proper upkeep of the property without an increase for that purpose of the capital burden which it is expected to bear through the rate.

J. E. Willoughby said that the method of penalizing the owner suggested by Mr. Alvord—the deduction of the accrued depreciation from the reproduction cost new—is a confiscation of property to the amount of the accrued depreciation because the amount of the

accrued depreciation was originally and necessarily put into the property before any depreciation could take place, and whatever has taken place is properly to be regarded as an expense of operation.

Frank C. Boes said that one cannot expect to deduct \$3,000 from a ten-thousand-dollar plant in fixing rates and still have a ten-thousand-dollar service maintained. Does one pay less for milk given by old cows or for apples grown on old trees?

Allen Hazen said that it is clearly the privilege and duty of public service corporations to charge rates that will permit marking off a proper allowance for depreciation. When this allowance has been once determined and marked off there would seem to be no equitable reason why the capital thus marked off should be further considered in connection with the question of fair rates.

H. C. Vensano said that the whole question as to whether or not depreciation should be deducted from physical valuations for rate-making purposes would seem to be largely a matter as to whether or not the public utility had been handled correctly. It would seem that no theory of any kind can be made to apply to a property which has not been handled reasonably and honestly by its management and at the same time be made to apply equally to a well-managed property.

William B. Jackson believes that undue importance is placed on depreciation of plant *per se* without due consideration being given to the question whether the property has been kept in such condition as to give substantially as good and economical service as a new property and is fully safeguarded by its reserves from financial breakdown.

Henry Floy said that where a corporation is created and the money of owners is invested, after notice, under conditions prescribed in advance by regulating bodies, there can be no fair or honest objection to the insistence on accumulation of depreciation funds out of revenue and the use of such funds in any reasonable way, but they cannot necessarily be used as a measure of the value of the property on which rates are to be fixed. With respect to corporations that have been in existence for a considerable period of time without commission regulation and have been following certain generally accepted principles with the consent, more or less definite, of public authorities, Mr. Floy takes emphatic exception to the proposition advanced by Mr. Alvord that value for rate-fixing purposes must be determined by deducting the amount of a computed but not accumulated reserve fund from the cost of reproduction new.

Contributions to the discussion were also made by Leonard Metcalf, F. Lavis, Clinton S. Burns, Stuart K. Knox, J. H. Gondolfo and Alexander C. Humphreys.

PACIFIC POWER COMPANY TIE LINE

To provide for the exchange of surplus energy generated by the Pacific Power Company, the Nevada-California Power Company and the Southern Sierras Power Company, a tie line is being erected between Bishop and Lundy, Cal., to connect the three systems. Normally it is not proposed to operate the Pacific system in synchronism with the other pair, the two groups of circuits being segregated except when energy is being transferred. The tie line, a single circuit, is about 65 miles long and is now strung on wooden poles which will eventually be replaced by steel towers. When completed the line will connect six hydroelectric plants and two steam plants having a total rating of over 46,000 hp.

As the Southern Sierras Company now has a distributing system about 225 miles long, an increase in voltage from 55,000 to 90,000 volts will probably be made.

Equipment and Its Maintenance

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates)

HARDENED PINS AND SPECIAL BUSHINGS

BY WARREN L. BOYER

One of the questions now uppermost in the mind of the superintendent of equipment is whether it pays to use hardened pins and bushings for brake rigging. The writer has had much experience with such pins and bushings and has followed their performance on many lines. This study has convinced him that their use will bring handsome returns despite their slightly higher first cost. It is true that bushings have sometimes been tried with unsatisfactory results, but usually the failure was due to poor fitting and consequent loosening in service. As in other things, what is worth doing at all should be done well.

In truck construction 99 per cent of the brake-hanger brackets and brake heads are made of malleable iron, which, when good, is soft and wears rapidly under friction. Assume that when the brake hanger brackets were purchased from the truck builders they cost 50 cents each. They are not likely to break, but they must be renewed at least once a year, and for about six months of that time they are responsible for the chattering which follows from the wear of the pin hole in the bracket. The scrap value of the casting is only 3 cents, making the net annual cost of the bracket 47 cents. As there are usually eight brackets per car, the cost would be \$3.76 a year, or \$22.56 for six years. On the other hand, if the very same type of bracket is furnished with a properly fitted hardened bushing, it would cost only 10 cents more but give at least twice the life. If we assume that two renewals of the bushing would wear so large a hole that a third renewal would be impracticable, the net cost per bracket for six years would be 60 cents plus two hardened bushings at 10 cents each, namely, 80 cents, or \$6.40 per car. Thus, in this one small item of car equipment, a saving of \$16.10 would be obtained during a period of six years.

Furthermore, the foregoing comparison is made on the assumption that the user of the hardened bushing has still retained the soft brake pin. A much longer life for both pin and bushing would be obtained if the pin was case-hardened. This statement may seem strange because many people believe that a hardened pin will wear the hole in which it turns much faster than a soft pin and in exact ratio to the degree of hardening. It is true that a rough hardened pin will do this, but as soon as it has been worn smooth the wear on the whole will be reduced in proportion to the hardness. The greatest possible life of the pin is obtainable only with a hardened bushing. The reason why a hard pin causes less wear than a soft one is explained as follows:

When two soft surfaces bear against each other the wear is rapid and varies with the pressure. The products of this wear are minute particles which resemble fine filings. These particles remain between the bearing surfaces, upon which they act as an abrasive and increase the wear in proportion to their number. Comparatively soft materials like malleable or gray

iron and common steel never show a very bright smooth surface from wear, and a microscope will betray the abrasions of the fine particles distinctly. The wear also increases in proportion to the amount of play which the pin has in the hole. Except possibly on one-way cars, few brake-rigging pins are under a constant pressure in the same direction. They are either in the release position or under the severe pressure of a braking application. Necessarily, in the change from release to application, the pin moves from one side of the hole to the other. The amount of this play and the suddenness of application add the wear of impact to that of abrasion. It will be readily seen what effect this action must have on soft material. On the other hand, when both the bushing and pin are hardened, the two surfaces soon take on a very high polish, and the abrasive wear is so small that very few particles can be found. The rate of wear is therefore decreased, and the hammer effect due to the gap between pin and bushing is proportionately delayed. In any event, even with the same blow and distance to travel, the hammer effect on hardened surfaces would be less.

The foregoing discussion has a most important bearing on the "safety first" movement, because the condition of the bushings greatly affects the reliability of the brake rigging. For instance, on brake levers, two of the holes will wear faster than the others owing to higher pressures and longer movements under pressure. Instead of bushing the holes or renewing the levers when the holes are worn, it is a common practice to countersink the worn holes slightly on both sides, weld a plug in them and then drill a new hole through the plug. This practice is bad because seven out of every ten plug welds are poor. It must be borne in mind that the plug is in the center of a lever usually only 4 in. wide. Hence the edges of the lever are often burned while a welding heat is being obtained on the plug. Much hammering on the weld is also necessary, and this reduces the original size of the lever and also lowers its strength through the crystallization of the fibers. On one small road with which the writer is acquainted hand-brake levers have failed several times from this cause within the last few months. This cause for the weakening of brake levers is more general than most people suspect.

The cost when lever holes are renewed in the right way is actually less than when they are renewed in the wrong way. To countersink one lever with two holes on both sides, make and weld two plugs and lay out and drill the holes one must have the services of a blacksmith and helper at, say, \$1 an hour. If they do the work in twenty minutes, the labor cost is 33 1/3 cents. On the other hand, the two holes may be reamed as quickly as they are drilled, but 10 cents may be allowed as a liberal extra cost for the better process. Two bushings at 5 cents each would cost 10 cents, and their insertion in two minutes by two men paid 60 cents an hour would cost another 4 cents, making a total of 24 cents. The cost of reaming would be saved at the second and third bushing of the same lever, so that renewals would involve merely the substitution of

new for old bushings at a labor cost of 4 cents a pair. Welded plugs wear rapidly and leave a greatly weakened lever, while bushed holes wear twice or thrice as long, do not impair the original strength of the lever and cost only 72 per cent as much as the less effective method.

OKLAHOMA LINE CAR WITH PLATFORM HAVING SIDE ADJUSTMENTS

The Oklahoma (Okla.) Railway Company recently completed a line car embodying features which should offer some valuable suggestions to other companies interested in line-car construction. The general dimen-



Oklahoma Railways Line Car—Tower Elevated and Extended

body. The platform is 9 ft. square but is provided with an extension which permits the width to be increased to 9 ft. x 16 ft. It can be elevated so the maximum height when raised is 20 ft. 5 in. above the top rail. The tower is raised and lowered by an ordinary 5-in. drum compound gear, hand-operated winch connected by a $\frac{3}{8}$ -in. steel cable which passes over four pulleys supported in the roof of the car. The adjustable portion of the platform provided so workmen can make repairs on the trolley wire of an adjacent track, or work on poles between tracks, is arranged to move outward on either side of the car body. This platform is shifted by means of an ordinary rack attached to the base of the extension and pinion gears. A shaft extends the



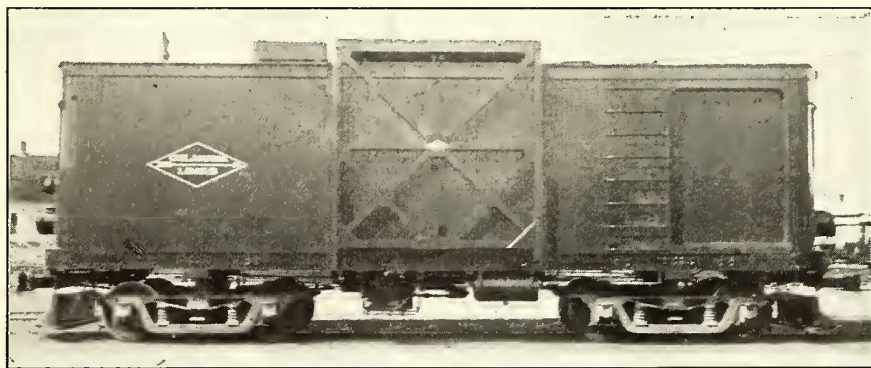
Oklahoma Railways Line Car—Tower Is Shown in Its Lowered Position

sions of the car are as follows: Length of car body, 34 ft. 9 in.; length over bumpers, 36 ft. 1 in.; height of car body, 9 ft. $2\frac{1}{2}$ in.; height from top rail to top of trolley stand, 13 ft.; width over all, 9 ft. $\frac{1}{2}$ in.; total weight, including special equipment, 61,062 lb.

The body was constructed of wood reinforced with steel plates and tie rods and was mounted on St. Louis trucks. It was designed for double-end operation and equipped with K-14 controllers in combination with GE-57 50-hp motors. A single side door, with 4-ft. 11-in. x 6-ft. $9\frac{1}{2}$ -in. clear opening, has been installed at

full width of the platform and pinions are keyed on each end so they engage in the rack under the adjustable platform. This platform extension is guided and held securely in position by angles which are bolted to the tower-supporting frame, and it is manually shifted to either side by means of an ordinary 20-in. crank and handle.

The interior of the car is fitted with a complete equipment of shelving, lockers, work bench and hangers to receive such tools and supplies as are needed in making line repairs. A pair of pedestals arranged to support a reel of trolley wire at all times were installed at the approximate center of the car body. The trolley wire passes from this support through an opening in the roof over an insulated idler pulley. The reel support is equipped with a brake which is attached to the trolley-wire reel so wire may be strung with the current on the line. An emergency tool and supply box with a few tools and supplies used to fasten the trolley wire to spans is installed on the line-car roof. After several months' operation this car has proved most convenient and efficient. The only improvement found necessary was to provide a small door in one end



Oklahoma Railways Line Car—Side View Showing Wood and Steel Reinforced Frame for the Adjustable Tower

the diagonal corners of the car body adjoining the bulkhead, the three windows in each end of the car provide ample natural illumination, and the location of the wide side doors is such as to give maximum wall space and floor space for shelving and the storage of line materials.

Perhaps the most striking feature in the construction of this car is the method of installing the adjustable tower. The tower and platform are supported on a combination wood and steel reinforced frame set in four steel guides, two attached to each side of the car

so that a pole can be loaded into the car in case quick repairs are necessary.

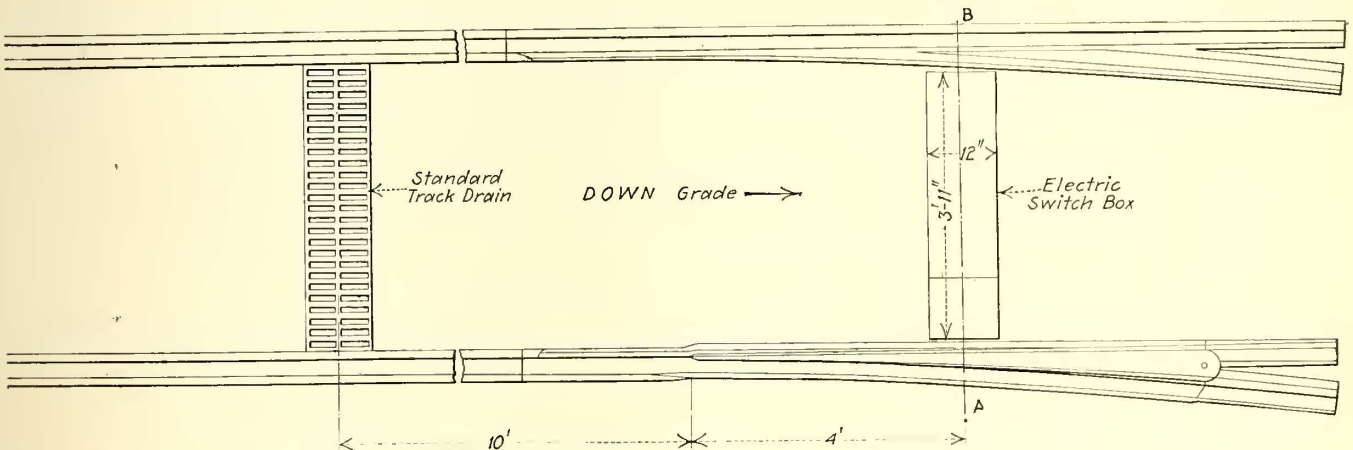
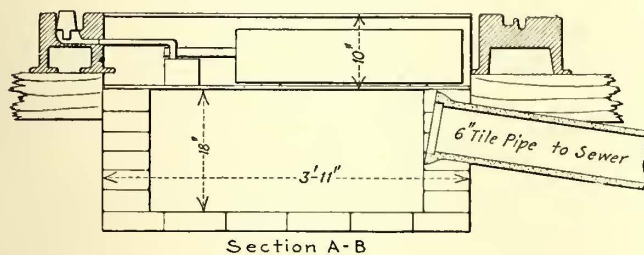
The Pennsylvania Railroad has announced that it will establish schools of electrical instruction for its employees at Conemaugh, Derry, Gallitzin, Cresson, Pitcairn and Pittsburgh, all on the division which extends from Pittsburgh to Altoona, a distance of 119 miles. In this stretch is the big mountain range at the summit of which is the Gallitzin tunnel. At the other side of the tunnel is the big slope down to Altoona, known as the Horseshoe Bend.

PREVENTING THE FREEZING OF ELECTRICALLY OPERATED SWITCHES

BY "CONTRIBUTOR"

The problem of preventing freezing of switches on the lines of the Connecticut Company is a difficult one on account of the wide variation of temperature and weather conditions. The New Haven lines alone have twenty-seven electrically operated switches and sixty patented spring boxes of various designs. Aside from salting, which is a common practice, we find the following procedure very satisfactory:

First—When new switches are installed at any season of the year, the tongue and heel tightening device is removed, oiled and carefully adjusted, and the heel box is filled completely with oil-soaked waste.



Plan Showing Location of Track Drain and Electric Switch Box; Also Settling Box for Drainage of Electrically Operated Switch

Second—Electrically operated switches require regular inspection and adjustment. A settling box is built under them, connected directly to the sewer. When the switch is installed in a water pocket a track basin is placed so that it will catch sand and dirt before it reaches the switch piece. Salting in snowy weather and oil in dry weather will keep these switches free for satisfactory service.

Third—"Anti-kick" spring boxes not equipped with a stuffing box are cleaned and oiled and then filled completely with oil-soaked waste plus a little salt. The waste is packed loosely around the working parts, and care must be taken that it does not interfere with their operation. This treatment applied twice during an ordinary winter will practically eliminate trouble due to freezing.

Fourth—In all spring boxes in which plunger connections operate through a stuffing box the tight compartment should be kept filled with compressor oil.

Fifth—As to the salting of switches at night, we find that sending one or more cars over the lines is the cheapest and most effective method of keeping the switches free. These cars salt switches, run through all special work not in regular use and operate all automatic switches.

SHOP WORK ON A PIECE-WORK BASIS AT THE THIRD AVENUE RAILWAY SHOPS

BY A. R. JOHNSON, ASSISTANT TO SUPERINTENDENT OF EQUIPMENT THIRD AVENUE RAILWAY, NEW YORK

The Third Avenue Railway Company in equipping its 575 convertible cars with prepayment devices adopted the piece-work system on about 75 per cent of the entire job with very good results. In establishing piece-work rates it is very essential that the prices shall be so made that they will not have to be cut. At our shops this undesirable feature has been entirely eliminated by thoroughly checking the proposed prices before they are submitted for approval to J. S. McWhirter, superintendent of equipment. In fact, the prices in many cases have been raised.

In establishing a piece-work rate for any particular class of labor, we select one or more men who are known to be capable of doing first-class work in the shortest time. This time is then checked up and the piece-work rate is made by deducting from 25 per cent to 40 per cent from the amount of time taken at the regular day rate. It is a well-established fact that many employees complain beforehand about the smallness of the price established, but when they are told to go ahead and are assured that they will be guaranteed

their regular day's pay at the time rate they are thoroughly satisfied.

On several occasions the question has arisen as to whether or not the employees whose time for a job establishes the piece-work rate take longer than is necessary for the purpose of making the price larger. We do not think this a fact, as these very men when put on the same work at the established piece-work rate with the ordinary class of men have invariably made but 15 per cent to 25 per cent more than their daily rate, while saving 25 per cent to 40 per cent in time. The accompanying comparison (Table I) shows the saving in piece-work prices over the day rate on work in connection with the installation of prepayment devices on 575 convertible cars.

It may be added that approximately 90 per cent of the maintenance car painting is done on a piece-work basis at the very low average cost of \$45 per car for labor and material. We turn out an average of three cars a day with a force of thirty men, who average 27½ cents per hour. This result could be accomplished only with the aid of piece work. Some readers may come to the conclusion that this does not include costs for a complete job, but the figures actually do include a complete job, such as stripping the inside trim, gilding seat

$\frac{1}{2}$ -in. bar for the top member. The 6-in. channel mentioned is made in one piece which is bent down at the center for the platform or well. The sills are 4-in., $7\frac{1}{2}$ -lb. I-beams spaced approximately on 3-ft. centers. The vestibule end frame and the center-entrance platform are reinforced with diagonal braces. The buffer is a Hedley anti-climber. The end sill is built up of steel plates and rolled shapes. The vestibule ends are sheathed with No. 12 sheet steel and have a buffer shield. Cast-steel bolsters are used.

All posts of the body framing are made of $1\frac{1}{2}$ -in. x 2-in. x $\frac{1}{4}$ -in. T's bent around from side sill to side sill and forming carlines and all have post ash strips to serve for sash guides. The upper sash is stationary while the lower sash is arranged so that it can be raised. The center-entrance posts are of tees and pressed channels with a plate and channel over the door to provide compression members in the side-girder construction. The vestibule ends have wooden posts with outside bar reinforcements.

FLOORING, FINISH AND EQUIPMENT

The roof is of plain-arch type. The T-posts which form the carlines have ash roof nailing strips bolted on the top and sides for the attachment of the agasote

Earll trolley catchers and HB wheel guards. The air-brake equipment has a special conductor's valve so mounted over each wheelguard that when the guard trips the valve will operate to apply the emergency brakes and cut off power.

OPERATING NOTES ON A CANADIAN LOCOMOTIVE

The Galt, Preston & Hespler Railway, Preston, Ont., placed a 40-ton Baldwin-Westinghouse locomotive in service on Nov. 30, 1910. Since that date it has been in continuous operation twenty-four hours every day except Sundays, averaging about 150 hours per week. This service includes hauling practically every kind of freight in standard steam railroad rolling stock from the Canadian Pacific Railroad at Galt to Berlin and Waterloo, a distance of from 12 to 14 miles north. Although the haul is not very long, there are several 2 per cent to $2\frac{1}{2}$ per cent grades, from 1 to 2 miles long. The maximum number of cars hauled in one train is about twenty-five, the average number being fifteen. The load per train is about 200 tons, or on four trips of road service a day 2000 tons. It is hardly possible to estimate exactly the total mileage as the greater part of



One of Twenty-five Center-Entrance Cars for the Manhattan & Queens Traction Corporation

ceiling. The roof boards are $\frac{3}{8}$ -in. tongued and grooved poplar. The vestibule end roof is supported on ash carlines bent to shape. Below the sash rest the cars are finished in $\frac{3}{8}$ -in. mahogany sheathing, which is applied between the posts with an allowance for $\frac{1}{2}$ -in. air space between the outside girder plate and this wainscoting. All metal trim is of highly polished bronze.

The flooring is a single thickness of $13/16$ -in. x $3\frac{1}{4}$ -in. yellow pine except that Chanarch with composition flooring is used at the entrance platform. The flooring in both ends of the car is sloped downward for 3 in. from the bolster to the center entrance, while the floor of the center well is sloped 1 in. downward toward the door.

The pair of center doors on each side are of the sliding type with glass panels; they operate simultaneously with the steps. Hinged doors for the use of the motorman only are provided in the vestibules. Among the specialties furnished by the car builder are vertical wheel brakes, rattan seats, ventilators, motorman's alarm gong, conductor's signal bell, illuminated signs, air sanders and No. 99-B trucks. Other specialties on these cars are 3-in. Feralun safety treads set flush, Peacock geared brakes (in addition to air), Consolidated Car Heating Company's push-button system and heaters, Rico sanitary strap covers and straps,

the time, sixteen hours a day, the locomotive is in switching service. No record is kept of the tonnage and mileage, but the switching mileage would easily equal half, if not three-quarters, of the road service.

The locomotive is equipped with four No. 308-B-2 commutating-pole 600-volt motors, rated at 120 hp and unit switch control. The locomotive receives one-half hour inspection every twenty-four hours and about five or six every Sunday, when making light repairs, such as applying brakeshoes, changing wheels for tire running and inspection of motors, air-brakes and control equipment. Tires have been turned twice since this locomotive went into service, and the total repair account to date, as quoted by the Westinghouse company, is given below:

Air compressor (principally due to armature and field trouble due to low trolley voltage).....	\$170
Tire turning	45
Motor axle bearings	30
Unit switch control.....	50
Trolley parts, wheels, harps, poles and bases.....	110
Brakeshoes	270
Miscellaneous	30

Total (from Nov. 30, 1910, to July 14, 1913).....\$705

The total expenditures—\$705—for repairs on this locomotive covering a period of more than two and one-half years is considered a fine record by the operating company in view of the large amount of service.

News of Electric Railways

Toledo Council Refuses to Entertain Franchise Offer

The City Council of Toledo, Ohio, at its regular session on Feb. 4, declined by a vote of seventeen to one to entertain the proposals of the Toledo Railways & Light Company for a settlement of the franchise question. That body also decided not to enter into immediate negotiations with the company on any basis. The receivership suit brought recently seems to stand as the point of objection and City Solicitor Thurston continues to advise the city to do nothing until the suit is withdrawn.

Henry L. Doherty, of H. L. Doherty & Company, New York, was present at the meeting and explained the franchise to members of the Council. He said the new owners of the company were anxious to settle the franchise matter upon a basis that will yield a fair return on the capital invested and provide good service for the people. In discussing the situation after the meeting Mr. Doherty said: "I do not know what our next action will be. I did not expect the action which the Council took. Council has made a mistake and I think the councilmen will see it. They have taken the attitude of declining to see whether our proposal is justified. We will, however, continue to effect a fair settlement with the city."

The vote stood nine to nine on Councilman Harry B. Irwin's motion to appoint a committee to investigate the company's books, obtain a valuation and determine the lowest fare at which a settlement could be made, but President Hassenzahl cast the deciding vote against it.

City Solicitor Thurston said that until the Doherty interests withdraw their suit for a receivership they are not showing good faith. They should present a concrete proposal, embracing a definite rate of fare, so that the franchise will be taken out of politics for a fixed number of years. Until this is done there will be only one answer and that is municipal ownership.

Mr. Doherty told the Council that the company desires a franchise for a fixed term of years so that it may obtain capital to develop the system in keeping with the needs of the city. With a full understanding on both sides he thought an understanding as to the amount of investment upon which profit should be paid could be easily reached. He was willing to withdraw the proposal if that would facilitate matters. He was willing to submit any settlement reached to the will of the people. Mr. Doherty explained that a fare of 3 cents would not, in his opinion, pay maintenance and operating expenses and leave anything for dividends. He suggested that the Council name a small committee to go into the matter of valuation. Mr. Doherty said that the city was not asked to take into consideration the company's \$14,000,000 bond issue in fixing the terms of settlement. The power plant had been omitted from the valuation suggested by the company because it furnished current for commercial purposes. Mr. Doherty said that the plant would have to be operated by the railway or the lighting department of the company and that current would then have to be purchased by the other department. This was the only way in which the accounts of the two departments could be handled properly.

Councilman Mulholland produced the signed agreement entered into before the election by the republican candidates to the Council pledging themselves to 3-cent fare and the submission of the question of municipal ownership to the people.

Public Relations at Newport News

C. Loomis Allen as president recently announced the consolidation of the Newport News & Old Point Railway & Electric Company; Citizens' Railway, Light & Power Company; Hampton Roads Traction Company; Newport News Gas Company, and Hampton, Phoebus & Fort Monroe Gas Corporation as the Newport News & Hampton Railway, Gas & Electric Company, as noted elsewhere in this issue. The process of rehabilitating the properties has been in progress since they were taken over some time ago by Allen & Peck, Inc. The announcement of the consolidation was received very favorably in the territory in which the companies

operate. The Newport News *Times-Herald* said in an editorial:

"Allen & Peck, who took hold of these properties about two years ago, found them in wretched condition physically, and the companies owning them were without means or the credit to make the necessary improvements. It was a desperate case, and the patient was in a deplorably run-down condition. But Allen & Peck are good doctors for such patients, and they employed heroic treatment in effecting a cure. In plain terms, the power plant was entirely rebuilt, the old machinery sold for junk and modern machinery put in. The tracks were repaired, new cars were ordered, a large gas holder erected, gas mains and electric wires extended, the ice plant overhauled and enlarged, and the properties generally put in first-rate condition, so that no other city in the State has a better service than the cities of the Lower Peninsula. In making these improvements and extensions, the owners have expended approximately \$600,000, and there are bonds of the par value of \$175,000 remaining in the treasury to be used for further improvements and extensions. But for all that the capitalization of the new company is \$317,000 less than the capitalization of the old company, which, when taken in connection with the money spent for betterments, is equivalent to a reduction of \$917,000. That simple statement speaks for itself and needs no commendation."

The Newport News *Daily Press* said editorially:

"Notwithstanding an expenditure of \$600,000 in improvements and extensions since the property was acquired by the present owners, the new capitalization is \$317,000 less than it was under the former ownership, and the company retains in its treasury \$175,000 of the bonds issued, to be used as needed for further improvements and extensions. Besides, the company has made provision in its authorized bond issue for ample capital in the future to keep its properties fully abreast of the progress of the Lower Peninsula. This seems to us to be admirable financing, and is another evidence of the integrity, good faith, public spirit and discreet management of the men who now own and manage these properties. The community, no less than the owners and managers, is to be congratulated on the gratifying exhibit."

Rapid Transit Details Settled in New York

It has been definitely decided that the junction between the existing subway and the new Lexington Avenue subway shall be made at Forty-second Street. The Public Service Commission for the First District has instructed its chief engineer to prepare plans for the construction of what is known as the diagonal station plan for this junction. The existing subway running down Park Avenue will be connected with the Lexington Avenue subway north of Forty-second Street by a diagonal branch running from the existing subway, under the Grand Union Hotel, diagonally across Forty-second Street and under the property of the New York Central & Hudson River Railroad on the corner of Lexington Avenue and Forty-second Street, into the Lexington Avenue line. The express station will be located on this diagonal line and will extend under the greater part of the connecting line. It will connect with the Grand Central Station, with the existing subway, the Hudson & Manhattan Railroad and the Steinway tunnel to Long Island City. The commission has decided to condemn the property of the Grand Union Hotel, which will be needed for the purpose. An easement under the property of the New York Central & Hudson River Railroad on the north side of the street will be acquired either by purchase or by condemnation.

The Public Service Commission has authorized a change in the route of the 162d Street and Eighth Avenue connection, which will connect the existing Ninth Avenue elevated railroad with the proposed elevated railroad on the Jerome Avenue branch of the Lexington Avenue subway. As originally planned, this route curved to the south after leaving Anderson Avenue and continued easterly across Jerome Avenue and through 162d Street to River Avenue

and a connection with the Jerome Avenue line. The change involves the continuation of the route from Anderson Avenue in a straight line to the Jerome Avenue elevated in River Avenue, thus eliminating two curves. By this change the stretch of 162d Street east of Jerome Avenue will be relieved of the elevated structure, which will run through the interior of the blocks fronting on that street. An agreement to modify the certificate granted to the Interborough Rapid Transit Company for this purpose has been approved by the commission and sent to the company for its acceptance.

There will be an express station on the Broadway subway in Manhattan at Forty-second Street. This is the subway which is being built for operation by the New York Municipal Railway Corporation. The plans of the Public Service Commission provided for a local station at Forty-second Street, but property owners at Times Square objected and demanded an express station. After considering the matter for several months the commission decided to grant the request for an express station, but to locate the station in Broadway south of Forty-second Street. The property owners wished it located north of Forty-second Street, but there were too many engineering difficulties to be overcome in that location.

The commission will hold a public hearing on Feb. 16 on the application of the Interborough Rapid Transit Company for the approval by the commission of a contract entered into between the company and Artemus Ward for the advertising, news-stand and other merchandise privileges on the subway and elevated railroads to be operated by that company under the dual system contracts. This contract is to run for fifteen years from Jan. 1, 1914. It provides for the payment by Mr. Ward to the company for the privileges conveyed of \$600,000 for the year 1914, \$700,000 for each year from 1915 to 1918, inclusive, and \$800,000 for the year 1919 and every year thereafter plus 10 per cent of the gross receipts after 1919. If new stations are opened Mr. Ward agrees to pay an additional sum of \$1,250 a year for each side of such station or \$2,500 for the entire station.

New Detroit Charter Defeated

The voters of Detroit defeated on Feb. 10 a new charter, differing in many details from the present fundamental law of the city. Among the more important provisions proposed were the elimination of partisan politics in local elections; the preferential ballot; the separation of municipal from State and national elections; the concentration in the Mayor of responsibility for the acts of city officers; the reduced size of the City Council—one Alderman instead of two from each ward; the abolition of the board of estimate; the establishment of new departments of public safety, recreation, labor, welfare, and arts; an eight-hour work day and minimum wage for city employees, and the initiative, referendum and recall.

Mayor Oscar B. Marx in his recent message to the Common Council said in part in referring to railway matters:

"The year just ended culminated in a temporary settlement of our differences with the Detroit United Railway and witnessed a determined struggle for the acquisition of the street railway system by the city with the submission and adoption of a municipal ownership amendment and the appointment of the first street railway commission.

"During the closing months of the year, the charter commission completed its task, leaving for our approval or rejection a document providing for numerous and vital alterations in our city government.

"Pre-eminent among the problems which now confront us is the completion of plans for acquiring the street railway system. Unless the Supreme Court fails to sustain the decision of the Wayne County circuit judges, progress toward city ownership and operation of the traction system should be most speedy during the next few months. As to whether the company's property should be condemned or purchased, or new lines constructed, I believe we may with full confidence rely on the judgment of the members of the street railway commission. Should the Supreme Court decision on the Verdier bill be an unfavorable one, it does not follow that we must abandon all hope. The charter to be submitted to the electorate next month contains pro-

visions for city ownership. The defects in the charter may be eliminated by piecemeal amendment.

"The health, cleanliness and the comfort of our people demand that we take a step forward in seeking to have the railroads passing through the city substitute electric for steam power."

As stated in the *ELECTRIC RAILWAY JOURNAL* of Jan. 31, 1914, page 275, the Michigan Supreme Court on Jan. 16 handed down its decision on the Verdier bill, an act designed to give Michigan cities the right to amend their charters piecemeal. The court, however, did not pass on the question of whether or not the amendment to the Detroit City charter providing for the municipal ownership of street railways adopted last April is constitutional.

Resolution Passed for Inquiry Into New Haven Finances

The Norris resolution, with slight modifications, to investigate the finances of the New York, New Haven & Hartford Railroad, was passed by the Senate on Feb. 7, 1914. The resolution reads:

"Resolved, That the Interstate Commerce Commission be requested to make public the facts in its possession concerning the financial transactions of the New York, New Haven & Hartford Railroad and, as far as it may be necessary to get additional information thoroughly to cover the subject, to reopen its examination of the affairs of that company and make a further investigation of its financial transactions with a view of ascertaining:

"1. What became of the funds of said company invested in the various enterprises and corporations mentioned in the opinion of the Interstate Commerce Commission, numbered 2384, case numbered 4842, entitled, 'The New England Investigation in the Matter of Rates, Classifications, Regulations and Practices of Carriers,' submitted on May 20, 1913, and decided on June 20, 1913.

"2. Whether the person or persons authorizing such investment of the funds of said company and the person or persons receiving the benefit thereof are liable to punishment under existing laws.

"3. Whether, under existing law, such funds so invested can be recovered on behalf of the stockholders of said company.

"4. What legislation, if any, is necessary to prevent the recurrence of similar transactions."

In accordance with the Senate resolution the Interstate Commerce Commission on Feb. 10 ordered the inquiry into the finances of the New York, New Haven & Hartford Railroad to begin immediately. Hearings may be held, but it was not on Feb. 10 decided when or where, or whether they will be public. For the present, the commission will conduct its inquiry by gathering from all available sources whatever information may throw light on the questions at issue.

Toronto Purchase Complications

Corporation Counsel Geary, of Toronto, Ont., took issue with the members of the Board of Control of Toronto on Feb. 3 on a question of jurisdiction. The difference of opinion is said to have arisen over the question of the advisability of inserting in the railway purchase agreement between the city and the Toronto Railway a clause permitting and defining running rights for radial electric railway cars within the city limits. Mayor Hocken advocated the omission of any such clause in order that radial rights might be secured only through application to the Ontario Railway Board under general legislation. Mr. Geary opposed such a clause being omitted. He held that such a clause was required in his instructions from the City Council and declined to accept any variation of those instructions at the behest of the controllers, contending that the sole right to vary the instructions rested with the Council. D. E. Thomson, who advised Mr. Geary in drafting the agreement, advocated a definition of the running rights, but a majority of the controllers disagreed with him. There will be a further conference at which the lawyers will present statements in support of the contention that the running rights clause should be included. If the controllers remain unconvinced they will have to go to the City Council with a recommendation for new instructions to Mr. Geary.

The *Mail and Empire* published the following editorial on Feb. 5:

"That the task of drawing up an agreement clearly setting forth the terms of the proposed street railway purchase would be a difficult one was foreseen, and an able lawyer was appointed to assist the corporation counsel. Even so, it now seems that the problem was a knottier one than the Council realized. Indeed, it begins to appear as if the Council itself had contributed to the knottiness of it. After long weeks the agreement was submitted to the Mayor a day or two ago, and differences arose at once. The Mayor points out that the draft agreement provides for the concession to the radial railway companies of running rights within the city. The corporation counsel maintains that therein the agreement corresponds with the negotiation documents he was instructed to follow.

"The misunderstanding is unfortunate—the more so because it was avoidable. The question as to radial companies' running rights within the city was raised several times during the discussion of the purchase proposal. It is to be admitted, however, that the counsel engaged on the agreement would not find the discussion to be very conclusive on that point. But the very fact that radial entrance was a matter of controversy, that there were positive affirmations and positive denials that the right of entrance was granted, should have been taken cognizance of by the framers of the agreement, who should have called upon the City Council to instruct them specifically on that matter and clear up all doubt. Valuable time would have been saved. If the counsel for the Toronto Railway were preparing the agreement upon the client's instruction, there is no doubt the same view as to radial entrance would have been taken as the corporation counsel has taken, and, generally, the benefit of all doubts or uncertainties would have been given to the company by its counsel. If the company's drafters found anything that seemed to favor the city as to a controverted point, the company would have been advised and would have been asked for further instructions. It would seem as if the communications which the corporation counsel had to look to for the terms had to be examined with some legal keenness for purposes of interpretation. But instead of proceeding upon the assumption that the radial railways were to have the advantage, counsel ought to have referred to the city government to clear up the point."

The Proposed Depot Line in Kansas City

The Metropolitan Street Railway, Kansas City, Mo., recently protested the ordinance permitting the company to lay tracks in Twenty-fourth Street, from McGee to Main Street; to provide the new Union Depot with service from the north, east and southeast sections of the city. The measure was presented to the Council on Feb. 9. A number of objectionable features are included in the ordinance, which, if passed, will not be accepted by the receivers for the company, it is stated. The receivers believe that the Kealy-Ash plan, recently presented, is sufficient for all purposes. The plans proposed by P. J. Kealy, engineer for the company, and L. R. Ash, city engineer, provide for cars on the plaza at the new station. The receivers state that the plans fit street railway conditions at the station, and that by this routing cars will be taken to every section of the city.

Cleveland Railway Protests Against Tax Assessment

The Cleveland (Ohio) Railway has notified the tax officials of Ohio that it does not intend to pay the taxes on the valuation of \$22,500,000 fixed by the state tax commission, and that it will resist all efforts to collect the amount demanded. Some months ago, when the commission announced a tentative valuation of \$22,500,000, J. J. Stanley, president; Henry J. Davies, secretary, and other officers of the company appeared and objected to its being made permanent. They told the commission that their books would show that the valuation is less than \$19,000,000 and that even this sum would be high.

The company asserts that the Cleveland Railway is valued higher than other similar property. The law, it is pointed out, requires that all properties shall be valued at

their true worth. It is left with the courts to determine whether the values fixed by the commission are excessive in comparison with those of other property.

Councilman William Stolte, member of the street railway committee, is endeavoring to have an investigation of the cost of the new station and car yards at St. Clair Avenue and East 129th Street made to ascertain whether it was really necessary to put as much money into these improvements as this one required. The only question brought up is whether cheaper structures would not have answered the purpose. The new station is a model of modern construction. Including equipment, the cost of the yards and other things necessary so far has been about \$160,000. The company has planned the construction of a station at the Superior Avenue terminal and Mr. Stolte brought this matter up in anticipation of this later improvement. Peter Witt, street railway commissioner, has approved the purchase of land for the building and has kept track of the expenditures for the construction of the St. Clair Avenue building.

The company has asked Council for permission to relay twelve miles of track the coming year at a cost of approximately \$477,415. The expenditure of almost \$500,000 for extensions and improvements by the company had previously been allowed. The greater part of the renewal of tracks is to be made on Woodland Avenue, but some of the money will be spent on East Fifty-fifth Street, Lorain Avenue and Superior Avenue between West Ninth Street and the Public Square.

Dr. Eliot on Unions

Charles W. Eliot, former president of Harvard University, wrote a letter in part as follows on Feb. 5, 1914, to one of the members of the local electric railway union in New Haven, Conn., in reply to a letter asking why he objected to trade unions:

"My objections to the trades unions are altogether educational and moral. They seem to me to have had a bad effect on the character and happiness of their members, because of certain methods which they have used and are still using. The first of these objectionable methods is the habitual use of violence against persons and property to gain their ends. The second is the limited output. The third is the uniform wage, alike for all journeymen without regard to age or skill. The fourth is the disregard of contracts—their own contracts, and contracts which employers or managers have entered into with owners or consumers but have not yet fulfilled.

"The first and last of these practices are grave violations of the universal moral sense. The second and third rob the workingman of strong motives for self-improvement and make it probable that he will do no hearty, zealous, faithful work. Under these conditions it is impossible to be happy in the life work, for there is no happy, contented work except that done with good will, generous zeal and loyalty.

"I cannot agree with you that the trades unions have brought happiness to any workingmen. Higher wages, shortened hours, better clothes and more meat do not necessarily contribute to genuine happiness any more than the luxuries of the rich do. Happiness and content are states of mind. Is it not perfectly plain that in our country trades unionists are not really happy as a matter of fact? To my thinking they never will be so long as they get no satisfaction in their daily work. It is the grudging spirit in which they work which prevents them from getting any content out of their work for a livelihood.

"All well-read, thinking people believe that the progress of civilization depends on universal, steady, productive labor; the unions seem to believe that the less one works the better.

"Although profit-sharing is not applicable in all industries, I see in sound methods of profit-sharing one mode of escape from the deplorable effects of trades union teachings; for just profit-sharing will put to employer and employed alike precisely the same motive for faithful, generous, co-operative industry, and for successful productiveness. No profit-sharing method will work which does not turn out to be in the long run profitable alike to employer and employed, to owner and to wage earner, to capital and to labor."

St. Louis Loses Suit Against Company.—The city of St. Louis has lost its suit to oust the United Railways from control of the Jefferson Avenue line.

Increase in Fares on Toronto Municipal Line Advocated.—Fares on the city of Toronto Civic Lines were under discussion at the monthly meeting of the Bathurst Hill Rate-payers' Association on Feb. 6, and a resolution was introduced suggesting that the fare be raised from 2 cents to 5 cents, in order that the deficit in the cost of operation may be reduced. It was pointed out that the cars are used largely by persons who live outside the city limits and pay no taxes in Toronto. The resolution was finally tabled until the next meeting of the association, when representatives of the outside districts which are benefited by the civic car lines will be invited to be present in order to discuss the matter.

Important Improvements in Birmingham.—The executive committee of the American Cities Company has approved the requested appropriations of A. H. Ford, president of the Birmingham Railway, Light & Power Company, Birmingham, Ala., for \$1,148,000 to be expended in Birmingham during the next twelve months for betterments that are considered necessary. The appropriation provides for the extension of the gas department, the extensions of the street railway service and other betterments. About \$400,000 or perhaps a little more will be spent on the gas department. The extensions of the street railway at various points and the double-tracking work will consume the remainder of the appropriation.

Strike in Vermont.—The conductors and motormen in the employ of the Barre & Montpelier Traction & Power Company, Montpelier, Vt., went on strike on Feb. 5, 1914, because their demands for an increase in wages and shorter hours had not been granted. The cars are being operated with special crews secured by the company from among men acquainted with electrical work and the service between the two cities is being continued although the schedule time is not maintained. The company offered to advance wages about 1 cent an hour and grant the men's request for a reduction in working time from eleven to nine hours. The men asked for \$2 a day for the first year, \$2.25 for the second year and \$2.50 a day thereafter. The old rate was 16½ cents to 22 cents an hour, and the rate offered the men was 18 cents an hour for men employed six months, 20 cents an hour the second six months, 21 cents an hour the third six months, 21½ cents an hour the fourth six months, 22 cents an hour the fifth six months, 22½ cents the sixth six months and 23 cents an hour thereafter.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

MARYLAND

The changes in the Public Service Law of Maryland recommended by the Public Service Commission in its report to the Legislature have been offered in a bill introduced by Senator Hammond at the request of the commission. The changes contemplate giving the commission control over grade crossings, power to fix certain standards of gas, power to compel corporations to obtain authority from the commission before abandoning any railroad enterprise and permission to change the commission's office hours from 8 a. m. to 9 p. m. to 8.30 a. m. to 5.30 p. m.

NEW YORK

Street surface railways in New York City are required, in a bill by Assemblyman Scheidemann, to place an additional conductor on the rear platform of each car and an additional collector of fares inside where more than ten passengers are allowed to stand within the car and three persons on the rear platform after all the seats have been filled. In the case of elevated or sub-surface railroads in the city not more than fifteen persons must be allowed to stand in any car after the seats provided have been filled. A penalty of \$50 for each violation is provided.

A bill has been introduced in the Senate to amend the railroad law in relation to the expiration of the corporate powers of a railroad or street surface railway and to provide for the transfer of the property "when the existence of a railroad corporation ceases." The measure has been referred to the committee on railroads. A bill has also been

introduced to extend the time in which the Frontier & Western Railroad is to begin the construction of its road and place the property in operation. Another bill, introduced in the Assembly, would amend the railroad law in relation to the establishment of electric signals at grade crossings outside of cities.

OHIO

Before the adjournment of the Legislature on Feb. 6, 1914, the so-called Mills public utility measure was referred to a conference committee in an endeavor to formulate provisions that will be satisfactory to both the House and the Senate. This is the bill which, in its original form, would have allowed municipalities to pledge the credit of the cities affected as security for bonds issued for the purchase of public utility properties. Some time ago the House passed the bill, with an amendment which provided that the bonds should be made a lien only on the railway. Mayor Newton D. Baker of Cleveland declared he would prefer no law at all to the measure as passed by the House. On Feb. 5 the Senate passed the bill, after re-inserting the provision which the House removed. The vote was seventeen to fifteen. The bill went back to the House on Feb. 6 and the amendment made by the Senate, providing that bonds should be a lien against the city, was defeated. It was then referred to a conference committee. As the Legislature took a recess the same evening, the bill will stand little chance of getting through this session. There will be only one day more for the consideration of unfinished business, Feb. 16, on which day the Legislature will meet and adjourn.

The Legislature, in making up its budget of expenditures, included \$25,000 for the Public Utilities Commission, with which to value the property of the Cincinnati Street Railway.

PROGRAM OF ASSOCIATION MEETING

The A.I.E.E. Mid-Winter Convention

The second annual mid-winter convention of the American Institute of Electrical Engineers will be held in the Engineering Societies Building, Feb. 25 to 27. The time is divided into an opening session Wednesday morning, power station session Wednesday afternoon, organization dinner of the International Electrical Congress Wednesday evening, transmission session Thursday morning, power generation session Thursday afternoon, publicity meeting on International Congress Thursday evening, distribution session Friday morning, protective apparatus session Friday afternoon and reception Friday evening. The power station session will be devoted largely to a discussion of the relative advantages of outdoor and indoor substations. The report of the sub-committee on the distribution of electrical energy to be presented Friday morning contains the following appendices among others: Appendix 4, "Direct-Current Distribution for Surface Railways—Urban Service," by R. H. Rice; Appendix 5, "Direct-Current Distribution for Underground and Elevated Railways," by E. J. Blair; Appendix 6, "Direct-Current Distribution for Interurban and Steam Railroads," by W. G. Carlton; Appendix 7, "Alternating-Current Distribution for Interurban and Steam Railroads," by W. S. Murray.

Following is the program for the publicity meeting on Thursday evening:

"The International Electrical Congress," by Dr. C. P. Steinmetz.

"The Panama-Pacific International Exposition," by Dr. William Rader.

"The Lighting of the Panama-Pacific International Exposition," by W. D'A. Ryan.

"Scenic Features of a Trip to San Francisco," by James A. Cruikshank.

"Some Electrical Features of a Trip to San Francisco," by P. M. Lincoln.

The topics chosen are of general as well as engineering interest in connection with the congress, the exposition and the scenic and electrical features of the transcontinental journey. Dr. Steinmetz is the honorary president of the congress, and Mr. Ryan designed the illumination for both the exposition and the Panama Canal.

Financial and Corporate

Stock and Money Markets

Feb. 10, 1914.

In the early trading on the New York Stock Exchange today a number of issues in which there was speculative interest yielded sharply, but the supply was readily absorbed. The strength which developed later in the day offset the early losses in the more important issues and many of the leaders showed fractional gains at the close of the trading. Rates in the money market to-day were: Call, 1½@2 per cent; sixty days, 2½@3 per cent; four months, 3@3¼ per cent; six months, 3¼@3½ per cent.

The early trading in Philadelphia reflected the tendency shown in New York, being dull and featureless. The market closed strong.

The Chicago market was broad to-day, but the volume of transactions was small. The bond market was dull.

The Boston market to-day was fairly active at times but irregular. The bond transactions totaled only \$17,000, par value.

There was a decided improvement in the trading in stocks in Baltimore to-day. The bond market was unusually broad and active, transactions totaling \$61,900, par value.

Quotations of traction and manufacturing securities as compared with last week follow:

	Feb. 4	Feb. 11
American Brake Shoe & Foundry (com.)....	95	95½
American Brake Shoe & Foundry (pref.)....	142	142
American Cities Company (com.)....	36	36½
American Cities Company (pref.)....	65¾	64
American Light & Traction Company (com.)..	350	350
American Light & Traction Company (pref.)..	106	106
American Railways Company.....	38½	39
Aurora, Elgin & Chicago Railroad (com.)....	80	87½
Aurora, Elgin & Chicago Railroad (pref.)....	104¾	81
Boston Elevated Railway.....	84	84
Boston Suburban Electric Companies (com.)..	7	7
Boston Suburban Electric Companies (pref.)..	60	60
Boston & Worcester Electric Companies (com.)	*6¼	*6¼
Boston & Worcester Electric Companies (pref.)	39	39
Brooklyn Rapid Transit Company.....	91½	91¾
Capital Traction Company, Washington.....	112	107¾
Chicago City Railway.....	170	170
Chicago Elevated Railways (com.)....	20	20
Chicago Elevated Railways (pref.)....	65	65
Chicago Railways, pteptg., ctf. 1.....	92	91½
Chicago Railways, pteptg., ctf. 2.....	33¾	32½
Chicago Railways, pteptg., ctf. 3.....	8	7½
Chicago Railways, pteptg., ctf. 4.....	3	2½
Cincinnati Street Railway.....	107	107
Cleveland Railway.....	105¼	105
Cleveland, Southwestern & Columbus Ry. (com.)	*5	*5
Cleveland, Southwestern & Columbus Ry. (pref.)	*26	*26
Columbus Railway & Light Company.....	13	13
Columbus Railway (com.).....	75	75
Columbus Railway (pref.).....	82½	a90
Denver & Northwestern Railway.....	*70	71
Detroit United Railway.....	71	71
General Electric Company.....	148	146¾
Georgia Railway & Electric Company (com.)..	119	118
Georgia Railway & Electric Company (pref.)..	84¾	85½
Interborough-Metropolitan Company (com.)..	15¾	15¾
Interborough-Metropolitan Company (pref.)..	61½	61
International Traction Company (com.)....	30	30
International Traction Company (pref.)....	90	a85
Kansas City Railway & Light Company (com.)	15	19½
Kansas City Railway & Light Company (pref.)	30	35
Lake Shore Electric Railway (com.)....	6	5
Lake Shore Electric Railway (1st pref.)....	92	82
Lake Shore Electric Railway (2d pref.)....	24	20
Manhattan Railway.....	131	130¼
Massachusetts Electric Companies (com.)....	12	10
Massachusetts Electric Companies (pref.)....	63	62
Milwaukee Electric Ry. & Light Co. (pref.)..	95	95
Norfolk Railway & Light Company.....	24¾	24½
North American Company.....	72	69
Northern Ohio Traction & Light Co. (com.)..	62	64
Northern Ohio Traction & Light Co. (pref.)..	98½	101
Philadelphia Company, Pittsburgh (com.)....	43¾	45¾
Philadelphia Company, Pittsburgh (pref.)....	42	42¾
Philadelphia Rapid Transit Company.....	18½	18½
Portland Railway, Light & Power Company..	48	53
Public Service Corporation.....	109	110
Third Avenue Railway, New York.....	42½	44½
Toledo Traction, Light & Power Co. (com.)..	20	20
Toledo Traction, Light & Power Co. (pref.)..	80	80
Twin City Rapid Transit Co., Minneapolis (com.)	107	107¼
Union Traction Company of Indiana (com.)..	11½	11½
Union Traction Company of Indiana (1st pref.)	80	80
Union Traction Company of Indiana (2d pref.)	14	14
United Rys. & Electric Company (Baltimore)..	26	25½
United Rys. Inv. Company (com.).....	22	22½
United Rys. Inv. Company (pref.).....	44¾	47½
Virginia Railway & Power Company (com.)..	52½	53
Virginia Railway & Power Company (pref.)..	95	95
Washington Ry. & Electric Company (com.)..	90	90
Washington Ry. & Electric Company (pref.)..	89¾	87
West End Street Railway, Boston (com.)....	73	72¾
West End Street Railway, Boston (pref.)....	92	93
Westinghouse Elec. & Mfg. Company.....	71½	70½
Westinghouse Elec. & Mfg. Co. (1st pref.)....	119	115

* Last sale. a Asked.

ANNUAL REPORTS

Detroit United Railway

The following statement of income, profit and loss is a summary of the business of the Detroit (Mich.) United Railway, the Rapid Railway System, the Detroit, Monroe & Toledo Short Line Railway, the Detroit, Jackson & Chicago Railway and the Sandwich, Windsor & Amherstburg Railway for the years 1913 and 1912:

	1913	1912
Passenger earnings.....	\$11,952,286	\$10,932,687
Express earnings.....	708,473	704,068
Mail earnings.....	12,031	11,938
Special car earnings.....	51,038	46,837
Gross earnings from operation.....	\$12,723,828	\$11,695,530
Operating expenses.....	8,694,230	7,730,409
Net earnings from operation.....	\$4,029,598	\$3,965,121
Income from other sources.....	251,937	208,857
Gross income less operating expenses...	\$4,281,535	\$4,173,978
Deductions:		
Interest on funded and floating debt, and taxes:		
Detroit United Railway.....	\$1,553,133	\$1,539,974
Rapid Railway System.....	168,098	166,792
Sandwich, Windsor & Amherstburg Railway.....	37,534	35,414
Detroit, Monroe & Toledo Short Line Railway.....	168,633	160,167
Detroit, Jackson & Chicago Railway..	223,660	221,166
	\$2,151,058	\$2,123,513
Credited to depreciation reserve.....	500,000	500,000
Credited to contingent liability reserve...	100,000	100,000
Dividends.....	750,000	625,000
Total deductions.....	\$3,501,058	\$3,348,513
Net income to surplus.....	\$780,477	\$825,465

On Jan. 1, 1913, the mileage of the companies was as follows: Detroit United Railway, 438.010 miles; Rapid Railway System, 132.236 miles; Detroit, Monroe & Toledo Short Line Railway, 76.696 miles; Detroit, Jackson & Chicago Railway, 108.052 miles; Sandwich, Windsor & Amherstburg Railway, 38.284 miles. During the year there were added the following: Detroit United Railway, 3.587 miles; Rapid Railway System, 0.490 mile; Detroit, Monroe & Toledo Short Line Railway, 2.814 miles; Detroit, Jackson & Chicago Railway, 0.086 mile; Sandwich, Windsor & Amherstburg Railway, 1.647 miles. The total number of miles in operation by these companies as of Dec. 31, 1913, was 801.902.

The companies' rolling stock consists of 1405 closed passenger cars, 264 open passenger cars, 254 freight and construction cars, 36 live cars, 69 express cars, 16 miscellaneous cars, 2 locomotives, 3913 motors and 3027 trucks. The companies have eleven power houses with a combined capacity of 67,290 hp, two storage batteries with a combined capacity of 4500 amp and twenty-three substations with a combined capacity of 20,850 kw.

There was expended on capital account during the year and charged out under the head of "additions and betterments," in accordance with the classification of expenditures for road and equipment as prescribed by the State and Interstate Commerce Commissions, \$905,127 for road and \$706,823 for equipment, or a total of \$1,611,950.

During the year 1913 liberal expenditures were made for the maintenance of tracks, rolling stock and other properties. On Jan. 1, 1913, the depreciation reserve stood credited with \$2,023,627. There was expended during the year for replacement of motor equipment \$67,064, of which \$27,064 was charged to maintenance of equipment, and \$40,000 to the depreciation reserve. This reserve was credited with \$500,000 out of the income of 1913, leaving a balance Dec. 31, 1913, of \$2,483,627.

The annual report contains the following passenger and mileage statistics for the year 1913:

	Total
Revenue passengers.....	240,940,133
Transfer passengers.....	74,830,285
Employee passengers.....	8,147,219
Total passengers.....	323,917,637
Receipts per revenue passenger.....	\$0.0496
Receipts per passenger.....	.0366
Car mileage.....	46,126,994
Earnings per car mile.....	\$0.2758
Expenses per car mile.....	.1884
Net earnings per car mile.....	.0874

The J. G. Brill Company

The J. G. Brill Company, Philadelphia, Pa., and subsidiary companies report sales and expenditures for the year 1913 as follows:

Total sales and other income.....	\$9,154,433
Less material used; operating, general and administration expenses, and depreciation.....	8,245,290
Net profit undistributed.....	\$909,143
Surplus account, previous year.....	\$1,233,558
Less adjustments	286,684*
	\$946,873
Total adjusted surplus	\$1,856,016
Less dividends paid during year.....	320,600
Net surplus	\$1,535,416

*Included in this adjustment is a sum of \$207,723, which represents damages and expense found against the company by the United States Circuit Court of Appeals in a case begun over twenty-two years ago, for the alleged infringement by the Brill Company of a small portion of a journal box. This case was tried during this long period in various courts, and final judgment was obtained against the Brill Company, and the award, which covered business done in previous years, was paid early in 1913.

The combined balance sheet as of Dec. 31, 1913, follows:

ASSETS	
Value of properties	\$7,987,860
Materials raw and in process.....	1,887,499
Bills and accounts receivable.....	1,622,998
Investments	316,795
Cash	436,699
	\$12,251,851
LIABILITIES	
Preferred stock	\$4,580,000
Common stock	5,000,000
Bonds (John Stephenson Company).....	400,000
Bills and accounts payable	736,434
Surplus	1,535,417
	\$12,251,851

Samuel M. Curwen, president of the company, in presenting the report to the stockholders on Feb. 11, 1914, said in part:

"The total sales value of the combined output of all the five plants owned and operated by The J. G. Brill Company for the twelve months ended Dec. 31, 1913, was \$9,154,433. The amounts of the combined sales of the five plants for the six years prior to 1913 are here given for purposes of comparison: 1907, \$9,211,825; 1908, \$3,845,173; 1909, \$4,261,204; 1910, \$5,960,778; 1911, \$5,870,907; 1912, \$7,842,090; 1913, \$9,154,433.

"The combined profit resulting from the operation of the plants owned and operated by the company during the year 1913 amounted to \$909,143.

"The regular quarterly dividend on the preferred stock, at the rate of 7 per cent per annum, amounting to \$80,150, was declared by the directors at a meeting held Jan. 19, 1914, and was paid on Feb. 1.

"The properties were all maintained during the year in excellent physical condition, and the entire expense of all maintenance and upkeep, amounting to \$257,242, was taken from current earnings.

"During the year there was set aside out of earnings, as an addition to the depreciation reserve, the sum of \$155,234, in pursuance of the regular conservative policy of your management. This total reserve now amounts to \$1,462,580.

"As shown by this report, a large amount of work was obtained and executed during the year, a very satisfactory portion of this work being for export. On Feb. 9 the amount of orders of your combined companies in process of execution amounted to \$1,781,000.

"The outlook for the coming year at this time makes your management somewhat uncertain as to how profitable a year may be expected. Conditions, however, seem to show a marked improvement during the last few weeks."

Organization of Newport News & Hampton Railway, Gas & Electric Company

President C. Loomis Allen has issued a statement concerning the operations of the corporations which were recently consolidated under the name of the Newport News & Hampton Railway, Gas & Electric Company. This statement follows in part:

"The consolidation of the Newport News & Old Point

Railway & Electric Company, Citizens' Railway, Light & Power Company, Hampton Roads Traction Company, Newport News Gas Company and Hampton, Phoebus & Fort Monroe Gas Corporation, together with the voting of the deed of trust and mortgage, completes the reorganization of the public utilities that render service to the residents of the peninsula.

"During 1911 the service rendered was not satisfactory, interruptions were frequent and long and the patience of the public was strained to the breaking point. The corporations were burdened with debt and had no credit. Large sums of money were required to rehabilitate the property and to make extensions and improvements.

"The present owners of the public utilities early in January, 1912, undertook the work of rehabilitating the physical property, in order that proper service could be given, and to make improvements and extensions to the railway service and the electric light, power and gas distribution system in residential sections that were unserved by these utilities. Over \$600,000 in cash has been expended in making improvements, betterments and extensions. At the same time purchases were made of the underlying bonds of the above-mentioned companies (the Newport News Gas Company excepted), with the view that when the improvements were completed a conservative reorganization of the finances of these corporations could be accomplished so that not only the present financial needs would be cared for, but that ample provision would be made to pay for improvements and extensions in years to come.

"The Newport News & Hampton Railway, Gas & Electric Company is now prepared to make such improvements, additions, betterments and extensions into new territory as good business judgment will justify.

"The following is a brief statement of the financial condition of the corporation:

	Authorized	Issued
Common stock	\$1,250,000	\$1,250,000
Preferred stock	1,250,000	1,000,000
First and refunding bonds.....	7,500,000	2,479,000
Underlying bonds	2,225,000	2,225,000

"Of the \$2,479,000 of first and refunding bonds issued, \$175,000 are in the company's treasury and the proceeds of the same will be used to pay for improvements and extensions that are contemplated in the near future."

American Water Works & Guarantee Company, Pittsburgh, Pa.—In the United States District Court in Pittsburgh on Feb. 2, 1914, an order was made in the suit of F. D. Glover, the West Penn Traction Company and Elizabeth M. Van Wagener, plaintiffs, and the American Water Works & Guarantee Company, defendant, authorizing the receivers of the American Water Works & Guarantee Company to permit an extension of time for the payment of principal on outstanding bonds of the Arkansas Water Company to Feb. 1, 1916. They were issued on Feb. 1, 1894, and were due on Feb. 1, 1914. A similar order was made covering the payment of the principal on outstanding bonds of the Louisiana Water Company issued on Jan. 15, 1894, and due on Dec. 15, 1914. Payment was extended to Jan. 15, 1915. The order makes provision for the payment of the interest by the borrowing of funds for that purpose.

City of Toronto (Ont.) Civic Lines.—The number of passengers carried and the receipts of the City of Toronto Civic Lines in 1913 were as follows: St. Clair Avenue, opened Aug. 25, passengers, 1,150,426; receipts, \$19,672; Danforth Avenue, opened October, passengers, 517,024; receipts, \$8,841; Gerrard Street, operating all year, passengers, 1,697,268; receipts, \$29,024; total passengers, 3,364,718; total receipts, \$57,537.

Columbus Railway, Power & Light Company, Columbus, Ohio.—On Jan. 30, 1914, the Columbus Railway, Power & Light Company filed in Ohio a certificate of increase of authorized capital stock from \$1,000,000 to \$11,550,000, to consist of \$6,340,000 common, \$1,143,500 preferred "A" and \$4,066,500 preferred "B." On Feb. 1 the company took title to the several leased properties, except the Columbus Light, Heat & Power Company, in accordance with the reorganization plan.

Fort Wayne & Northwestern Railway, Kendallville, Ind.—At the annual meeting of the Fort Wayne & Northwestern Railway, held in Kendallville, Ind., recently, an initial divi-

dend of 1 per cent was declared. The following directors were elected: W. L. Taylor, Indianapolis; J. H. Rose, F. E. Zollars and E. E. Leonard, Fort Wayne; C. J. Munton, Kendallville.

Fort Wayne & Springfield Railway, Decatur, Ind.—Judge O'Rourke at Decatur has decided as special judge in the case of the Fort Wayne & Springfield Railway, which has been in the hands of a receiver for some time, that the road must be sold on May 15 to the highest bidder at a minimum bid of \$200,000. A certified check for \$20,000 must accompany each bid. Some time ago the court ordered the road sold at a price of at least \$250,000, but there were no bidders, so the court lowered the upset price.

Galveston-Houston Electric Company, Galveston, Tex.—In order to pay the \$600,000 of three-year 6 per cent notes, due April 1, 1914, and to meet other capital requirements, directors of the Galveston-Houston Electric Company have offered to preferred and common stockholders of record Feb. 4, for subscription pro rata at par, \$1,000,000 of the authorized but unissued common stock. This stock, if paid for in full, is to carry the dividend of \$3.50 per share, payable March 16. Payment for new stock must be made either (1) in full at \$100 per share on or before Feb. 25, 1914, or (2) in two instalments of \$50 per share, the first on or before Feb. 25, and the second on or before Aug. 25.

Laredo Electric & Railway Company, Laredo, Tex.—Frank E. Scovill, secretary and general manager of the Laredo Electric & Railway Company, reports the sale of the property of the company on Jan. 25, 1914, to Messrs. Morrison and McCall, St. Louis.

Los Angeles (Cal.) Railway Corporation.—E. H. Rollins & Sons, Boston, Mass., have bought \$10,000,000 of Huntington Land & Improvement Company 6 per cent collateral trust bonds, guaranteed by the indorsement of H. E. Huntington. They are being offered to yield 6.15 per cent. The bonds are part of an authorized issue of \$14,000,000, the remaining \$4,000,000 being reserved to retire a like amount of 6 per cent notes. The issue is secured by collateral having par value of \$46,800,000, including the entire capital stock of the Los Angeles Railway. The plans for the incorporation of the Los Angeles Railway as a merger of the Los Angeles Railway Corporation and the City Railway were referred to at length in the ELECTRIC RAILWAY JOURNAL of Dec. 13, 1913, page 1258.

Manhattan & Queens Traction Corporation, New York, N. Y.—Permission has been granted by the Public Service Commission of the First District of New York to the Manhattan & Queens Traction Corporation, the successor to the South Shore Traction Company, to issue \$765,000 of capital stock. It had asked for leave to issue \$1,500,000 of stock and \$1,500,000 of bonds. All this stock must be issued on or before June 30, and the company must report every month how much it has sold and to what purposes it has devoted the proceeds. Moreover, all franchise payments and all expenditures for property to be held only to the end of the franchise must be amortized before the franchise expires. Consideration as to the issue of the bonds was postponed until the form of the \$10,000,000 mortgage which the company wishes to make has been settled. McArthur Brothers, New York, contractors for the road, have agreed to accept as payment for their work \$1,480,000 of the capital stock and \$1,500,000 of the first mortgage bonds of the company.

Monterey Railway, Light & Power Company, Monterey, Mex.—Directors of the Monterey Railway, Light & Power Company have issued notice that the interest due on Feb. 2 on the \$6,000,000 of first mortgage debenture stock will be deferred until such time as financial and political conditions improve in the republic. Owing to disturbed conditions in Mexico the State of Nuevo Leon has been unable to settle the claim of the company under the 10 per cent guarantee on the capital investment of the Monterey Water Works & Sewer Company, a subsidiary, although substantial sums have been paid on account of this claim. Notwithstanding this, the directors say that they would have been able to provide sufficient sums from revenue to pay the debenture interest if there had been a normal rate of exchange between Monterey and London; but they were unable to transfer the money without a large loss.

Mount McKay & Kakabeka Falls Railway, Fort William, Ont.—A report was recently made to the City Council of Fort William, Ont., on the question of purchasing the entire system of the Mount McKay & Kakabeka Falls Railway and operating it as part of the municipal electric railway system. The city railway committee will consider the matter.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—The California Railroad Commission has issued an order granting authority to the Oakland, Antioch & Eastern Railway to issue \$500,000 of first mortgage 5 per cent thirty-year bonds under its mortgage and deed of trust to the Union Trust Company of San Francisco and to pledge the bonds together with other bonds to a total of \$1,167,000 as collateral security for an issue of notes under the trust agreement. The funds will be applied to the physical development of the railroad's properties.

Pittsburgh, McKeesport & Westmoreland Railway, McKeesport, Pa.—James G. Hasking has been designated by the holders of more than 60 per cent of the outstanding bonds of the Pittsburgh, McKeesport & Westmoreland Railway as trustee under the mortgage and deed of trust dated Dec. 1, 1906, and has qualified in the stead of the Columbia-Knicknocker Trust Company, New York, N. Y.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—Stone & Webster have announced that the entire issue of \$2,686,200 of 6 per cent preferred stock of the Puget Sound Traction, Light & Power Company, underwritten by a syndicate of bankers of which Stone & Webster were syndicate managers and offered at 100, has been sold.

Southern Pacific Company, San Francisco, Cal.—The Southern Pacific Company on Feb. 7 made application to the California Railroad Commission and the Corporation Commission of Arizona for authority to issue \$55,000,000 of 5 per cent twenty-year convertible bonds. These bonds in the amount of \$29,000,000 are for refunding short-time notes and the remainder for betterments and additions.

Dividends Declared

Central Arkansas Railway & Light Company, Hot Springs, Ark., quarterly, 1 $\frac{3}{4}$ per cent, preferred.

Detroit (Mich.) United Railway, quarterly, 1 $\frac{1}{2}$ per cent.

Federal Light & Traction Company, New York, N. Y., quarterly, 1 $\frac{1}{2}$ per cent, preferred.

Massachusetts Consolidated Railways, Greenfield, Mass., quarterly, 1 $\frac{1}{4}$ per cent, preferred.

Northern Texas Electric Company, Fort Worth, Tex., 3 per cent, preferred; quarterly, 1 $\frac{3}{4}$ per cent, common.

Pacific Gas & Electric Company, San Francisco, Cal., quarterly, 1 $\frac{1}{2}$ per cent, preferred.

Portland Railway, Light & Power Company, Portland, Ore., quarterly, 1 per cent.

Tampa (Fla.) Electric Company, quarterly, 2 $\frac{1}{2}$ per cent.

Twin City Rapid Transit Company, Minneapolis, Minn., quarterly, 1 $\frac{3}{4}$ per cent, preferred; quarterly, 1 $\frac{1}{2}$ per cent, common.

ELECTRIC RAILWAY MONTHLY EARNINGS

AMERICAN RAILWAYS, PHILADELPHIA, PA.

Period		Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., Jan., '14		\$429,850	.....	.....	.....	.....
1 "	"	405,091	.....	.....	.....	.....
7 "	"	3,304,831	.....	.....	.....	.....
7 "	"	3,054,573	.....	.....	.....	.....

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.

1m., Nov., '13	\$164,572	\$109,799	\$54,772	\$33,919	\$20,854
1 "	155,213	96,360	58,853	32,050	26,803
5 "	937,136	568,136	368,999	168,960	200,039
5 "	895,032	497,298	397,734	160,395	237,339

CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY, CLEVELAND, OHIO.

1m., Dec., '13	\$105,473	\$62,915	\$42,557	\$33,087	\$9,470
1 "	97,272	59,564	37,614	32,066	5,648
12 "	1,255,343	759,495	495,849	381,931	113,918
12 "	1,183,332	693,529	489,803	373,113	116,690

DETROIT (MICH.) UNITED RAILWAY

1m., Dec., '13	\$1,016,655	\$715,282	\$301,373	\$177,545	\$123,827
1 "	1,037,459	685,795	351,664	177,682	173,982
12 "	12,975,767	8,694,231	4,281,536	2,151,058	2,130,477
12 "	11,904,388	7,730,409	4,173,978	2,123,513	2,050,465

*Includes taxes.

Traffic and Transportation

I. C. C. Accident Bulletin for Year

The Interstate Commerce Commission has issued accident bulletin No. 48, covering the three months ended June 30, 1913, and the year ended June 30, 1913. Some of the figures on accidents on electric railways reporting to the commission and were reproduced in the summary of that report which was published in the *ELECTRIC RAILWAY JOURNAL* of Jan. 3, 1913, page 53. The table of collisions and derailments on electric railways contained in the bulletin follows:

No.	Classes	Number	Persons Killed	Injured	Damage to Road and Equipment and Cost of Clearing Wrecks
Collisions:					
1	Rear	103	7	816	\$35,475
2	Butting	42	9	245	70,177
3	Trains separating	56	2	130	55,446
4	Miscellaneous	201	18	1,191	\$161,098
Derailments due to—					
5	Defects of roadway	23	1	50	\$1,539
6	Defects of equipment	12	1	25	8,108
7	Negligence of trainmen, signmen, etc.	11	2	55	30,685
8	Unforeseen obstruction of track, etc.	7	1	9	7,546
9	Malicious obstruction of track, etc.	2	1	1	.....
10	Miscellaneous causes	19	5	70	2,801
	Total	74	11	210	\$50,679
	Total collisions and derailments	275	29	1,401	\$211,777

The table of employees in the service of electric railways reporting to the commission on June 30, 1913, follows:

No.	Class of Employees	Number of Persons
Employees specially exposed to railway accidents:		
1	Freight trainmen, road service (enginemen, firemen, motormen, conductors, brakemen, rear flagmen, train baggagemen, train porters performing duties of trainmen)	1,914
2	Passenger trainmen, road service (enginemen, firemen, motormen, conductors, brakemen, rear flagmen, train baggagemen, train porters performing duties of trainmen)	20,736
3	Other persons employed on trains (dining-car employees, train porters not performing duties of trainmen, etc., when actually employed by the respondent carrier)	130
4	Yardmen (all employees in yard train work and switching—enginemen, firemen, conductors, brakemen, foremen, droppers, fieldmen, hostlers, hostler helpers, yardmasters, etc.)	800
5	Switch tenders, crossing tenders and watchmen	602
6	Bridgemen and trackmen	16,387
7	Other employees specially exposed to railway accidents (station and miscellaneous employees, shopmen, etc., excluding all officers, clerks, indoor employees, and others engaged in work in which they are not specially exposed to railway accidents)	8,963
	Total number of employees specially exposed to railway accidents	49,532
8	Employees not specially exposed to railway accidents (includes officers and other employees specifically excluded from item No. 7 above)	12,684
	Total number of persons employed on June 30, 1913..	62,216

Front-End Collectors in Kansas City

The facility with which the Metropolitan Street Railway, Kansas City, Mo., handled the immense crowds which turned out for "Go-to-Church" day on Sunday, Feb. 1, 1914, attracted attention to the front-end collectors who have been used by the company with increasing success for the past three years. About 250,000 persons attended church on the date named, it is estimated, establishing a new record in this respect, and probably also for the company for Sunday morning business. While the company installed additional cars for the occasion, the crowds could hardly have been handled so efficiently had it not been for the front-end collecting system. Many compliments were paid the company by the press, ministers and others interested in the success of "Go-to-Church" day.

The front-end collectors were installed by the Metropolitan Street Railway about three years ago, after extensive tests designed to determine whether or not the new plan was practicable and worth while. Stop watches were utilized to determine the saving of time effected by allowing passengers to use the front end of the cars not only for exits

but also for entrances. The investigations of the company indicated that the plan was satisfactory and it has been adopted on a steadily increasing scale. At present thirty-five front-end collectors are used in the evening, and a half dozen in the morning. The collectors are pressed into service from 4.30 p. m. to 6.30 p. m. on Saturdays and from 5 p. m. to 6.30 p. m. during the week. They are placed at busy transfer points, and in some instances at large department stores. Several also are placed in the packing house district, where the number of employees runs into the thousands. The front-end collectors also are used extensively on special occasions, such as ball games during the summer and at theaters in the winter.

The front-end collectors are conductors who perform precisely the same duties as the man on the rear of the car. The difference is that the collectors, instead of being on cars, are placed at a given point and remain there during a stated period. They issue and collect transfers, receive cash fares, and punch transfers where the slip is to be used a second time by the passenger. The collectors are equipped with neck registers, which enable them to work with expedition and at the same time keep an accurate record of their transactions. They also keep a tripper card, just as does a conductor in charge of a car. The front-end collectors all served as conductors prior to being appointed collectors.

One test made by the company at a busy transfer point with the front-end collectors working showed that 282 passengers were loaded through both the rear and front end doors in 304 seconds, or one passenger every 1.07 seconds. Of the 282 persons handled, 109 were loaded through the front door, and 173 by the rear. At another busy transfer point, under similar conditions with only the rear door in use and the front-end collectors eliminated, 105 passengers were loaded in 235 seconds, or an average of one passenger every 2.23 seconds. On another date, at the same point, 213 passengers were loaded in 292 seconds, with the front-end collectors working, an average of one person in 1.37 seconds. Under the same conditions, with the exception that the collectors were again banished, 144 passengers were loaded in 319 seconds, or an average of one person every 2.80 seconds.

The public did not take kindly to the innovation at first. This sentiment was overcome, however, when the advantages of the new system were seen, and a general protest would probably be lodged were a return to old methods proposed.

Welfare Program of Columbus Company

The Columbus Railway, Power & Light Company, Columbus, Ohio, has established a new scale of wages for motormen and conductors and inaugurated a system of sick and death benefits and retirement of employees on a pension. This was announced through a bulletin issued on Feb. 5. The new scale of wages is as follows: First three months, 20½ cents; the following nine months, 23¼ cents; second and third years, 25 cents; fourth and fifth years, 26 cents; after fifth year, 27 cents. The present scale for the first year is the same as the new one, and provides for 24½ cents thereafter. The new scale went into effect on Feb. 13.

The company will organize a co-operative beneficial association. It will receive as members white employees of the company eighteen years of age or over who have been in continuous service of the company for three months and whose wages do not exceed \$200 a month. Each member will pay an initiation fee of \$1 and dues of 50 cents a month and the company will pay into the treasury of the association each month half as much as the members pay that month in membership fees and dues. The company will also pay the expense of management. Sick benefits to the amount of \$1 a day will be paid for a term of twenty-six weeks. This, however, is the maximum limit for any consecutive twelve months, and the payments begin after the first seven days' illness. Payments will be made only to those who are not receiving wages during their absence from employment. Funeral benefits amounting to \$150 will be paid to beneficiaries of the deceased members. Independently of the association, the company will pay \$500 on the death of an employee, the payment being made to actual dependents, if any sur-

vive the employee. To be eligible to this benefit an employee must have been with the company at least two years, have reached the age of twenty-one years and be receiving not more than \$200 a month. Pensions of \$30 a month will be paid to those who have reached the age of sixty-five after having been twenty-five years in the service and whose salary is not more than \$200 a month. This payment applies on retirement from the service and the company reserves the right so to retire employees who are eligible to the pension and are unable to perform their regular duties.

"Safety First" in Trenton

The Trenton & Mercer County Traction Corporation, Trenton, N. J., has entered upon a "safety first" campaign. For some time past C. E. Davies, general claim agent of the company, has been distributing in the public schools celluloid calendar cards 2½ in. wide by 3¾ in. high which contain general safety hints and suburban electric railway schedules on one side and safety and sanitation hints and a calendar for the year on the other side. The distribution is made by Mr. Davies, who calls at the schools at the opening and the closing sessions and refers to accident statistics and the great need of the safety campaign. The work has been approved by the Board of Education and the supervising principal of schools and has also received the indorsement of principals and teachers in the schools. The company has also appointed men from its various departments to the "safety first" committee to carry on this work among the company's employees. The "safety first" hints which appear on the calendar cards follow:

"Remember that cars are confined to the tracks. They must run faster than you do. They cannot stop as quickly.

"In boarding be sure the car has stopped. Take hold of the grab handle with your right hand and step up with the left foot first.

"In alighting be sure the car is at a standstill. Take hold of the grab handle with your left hand and step down with the right foot first."

The safety and sanitation hints follow:

"Do your part to keep Trenton clean.

"Don't throw paper or other refuse in cars or on streets.

"Don't spit on the sidewalks, in cars or on the floors of public buildings.

"Don't smoke or carry lighted cigars, cigarettes or pipes in street cars.

"Learn the regulations of the board of health for your guidance."

Plans for Delivering Farm Produce in Philadelphia

Director of Public Safety Cooke, of Philadelphia, Pa., has announced that arrangements have been completed with the Philadelphia Rapid Transit Company whereby farm produce will be delivered cheaper and quicker in any part of the city by a new interurban electric railway freight service now being established by the company. Inauguration of this new freight service promises early establishment of "curb markets" which Director Cooke has urged as a potent factor in decreasing produce prices. Mr. Cooke is reported to have said that if Councils pass the curb market ordinance, it will make it possible to try some further experiments that will undoubtedly yield good results in that direction. As part of the proposed new freight service, Mr. Cooke says the Philadelphia Rapid Transit Company has made plans to build terminals immediately at Eleventh and Colona Streets, north of Susquehanna Avenue, and at the Farmers' Market, Ridge Avenue and Poplar Street. The company will also enlarge its freight station at Wheel Pump, Chestnut Hill, and in addition has expressed its readiness to construct market sidings at Fairmount Avenue and Second Street and Race and Second Streets and a third siding at such new public market as Councils by ordinance may authorize at some other place in the city, not yet designated. Announcement of the location of this new market, the director said, would be made within a few days. Mr. Cooke is quoted as follows: "These tangible results in the campaign to bring the products of the farmers of 'nearby Philadelphia' to our local kitchen doors are very gratifying, and

are an indication of the growing importance of the electric railway in this freight business. As a result of our inquiry into the high cost of living, the Philadelphia Rapid Transit Company has decided that it is good business to enlarge its present facilities."

Premiums for Reducing Coal Consumption in Kansas

The Topeka (Kan.) Street Railway effected a material saving in coal consumption during January by means of a prize contest, in which car crews were entered, and by putting into effect a ticket system, by which the amount of coal used on each car is recorded. Owing partly to warm weather, but chiefly to the new system, the company reduced its average daily coal consumption on cars to about 900 lb. daily, a substantial saving in comparison with the corresponding period in 1912, even considering the warmer weather. The motorman who stoked the heaters in the cars with the smallest amount of coal during January received a cash bonus of \$6. Nearest competitors received prizes of \$3, \$2 and \$1. A good deal of friendly rivalry was aroused by the contest, which will be continued during the winter. Under the new plan each motorman receives a number of coal tickets, each entitling him to a certain amount of coal. He gives a ticket to the accounting department every time he loads up with coal. The best grade of coal obtainable is used, usually consisting of Pennsylvania anthracite nut, costing around \$12 a ton.

"Safety First" Meeting of the Northern Ohio Traction & Light Company.—Meetings of the employees of the Northern Ohio Traction & Light Company, Akron, Ohio, have been held at Silver Lake Junction and other points recently to discuss the "safety first" movement.

Traffic Changes to Relieve Congestion.—The Interborough Rapid Transit Company, New York, N. Y., has agreed to make certain changes to relieve congestion at the 149th Street station of the subway and elevated railroad in the Bronx. These changes include the establishment of three new points for the issuance of transfers to passengers leaving the subway to board the elevated and also a change in the direction of traffic during the evening rush hours.

Storm in Northwestern Ohio.—Traffic over the electric railways in northwestern Ohio was reported on Feb. 7 to be partly disorganized. A severe sleet storm carried down the telegraph and telephone poles along the right-of-way of a number of the electric railways and put the transmission lines out of service. A number of the companies are reported to have offered premiums for extra work by linemen and other employees to rush repairs and open up schedules. On Feb. 7 all traffic to Akron was routed via Findlay and change was necessary at Fostoria.

Five-Cent Fare Into Kansas City.—Persons living on the Kensington branch of the Kansas City & Western Electric Railway, running from Kansas City to Leavenworth, Kan., are to have a 5-cent fare into Kansas City. This agreement was practically reached at a recent meeting between officers of the Metropolitan Street Railway, of the interurban, and R. J. Higgins, city counselor on the Kansas City, Kan., side. Arrangements are to be made whereby the Metropolitan Street Railway will take charge of the interurban cars at Chelsea Junction and also operate other cars over the line. The conductors for the city line now begin taking fares at Eighteenth Street and Central Avenue.

"Safety First" Results in New Albany.—The Louisville & Northern Railway & Light Company and the Louisville & Southern Indiana Traction Company, associated corporations, with offices in New Albany, Ind., have issued convincing figures showing the results of the "safety first" campaign which they have conducted for several years. In December, 1912, 696,862 passengers were handled, and the number of accidents was nineteen. In December, 1913, the number of passengers handled was 770,308, and the total number of accidents three, a reduction of more than 80 per cent. A significant sidelight on the figures is that the quarterly examination of trainmen held in December, 1913, covering matters pertaining to safety operation, resulted in all of the trainmen securing a passing grade. This was the first time everybody passed.

Commendation for New York Companies.—The New York *World*, commenting editorially on the distribution of \$70,000 among the employees of the Interborough Rapid Transit Company and the New York Railways at Christmas, said in part: "It is doubtful if any public service is rendered under more trying circumstances or with better temper and discipline. The crowds that make up a large proportion of the patrons of some of the lines during rush hours are about the rudest and least disciplined in any civilized city. Ill-mannered thousands rush the cars without respect for age or sex. These offenses frequently are little less than assault and battery. That there are not more fights or arrests is due in the main to the patience and tact of the employees. It is well, therefore, to have their merit recognized by the public as well as by the company. They deserve it."

Trolley Freight Terminal Discussed in Pittsburgh.—A committee of 100 citizens met with the City Councilmen and members of the Chamber of Commerce at Pittsburgh, Pa., recently, to discuss plans for establishing an electric railway freight terminal in Pittsburgh. Representatives of all electric railways which enter Pittsburgh attended. The freight and express business on the electric railways in western Pennsylvania has increased enormously and there is a demand for better facilities to and from all shipping points in the Pittsburgh industrial district. The plan is to erect an electric railway freight terminal to which all lines that enter Pittsburgh will have access. The representative of one line exhibited samples of fruit grown within 50 miles of Pittsburgh to illustrate the opportunities for farming and fruit growing provided quick and economical transportation from the place of production is assured. A committee of seven to represent the city was appointed to confer with a committee representing the electric railways.

Electric Railway Enlisted in Campaign Against Smallpox.—The Metropolitan Street Railway, Kansas City, Mo., is taking an active part in preventing a further spread of smallpox, about sixty cases of which are being treated in Kansas City. Placards reading as follows have been placed in all of the cars operated by the company: "To the Public: Vaccination prevents smallpox. Smallpox prevails to an alarming extent in malignant form in many parts of the State. You may contract the disease at any moment by coming in contact with a smallpox patient or a person who has been exposed to the disease, or with clothing or articles of merchandise which have come from infected premises. The experience of a century has taught that vaccination is a safe and positive preventive against smallpox." While it has refrained from issuing any form of positive order, the company has strongly advised employees to be vaccinated at once. In addition, the company has redoubled its efforts to maintain cleanliness and absence of germs in cars. Each car, as it arrives at the carhouse after the day's run, is always swept and disinfected. The proportion of disinfectant to the amount of water used has been increased during the smallpox scare.

Brooklyn Transfer Map.—The Public Service Commission of the First District of New York placed on exhibition on Feb. 10, 1914, in room 310 of the Tribune Building, New York, where the offices of the commission are located, several maps and charts showing the surface railways in Brooklyn and the intersections at which it is proposed to give transfers. This transfer system is a general rearrangement agreed upon by the Brooklyn Rapid Transit System and the commission. After several conferences, the committees made an arrangement whereby a retransfer upon a transfer could be eliminated. At the same time opportunity is given to all passengers to transfer between any two points in the same general direction for a single fare. The maps will be on exhibition for a week, so that Brooklyn people may familiarize themselves with the proposed arrangement. On Feb. 17 the commission will hold a public hearing on the plan. According to the plan, transfers will be given at every intersecting point of the surface railroad system of Brooklyn, including the lines of the Coney Island & Brooklyn Railroad, recently taken over by the Brooklyn Rapid Transit Company. At a few points, the direction will be limited, so as to prevent the holder of a transfer from riding back to the point from which he started without the payment of a second fare.

Personal Mention

Mr. H. O. Caster, Oberlin, Kan., has been appointed attorney for the Public Utilities Commission of Kansas.

Mr. W. L. Taylor, president of the Fort Wayne & Northwestern Railway, Kendallville, Ind., has been elected vice-president of the company.

Mr. Joseph S. Hart, of the Hart Mirror Plate Company, has been elected a vice-president of the American Public Utilities Company, Grand Rapids, Mich.

Mr. Arthur Reid, formerly superintendent of electric railways and electricity in Lethbridge, Alberta, has been elected commissioner of public utilities for that city.

Mr. C. J. Munton, treasurer and general manager of the Fort Wayne & Northwestern Railway, Kendallville, Ind., has been elected president and general manager of the company.

Mr. W. J. C. Wakefield has been elected chairman of the executive committee of the Washington Water Power Company, Spokane, Wash., to succeed the late Henry M. Richards.

Mr. Charles B. Kelsey, president of the American Public Utilities Company, Grand Rapids, Mich., has been elected chairman of the board of directors of the company, a newly created position.

Mr. J. Y. Carithers, who has been first vice-president of the Athens Railway & Electric Company, Athens, Ga., has been elected president of the company to succeed Mr. W. T. Bryan, resigned.

Mr. L. H. Brown, superintendent of the Lynn power station of the Bay Street Railway, Boston, Mass., has been elected president of the New England Society of Superintendent Engineers.

Mr. C. W. Hotchkiss, who has been vice-president of the Staten Island Midland Railway, New York, N. Y., has been elected president of the company to succeed Mr. S. F. Hazelrigg, resigned.

Mr. C. D. Cox, who has been treasurer of the Athens Railway & Electric Company, Athens, Ga., has also been elected secretary of the company, in which capacity he succeeds Mr. John White Morton, resigned.

Mr. G. N. Patterson, claim and purchasing agent and general freight and passenger agent of the Fort Wayne & Northwestern Railway, Kendallville, Ind., has in addition been elected treasurer of the company.

Mr. F. W. Frueauff, New York, N. Y., has been elected second vice-president of the Athens Railway & Electric Company, Athens, Ga., to succeed Mr. C. D. Flanigen, who has been elected first vice-president of the company.

Mr. Hugh H. Harrison, president of the Merchants' Heat & Light Company, Indianapolis, Ind., has been elected a vice-president of the American Public Utilities Company, of which the Merchants' company is a subsidiary.

Mr. Barrett Smith has resigned as advertising manager of the Stone & Webster Engineering Corporation, Boston, Mass., to go into special advertising work for himself. He will still give part of his time to the Stone & Webster advertising.

Mr. T. J. Mullen, formerly general superintendent of the Staten Island Midland Railway and of the Richmond Light & Railway Company, New York, N. Y., has been appointed to succeed Mr. S. F. Hazelrigg as general manager of both companies.

Mr. H. J. Blackham has been appointed general superintendent of the Staten Island Midland Railway and the Richmond Light & Railway Company, New York, N. Y., to succeed Mr. T. J. Mullen, who has been appointed general manager of the companies.

Mr. Joseph H. Brewer, vice-president and general manager of the American Public Utilities Company, Grand Rapids, Mich., has been elected to succeed Mr. Charles B. Kelsey as president of the company. Mr. Brewer will also continue in the capacity of general manager.

Mr. James A. Braden, for the last year advertising and publicity manager of the Northern Ohio Traction & Light Company, Akron, Ohio, operating the Akron, Bedford &

Cleveland, the Canton-Akron, the Canton, Massillon, New Philadelphia & Urichsville and other interurban roads and city lines in northern Ohio, has been appointed general passenger agent of the company. Mr. Braden gained a wide advertising and selling experience through a ten-year connection with the Diamond Rubber Company, Akron, as advertising manager.

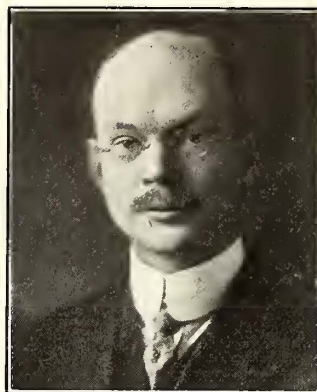
Mr. Edward A. Maher, Jr., has recently been appointed assistant general manager of the Third Avenue Railway, New York, N. Y. Mr. Maher is a son of the vice-president and general manager of the company and is a member of the New York bar. He has also had an extensive experience in railway and electric lighting affairs in New York, having been for ten years, or between 1892 and 1902, president and general manager of the North River Electric Light & Power Company. Then he entered the legal department of the New York City Railway and the Third Avenue Railroad, with which he was connected for seven years. He assumed his present duties on Dec. 1.

Mr. W. G. Nicholson, who has been elected secretary of the Omaha & Council Bluffs Street Railway, Omaha, Neb., in addition to auditor of the company, was connected with the accounting department of various steam railroads prior to entering the electric railway field. He was with the Chicago, Rock Island & Pacific Railway, Chicago, Ill., for a number of years. In 1905 he entered the service of the Cincinnati, Hamilton & Dayton Railway at Cincinnati, Ohio. After a brief connection with that company he resigned to become chief clerk to the secretary and treasurer of the Indiana, Columbus & Eastern Traction Company, now included in the system of the Ohio Electric Railway, Cincinnati, Ohio. On Jan. 1, 1910, Mr. Nicholson was appointed auditor of the Omaha & Council Bluffs Street Railway. On Jan. 19, 1914, he was in addition elected secretary of the company.

Mr. J. S. Goodwin was appointed superintendent and was elected secretary of the Hartford & Springfield Street Railway, Warehouse Point, Conn., on Jan. 30, 1914, to succeed Mr. Ray W. Reynolds, whose appointment to the Springfield (Mass.) Street Railway was noted in the *ELECTRIC RAILWAY JOURNAL* of Jan. 31, 1914. Mr. Goodwin was born in Beverly, Mass., in 1877. He entered railway work in 1895 as a motorman on the Gloucester, Essex & Beverly Street Railway, now a part of the Bay State Street Railway. He was subsequently employed as a motorman for a short time with the Rhode Island Company, Providence, R. I. In 1901 he entered the employ of the Hartford & Springfield Street Railway as a motorman. He was later appointed a dispatcher of the company. In 1906 he was advanced to chief dispatcher and served in that capacity until the time of his advancement to superintendent and secretary.

Mr. Adam S. Widenor, whose election as treasurer of the Omaha & Council Bluffs Street Railway, Omaha, Neb., was announced in the *ELECTRIC RAILWAY JOURNAL* of Jan. 31, 1914, was born in Belvidere, N. J. He entered newspaper work and was connected with the mechanical and business departments of newspapers at Leadville, Col., from 1879 to 1887. He entered the employ of the Cable Tramway, Omaha, Neb., in June, 1888, as a conductor. In 1889 he was appointed assistant superintendent of the Cable Tramway, which was consolidated with the Omaha Street Railway in that year. He was subsequently advanced to assistant cashier and continued in that capacity with the consolidated Omaha & Council Bluffs Street Railway & Bridge Company. In 1902 Mr. Widenor was appointed cashier of the Omaha & Council Bluffs Street Railway and on Jan. 19, 1914, he was elected treasurer of the company.

Prof. H. H. Norris, who has been a special contributor to this paper for several years, has now joined the editorial staff and will give all his time to this publication. Professor



Prof. H. H. Norris

Norris is a native of Philadelphia and secured his university education at the Johns Hopkins University, where he was a special student in physics and applied electricity, and at Cornell, where he was graduated in the class of 1896 with the degree of M.E. He was an instructor in Cornell from 1896 to 1900, an assistant professor from 1900 to 1905 and a professor from the latter year to 1913. He was also in charge of the department of electrical engineering during the last four years of his stay there. Professor Norris has also

done a great deal of electrical work outside of the college. He was superintendent of the tests conducted by the Electric Railway Test Commission at the St. Louis Exposition and later on the lines of the Union Traction Company of Indiana in Anderson, and with Prof. B. V. Swenson edited the report of the commission. He was also a member of the international jury at the St. Louis Exposition and secretary of the electric railway section. In 1905 his services were secured by the American Electric Railway Association to formulate plans for the reorganization of that association and he drafted the constitution and by-laws which are now in effect. He has also for a number of years been chairman of the educational committees of the American Institute of Electrical Engineers and of the American Electric Railway Association and has just been appointed by the National Electric Light Association to the committee on relations of that organization to educational institutions. He was manager of the American Institute of Electrical Engineers from 1909 to 1913, and since 1909 has been secretary of the Society for the Promotion of Engineering Education. He is also the author of several books dealing with electrical engineering subjects and of numerous contributions to the technical press. For the present Professor Norris will have his headquarters with the New York office of the *ELECTRIC RAILWAY JOURNAL*.

OBITUARY

James H. Bryan, who was president of the Woronoco Street Railway, now included in the system of the Springfield (Mass.) Street Railway, is dead.

At the midwinter meeting of the Brooklyn committee of public safety, held recently at the Hamilton Club, an address was made by Henry W. Forster, chief engineer of the Independence Inspection Bureau, and Gen. George W. Wingate, chairman of the committee, presented a report on its work since its organization on Nov. 20, 1913. In addition to the daily lectures in the schools, illustrated with large accident drawings and model electric railway cars, approximately 350,000 safety blotters have been distributed to the children—one to every child in the schools—and nearly seven thousand safety calendars have been provided. These calendars, approved by the Board of Education, provide every class room in Brooklyn with a striking picture every month, in addition to specific safety instruction, and letters from many principals indicate that they are warmly appreciated. One hundred safety bulletin boards, with accompanying material for safety reports, have been provided and are being installed as fast as the co-operation of principals can be secured. With the installation of these bulletin boards goes the organization of safety patrols—bodies of ten or a dozen of the older boys in a school, who escort the younger children across dangerous crossings on their way home. The report spoke of lectures in the schools and street traffic regulation. The work of the Brooklyn Rapid Transit Company in this connection was described at length in *ELECTRIC RAILWAY JOURNAL* of Dec. 13, 1913.



J. S. Goodwin

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Frontenac, Mulberry & Arcadia Electric Railway, Pittsburg, Kan.—Application for a charter will be made by this company to build a 15-mile line to connect Frontenac, Mulberry, Arcadia and Pittsburg. Officers: J. S. Patton, president; Frank Markowitch, vice-president; P. J. McGinley, secretary; Antone Menghini, treasurer. [E. R. J., Jan. 31, '14.]

Central City, Greenville & Drakesboro Railway, Central City, Ky.—Application for a charter has been made by this company to build an electric railway to connect Central City, Drakesboro, Greenville, Hillside, Brownsville, Mercer, Powderly, Cleaton, Bevier and Graham. Capital stock, \$500,000. Incorporators: L. L. Dunham, New York; W. H. Netherland, Louisville; Samuel Cauffield, Wilmington; Hubert Meredith, Greenville; S. J. Gish and James Small, Central City. [E. R. J., Jan. 31, '14.]

***Rapid Transit Company of St. Louis, St. Louis, Mo.**—Chartered in Missouri to build an electric railway. Capital stock, \$2,500. Incorporators: James E. Westrich, H. E. Miller and Guy B. Negg.

***Wheeling & Eastern Railroad, Wheeling, W. Va.**—Chartered in West Virginia to build an electric or steam railway from Short Creek to Potomac Creek. Capital stock, \$100,000. Incorporators: B. L. Rosenbloom, R. T. Manning, M. E. McGreal, George A. Feeny and B. J. Smith, Wheeling, W. Va.

FRANCHISES

Los Angeles, Cal.—The Pacific Electric Railway has asked the Council for a franchise for a double-track line to connect its line at Sixth Street and Ceros Avenue with the south end of the proposed new Arcade Depot in Los Angeles.

Mill Valley, Cal.—The Marin County Electric Railway, Mill Valley, has received a franchise in Mill Valley. This company plans to build an electric line in that place, with a branch from the Northwestern Pacific depot to the Old Hill and Cascade Reservation in Marin County. B. F. Ames, president. [E. R. J., Jan. 31, '14.]

Stockton, Cal.—The Stockton Electric Railway has asked the Board of Supervisors for a fifty-year franchise for an extension of El Dorado Street to Castle in North Stockton.

***West Palm Beach, Fla.**—The City Council is asked to grant a franchise for an electric railway in West Palm Beach. This is part of a plan to build an electric line between West Palm Beach and Lake Worth. A company will be organized immediately upon the granting of the franchise. No names are yet given of those interested in the project.

Central City, Ky.—The Central City, Greenville & Drakesboro Railway has received a franchise from the Council on Broad Street in Central City. [E. R. J., Jan. 31, '14.]

Hagerstown, Md.—Henry A. Bester, Jr., representing the Washington County Traction Company, Hagerstown, has asked the Council for a forty-year franchise over East Washington Street in Hagerstown. This is part of a plan to build an electric line from Hagerstown to Security and eventually to Leitersburg, Chewsville, Cavetown and Smithsburg. The Washington County Commissioners have granted a franchise over the county road from Hagerstown to Security. [E. R. J., Jan. 17, '14.]

Springfield, Mass.—The Springfield Street Railway has asked the Council for a franchise for a relocation and double-tracking of its line on the south side of the state highway from a point near Lee's Crossing to the West Springfield town line.

***Newton, N. C.**—The Eastern Carolina Fair Association Company, Newton, has asked the Council for a franchise to build a 3-mile electric line from some point near the center of Newton to the fair grounds.

Brantford, Ont.—The Grand Valley Railway has asked the Council for an extension of time on its franchise in Brantford.

Portland, Ore.—The Portland Railway, Light & Power Company has asked the Council for a franchise on Halsey Street in Portland.

***Memphis, Tenn.**—H. D. Brennan, Memphis, who represents a syndicate which owns a subdivision near Memphis, has asked the City Commissioners for a franchise for an electric line $\frac{3}{4}$ mile long in Memphis. A similar request will be made to the County Commissioners, as part of the proposed line is outside the city limits. This line will not be operated by the Memphis Street Railway. It will run from the intersection of Lamar Avenue and Castalia Street to the subdivision.

Nashville, Tenn.—The Nashville Traction Company has asked the Council for a franchise in Nashville. W. O. Parmer, Nashville, president. [E. R. J., Feb. 7, '14.]

Richmond, Va.—The Virginia Railway & Power Company has received a franchise to build its tracks on the north and the south approaches to Mayo's Bridge to connect with the bridge tracks.

TRACK AND ROADWAY

Birmingham (Ala.) Interurban Railway.—Preliminary surveys are being made for an electric line between Birmingham and Hale Springs, a distance of 9 miles. This is part of a plan to build a 14-mile line to connect Birmingham, Hale Springs and the coal mines. Daniel P. Hale, Birmingham, is interested. [E. R. J., Jan. 17, '14.]

Birmingham Railway, Light & Power Company, Birmingham, Ala.—Improvements and extensions entailing an expenditure of \$1,148,000 for the year 1914 were recently ratified by the executive committee of the board of directors of this company. Among the extensions planned will be a line from Vinemont to Fairfield, one from Boyles to Dolomite, and the double-tracking of some of the present lines.

Birmingham-Tuscaloosa Railway & Utilities Company, Birmingham, Ala.—The 45-mile line between Bessemer and Tuscaloosa will be built by this company during the year.

Calgary Street Railway, Calgary, Alta.—It is planned to build 10 miles of new track in Calgary during the year.

Edmonton (Alta.) Radial Railway.—The reconstruction of $7\frac{1}{2}$ miles of track in Edmonton is contemplated by this company during 1914.

Geary Street Municipal Railway, San Francisco, Cal.—Citizens of the Sunset District have asked the Board of Supervisors that this company's Tenth Avenue line be extended across Golden Gate Park into Sunset District to Kirkham Street and thence westerly to Forty-fifth Avenue and southerly along the Ocean Boulevard in San Francisco.

Sacramento Valley West Side Electric Railway, Willows, Cal.—This company, which plans to begin work soon on the $12\frac{1}{2}$ -mile section of its line from Dixon south to a connection with the Oakland, Antioch & Eastern Railroad, at a recent meeting of the directors elected George W. Pierce president. [E. R. J., Jan. 17, '14.]

Georgia Railway & Power Company, Atlanta, Ga.—Plans are being contemplated for an extension of the Peachtree Road line via the Capital City Country Club, at Brookhaven, to the grounds of Oglethorpe University on Peachtree Road.

Waycross Street & Suburban Railway, Waycross, Ga.—Plans are being made to begin work in the spring on the extension to Gilchrist Park and Hebardville.

Chicago (Ill.) Surface Lines.—This company contemplates the construction of 20 miles of new track in the territory served by the Chicago Railways Company during 1914. This work includes extensions to existing lines and some new cross-town lines varying in length up to $2\frac{1}{2}$ miles.

Southern Illinois Railway & Power Company, Chicago, Ill.—Work will be begun on April 1 by this company on the extension from Harrisburg to Marion, Whiteash, New Virginia, Johnston City, West Frankfort, Benton and Herrin. Afterward a line will be built from Herrin to East St. Louis, via Carterville, Carbondale and Murphysboro.

East St. Louis & Suburban Railway, East St. Louis, Ill.—About 1 mile of new track will be built in East St. Louis during 1914.

Southern Traction Company of Illinois, East St. Louis, Ill.—Work will be resumed at once by this company on the line between East St. Louis and Belleville.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—This company is asked to consider plans to extend the Salisbury Street line to the Grand View Cemetery north of the corporate limits of Lafayette.

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—Material is being ordered by this company for its 15-mile line from Kansas City to Bonner Springs. It is planned to extend this line to Linwood during the coming summer, a distance of 9 miles. J. D. Waters, Bonner Springs, president. [E. R. J., Jan. 24, '14.]

Independence, Neodesha & Topeka Traction Company, Independence, Kan.—Altoona, Kan., will shortly hold a special election for the purpose of voting on an issue of \$15,000 worth of bonds for the city and \$12,000 in addition for the township, the proceeds to be turned over to the Independence, Neodesha & Topeka Traction Company in exchange for an equal amount of stock in that company, provided that the railway from Neodesha to Altoona is in operation by July 1, 1916. [E. R. J., Jan. 24, '14.]

Manhattan City & Interurban Railway, Manhattan, Kan.—During the next six weeks this company will award contracts to build 10 miles of new track. Work will shortly be resumed on the line from Eureka Lake to Fort Riley.

Joplin & Pittsburg Railway, Pittsburg, Kan.—Plans are being made by this company to build a line south from Joplin to Neosho and a connecting line will be built to the lines radiating from Parsons. This extension would best be made by the construction of a line from Cherokee to Parsons.

Topeka (Kan.) Street Railway.—This company will complete the Gage Park extension, on West Eighth Street, in Topeka, during the coming spring. About 1 mile of the work is yet to be done. The South Topeka line also will be extended from Eighteenth Street to Twenty-first Street on Kansas Avenue. The erection of poles and wires and other overhead work will be done during the coming summer, while the track-laying will wait until 1915.

Central City, Greenville & Drakesboro Railway, Central City, Ky.—This company, the incorporation of which is noted elsewhere in this issue, has completed surveys on the section of its proposed line between Central City and Greenville and will begin construction in the spring. It will purchase power from a plant in Central City and will soon build a new water plant on the Green River. James Small, Central City, is interested. [E. R. J., Jan. 31, '14.]

***Shelbyville, Ky.**—Eugene Cowles, Shelbyville, is chairman of a committee of the Business Men's Association which is securing data relative to the construction of an electric line between Shelbyville and Mount Eden.

Texas-Louisiana Traction Company, Shreveport, La.—Plans are being considered by this company to build a line from Mansfield northward to Vivian via Shreveport, Blanchard, Oil City and Mooringsport. Ultimately this line will be extended to Longview. A. B. Blevins, Jefferson, president. [E. R. J., June 28, '13.]

***Boston, Mass.**—Bids will be received until Feb. 17 by the Boston Transit Company (B. Leighton Beal, secretary) to build Section H of the East Boston Tunnel extension, situated in and near Court Street and Cambridge Street, extending from Stoddard Street to Staniford Street and including the Bowdoin Square station in Boston.

Detroit (Mich.) United Railway.—An extension of the Fourteenth Avenue line in Detroit is being contemplated by this company.

Hattiesburg (Miss.) Traction Company.—It is planned to construct about 2 miles of new track in Hattiesburg during the year.

St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.—Plans are being contemplated by this company to extend the Savannah interurban line to Marysville and Tarkio via Fillmore.

Metropolitan Street Railway, Kansas City, Mo.—Plans are being prepared for an extension to the new Union Station in Kansas City.

St. John (N. B.) Street Railway.—It has been decided to extend this company's lines from the present terminus through East St. John to Little River early in the summer. Later the line will be extended to the city of Coldbrook.

New York State Railways, Rochester, N. Y.—Plans are being considered to double-track the Dudley-East Genesee branch on Euclid Avenue from College Place to Westcott Street in Syracuse.

Durham (N. C.) Traction Company.—This company plans to improve and extend its lines in Durham.

Cleveland, Alliance & Mahoning Valley Railway, Cleveland, Ohio.—It has been announced that this company will extend its line from Ravenna to a point 2½ miles northwest of Hudson, where it will connect with the Cleveland-Akron line of the Northern Ohio Traction & Light Company. It is also intended to extend the company's line from Newton Falls east to Warren. Work on these extensions will soon be begun. [E. R. J., Jan. 3, '14.]

Bartlesville (Okla.) Interurban Railway.—Work will be begun on a belt line of 2.4 miles in Bartlesville about April 1. It will connect at Fourth Street with the main line which extends to Dewey.

Berlin & Waterloo Street Railway, Berlin, Ont.—It is planned to construct 2 miles of new track during 1914.

Temiskaming & Northern Ontario Railway, Toronto, Ont.—Plans are being made to electrify this company's line. Surveys have been completed for the divergence of the route in order to overcome the main curves in the line from North Bay to the northern terminus at Cochrane.

Dunnville, Wellandport & Beamsville Electric Railway, Wellandport, Ont.—About 22 miles of new track will be constructed by this company during 1914.

Sandwich, Windsor & Amherstburg Railway, Windsor, Ont.—About 3 miles of new track will be built by this company during the year.

South Fork-Portage Railway, Johnstown, Pa.—During the next six weeks this company will award contracts to build 7.5 miles of new track with 70-lb. rails. This track will be laid upon roadbed built during 1913.

Montreal & Southern Counties Railway, Montreal, Que.—The 15-mile line between Abbotsford and Granby will be constructed by this company during the year.

Regina (Sask.) Municipal Railway.—It is planned to build 8 miles of new track in the city of Regina during the year.

Northwestern Electric Railway, Easley, S. C.—Preliminary arrangements are being made by this company to build its 150-mile railway to connect Easley, Augusta, Anderson, Abbeville, McCormick and Edgefield. James E. Leach, Easley, is interested. [E. R. J., Jan. 17, '14.]

Clarksville & Dunbar Cave Railway, Clarksville, Tenn.—During the year it is planned to build 4 miles of new track in Clarksville.

Jackson Railway & Light Company, Jackson, Tenn.—Material is being purchased by this company to build its 2-mile extension in Jackson in the spring. Rails have been bought, but copper wire, cement, crushed stone, etc., are yet to be contracted for. This company has increased its capitalization from \$600,000 to \$700,000.

Dallas Consolidated Electric Street Railway, Dallas, Tex.—Work has been begun double-tracking the Knox Street line in Dallas. An extension will soon be built on Abbott Street. About \$600,000 will be spent by the company during the year on improvements and extensions of its lines.

Texas Traction Company, Dallas, Tex.—Plans are being considered for an extension from Mansfield to Vivian via Shreveport, Blanchard, Oil City and Mooringsport.

Fort Worth & Denton Interurban Railway, Fort Worth, Tex.—Preliminary arrangements are being made by this company for its 35-mile line to connect Fort Worth and Denton via Keller and Roanoke. William Capps, Fort Worth, is interested. [E. R. J., Jan. 10, '14.]

Northern Texas Traction Company, Fort Worth, Tex.—It is planned to double-track this company's 32-mile line between Dallas and Fort Worth.

Marshall (Tex.) Traction Company.—During the next few weeks this company will award contracts to build an 1800-ft. extension in Marshall.

Ogden (Utah) Rapid Transit Company.—Surveys have been completed and work will be begun as soon as the weather permits on the extension to Logan and Preston Ida.

Petersburg & Columbia Springs Railway, Petersburg, W. Va.—Preliminary arrangements are being made by this company to build its 120-mile line from Petersburg to Franklin via Pendelton and Pocahontas. It will connect with the Chesapeake & Ohio Railway. John Y. Hite, Fairmont, W. Va., is interested. [E. R. J., Nov. 22, '13.]

Appalachian Power Company, Bluefield, W. Va.—During the year this company plans to build about ½ mile of new track in Bluefield.

SHOPS AND BUILDINGS

Union Traction Company, Independence, Kan.—This company has built several new passenger stations on its line between Cherryvale and Parsons.

Manhattan City & Interurban Railway, Manhattan, Kan.—During the next six weeks this company will award contracts to build a new carhouse in Manhattan.

Mesaba Electric Railway, Duluth, Minn.—Plans are being made by this company to build a new carhouse in Virginia. The structure will be two stories and of brick construction. The cost of construction is estimated to be about \$36,000.

Cleveland (Ohio) Railway.—Plans are being made by this company to spend \$80,000 on improvements for special work and new tracks at its repair shops in Cleveland. It is also planned to spend \$75,000 for new operating yards at the Harvard repair shops.

Seattle (Wash.) Municipal Railway.—The new carhouse at Third Avenue West and Nickerson Street in Seattle has been completed. It will be used to house the cars on Division A of this municipal railway.

POWER HOUSES AND SUBSTATIONS

Manhattan City & Interurban Railway, Manhattan, Kan.—During the next six weeks this company will award contracts to build a new power house in Manhattan.

Bay State Railway, Boston, Mass.—This company has placed an order with the General Electric Company for a 2500-kw Curtis turbo-generator with a 15-kw exciter, a 1500-kw rotary converter and switchboard.

Omaha & Lincoln Railway & Light Company, Omaha, Neb.—This company has bought 112 transformers ranging from 1 kva to 165 kva, panels, switches, etc., from the General Electric Company.

Richmond Light & Railroad Company, New York, N. Y.—A new 1000-kw rotary converter, two 525-kva transformers and a starting panel will soon be installed by this company at its substation at Livingston, Staten Island. The equipment will be built and installed by the General Electric Company.

Portsmouth Street Railway & Light Company, Portsmouth, Ohio.—A new 1500-kw Curtis turbo-generator will soon be installed by this company in its power house in Portsmouth. The order has been placed with the General Electric Company.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—This company is installing a new converter station at St. Catharines, Ont., to be equipped with two Canadian General Electric 500-kw converters and the necessary appliances. This station when completed will cost about \$35,000.

Charleston-Isle of Palms Traction Company, Charleston, S. C.—This company will install substation equipment consisting of two 300-kw rotary converters, one 150-kva and six 100-kva transformers, switchboard and accessories. This apparatus has been ordered from the General Electric Company.

Jackson Railway & Light Company, Jackson, Tenn.—Plans are being made by this company to improve and enlarge its power plant in Jackson, a rotary converter being among the items of equipment to be bought in the near future.

Manufactures and Supplies

ROLLING STOCK

Indiana Utilities Company, Angola, Ind., expects to purchase one car.

Sterling, Dixon & Eastern Electric Railway, Dixon, Ill., expects to purchase three cars within the next six weeks.

Slate Belt Electric Street Railway, Pen Argyl, Pa., has ordered two pay-as-you-enter cars from The J. G. Brill Company.

Portland, Eugene & Eastern Railway, Portland, Ore., expects to purchase three 55-ft. baggage, mail and express cars.

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis., expects to purchase one new single-truck or double-truck interurban car.

Kansas City & Western Railway, Kansas City, Kan., has ordered four center-entrance, single-end cars from the Cincinnati Car Company.

Twin City Rapid Transit Company, Minneapolis, Minn., expects to build in its own shops eighty-six closed passenger cars and six work cars.

Chicago, Milwaukee & St. Paul Railway, Chicago, Ill., will order twelve 200-ton electric locomotives for freight service on the Three Forks-Deer Lodge line.

Manhattan City & Interurban Railway, Manhattan, Kan., expects to purchase several trailers and open bench motor cars, also good single-truck closed cars—all second hand.

Conestoga Traction Company, Lancaster, Pa., has ordered two 28-ft. double-truck closed car bodies and one 33-ft. 4 in. double-truck closed car body from the Cincinnati Car Company.

Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn., expects to purchase during 1914 three gas-electric locomotives, three gas-electric motor cars and twelve steel coaches.

Altoona & Logan Valley Electric Railway, Altoona, Pa., noted in the ELECTRIC RAILWAY JOURNAL of Dec. 27, 1913, as being in the market for five pay-within 28-ft. closed city cars and four 32-ft. 6-in. interurban cars, has ordered these cars from The J. G. Brill Company. The city cars will be equipped with Brill 39-E trucks, the interurban cars with Brill 27 M.C.B. I trucks.

Cleveland (Ohio) Railway, which was noted in the ELECTRIC RAILWAY JOURNAL of Jan. 24, 1913, as being in the market for fifty center-entrance cars, has requested the City Council to authorize the following expenditures: \$180,000 for center-entrance car bodies, \$94,000 for motor equipment, \$10,000 for derrick car, \$3,150 for fare boxes and \$4,800 for pneumatic door openers.

Utah Light & Railway Company, Salt Lake City, Utah, noted in the ELECTRIC RAILWAY JOURNAL of Nov. 1, 1913, as being in the market for twenty-four semi-steel closed pay-as-you-enter cars, with seating capacity of fifty-six, has ordered these cars from The J. G. Brill Company. Eighteen of these cars will be equipped with four Westinghouse 40-hp motors and six with four Westinghouse 60-hp motors for suburban service. Delivery is to be made May, 1914.

Greenville, Spartanburg & Anderson Railway, Greenville, S. C., noted in the ELECTRIC RAILWAY JOURNAL of Jan. 3, 1914, as having ordered ten trailers from the Southern Car Company, has specified the following details for this equipment:

Seating capacity	64	Car trimmings	
Weight of car body	37,000 lb.	Wallace Supply Co.	
Bolster centers, length,	40 ft. 6 in.	Curtain fixtures, Cur. Sup. Co.	
		Hand material...Pantasote	
Length of body...	51 ft. 3 in.	Hand brakes.....	Peacock
Length over all...	63 ft. 8 in.	Journal boxes...railway std.	
Width over all...	9 ft. 7¼ in.	Paint.....	Pullman std.
Body	steel	Sash fixtures.....	Edwards
Interior trim,		Seats....	Hey, Bros. & Wake.
	oak and mahogany	Seating material.....	plush
Headlining	Agasote	Step treads.....	Blake steps
Roof	arch	Trucks	Baldwin
Underframe	steel	Varnish....	Chicago Varn. Co.
Air brakes	West.	Wheels	railway std.

TRADE NOTES

T. H. Symington Company, Baltimore, Md., has transferred A. H. Weston, for many years mechanical engineer of this company, and stationed for the past two years at Rochester, N. Y., to its sales department, 30 Church Street, New York, N. Y.

Lackawanna Steel Company, Lackawanna, N. Y., has issued Bulletin No. 106, describing and illustrating various applications of its sheet steel piling. This material is designed primarily for use: (1) in temporary construction work where water, earth or other material is to be retained, as in cofferdams, open caissons, retaining walls, foundations of bridges, buildings, etc.; (2) in permanent constructions requiring resistance to water and to the elements and needing great strength to resist pressure from surrounding or superimposed material or both, as in permanent retaining walls, shaft linings, dams, curtain walls, core walls, docks, sea walls, bulkheads, locks, irrigation and reclamation work, levees, sumps, pits, pump wells and the like. There are no rivets, bolts or parts to shear off from the interlock in handling, driving or pulling.

General Electric Company, Schenectady, N. Y., has received orders for electrical equipment from the following electric railways: San Francisco-Oakland Terminal Railways, eleven GE-201 60-hp, four-motor car equipments and air brake equipments with CP-27 compressors; Bay State Railway, seven GE-201 60-hp, four-motor equipments with MK control and straight air brake equipments with CP-27 compressors; Mesaba Railway, six GE-201 60-hp, four-motor car equipments; Chicago & West Towns Railway, seventeen GE-203 50-hp, complete four-motor and ten two-motor car equipments and four trail car control equipments; Cumberland County Power & Light Company, ten GE-201 60-hp, four-motor car equipments and ten straight air brake equipments with CP-27 compressors; Twin City Rapid Transit Company, 100 four-motor equipments, type GE-200, 40-hp, 100 straight air brake equipments with CP-25 compressors, and five GE-73 75-hp, complete four-motor equipments; Chicago City Railway, 100 two-motor car equipments, type GE-242, 60-hp, 100 straight air brake equipments with CP-27 compressors.

ADVERTISING LITERATURE

Stevenson Company, Pittsburgh, Pa., has issued a catalog on the subject of its various metal parts of molded insulation, which are high heat-resisting, non-hygroscopic, impervious to oils, moisture and most chemicals.

Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y., has issued folders describing its No. 896 compact magneto, magneto desk and combination telephones, also new corrected price sheets on its telephone construction, material and supplies.

Curtis Pneumatic Machinery Company, St. Louis, Mo., has issued a comprehensive 80-page catalog on the subject of its air compressors, air hoists, air cranes, pneumatic and hydro-pneumatic elevators, trolleys, trolley systems and sand blasts. The catalog is well illustrated with diagrams showing the details and special features of each apparatus and with photographs showing installations of machinery in actual practice in various plants.

Plank Flexible Shaft Machine Company, Grand Rapids, Mich., has issued a catalog describing and illustrating its portable flexible shaft outfits and shafting for motor-driven rail grinders and drillers and other purposes. The units in the shaft are drop-forged out of chrome-vanadium steel, which are accurately machined and case-hardened. The units are connected to each other in the form of a tenon and mortise, which eliminates the use of all rivets, pins, retainer rings and all complicated connections. A given amount of longitudinal travel is allowed between each unit, which takes care of the various curvatures of the shaft from time to time. The tenon and mortise interlock idea allows the mortise and tenon portions of the unit to retain the greatest strength of the material at the point of leverage.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued catalog section DS 843, describing and illustrating its line of catenary material for high-tension single-phase a.c. systems and for d.c. systems of 500 volts or over, the important features of which are high insulation and smooth underrun. The following catenary ma-

terials and subjects are described: spacing of pole hangers, deflection angle and middle ordinate, messenger insulators, steady strains, hangers, clamps, crossings and section insulators.

"Light, Railway and Tramway Journal," London, England, has issued its diary for 1914, which contains besides the usual diary and advertising features articles on topics such as the following: "The Heat Treatment of Leaf Springs," "Extinguishing Fires in Oils and Volatile Liquids," "Digests and Analysis of Legislation Governing Railless Traction and Trolley Buses," "Electrolytic Corrosion of Iron in Soils" and "Standard Involute Gearing." There is also included a table of car-repair costs for thirty-one tramway systems. At the front of the diary there is placed an alphabetical index to specific articles giving the names of the makers or vendors of numerous patented and other articles used in the traction field but not known by the actual titles of the makers or vendors. The back of the book contains an extended directory section giving details of the personnel of British electric and steam lines and electric-lighting plants and other useful information.

Industrial Works, Bay City, Mich., have issued Book No. 103, a large and attractive catalog, describing and illustrating their locomotive cranes for construction, industrial and railroad purposes, with various accessories such as clamshell buckets, lifting magnets, special cars, booms and attachments. The catalog contains a sketch of the forty years' development of these products, in keeping pace with the remarkable progress of railroad and industrial engineering. Interesting and self-explanatory photographs show locomotive cranes in actual operation on various electric railways, including the Detroit United Railway, United Railroads of San Francisco and Boston Elevated Railway, where they are used for assisting the work of concrete mixing, handling ties, rails, crossovers, poles, etc., and for wrecking service. The cranes are also used by the British Columbia Electric Railway, Oregon Electric Railway, Pacific Electric Railway and Portland Railway, Light & Power Company.

NEW PUBLICATIONS

Annuaire pour l'An 1914. Written in French and published by Le Bureau des Longitudes, Paris, France. 1914. 502 pages. Price, 30 cents.

The 1914 edition of this technical almanac has been brought entirely up to date in regard to all tables relating to physics and chemistry. With reference to electrical information the various units of electricity are defined, and tables are included showing specific inductive power of various solids, liquids and gases, electromotive force in volts of standard batteries, electrical resistance of elements and alloys and specific conductivity of solutions of certain electrolytes. The book is comprehensive as a whole and contains tabular information which is invaluable to the technician, the physician and the mathematician.

Annuaire de l'Electricité. Published by La Lumière Electrique, Paris, France. 1914. 440 pages, bound in card-board. Price, exclusive of mailing, 80 cents.

The publishers announce that in response to numerous demands they have brought out a book which will give in handy form all important information on the electrical developments of France. The first part, which is devoted to the distribution of energy for lighting and power, gives the names of all plants, the management, the capacity, type of current and charges per kw-hour. Another list gives, according to geographical location, all the electric railways, showing their length and type of distribution. The third chapter gives a list of all electrical organizations of the country under the headings of construction, traction, exploitation and manufacturing, noting the date of establishment, the capital, the headquarters and the names of the executive officers. A particularly valuable chapter is the résumé of laws affecting electrical service. Other chapters contain a list of all electrotechnical schools, of the electrical press and of miscellaneous electrical industries. On the whole, this work is one which should be in the hands of every one who desires commercial or technical knowledge of electric lighting, railway and power conditions in France.