Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Volume 53 New York, Saturday, February 15, 1919 *Number* 7

Welding Processes Have a Wide Field of Usefulness

ALL METHODS of welding received a tremendous impetus from the conditions which resulted from the recent war. The great demand for steel and iron, the difficulty of obtaining labor for maintenance repairs and the necessity for rapid repairs to equipment in order to keep the output up to the maximum were contributing causes. The electric railways of this country were hard hit by these conditions and have been extending the use of the various welding and cutting processes. Much of the repair work which was undertaken chiefly to keep cars and equipment in service has been found to result in real economies. Many of the methods, devised in war time, will be continued. Thus on one electric railway contact shoes which had always been scrapped when excessively worn have been repaired by cutting out the worn portion and welding in a new wearing plate. The cost of this method of repair was found to be approximately $1 less per shoe than the price originally paid for the new shoes, and this method of repair can be repeated several times before it is necessary to scrap the shoes for wear at other points. This railway will continue repairs of this class even should steel and iron prices reach the low level of pre-war times.

In this accelerated development of welding the manufacturers of apparatus have joined with the practical men in a study of the problems, and the Emergency Fleet Corporation through its welding committee has assisted greatly. Some form of association for those interested in this art is highly desirable. As this issue goes to press we are advised that the formation of such a welding association is contemplated. It certainly would find much to do, as engineers in many fields are interested in advancing the welding art.

Any Eight-Hour Bill Should Exempt the Electric Railways

THIS is the open season for corporation baiting in the state legislatures. We are not surprised, therefore, to note that the perennial demand for an eight-hour day is being pressed by union labor lobbyists in various sections of the country. While the proposed legislation has no special reference to electric railway employees, we think it proper to remind the companies of this class to be on their guard. Nine-in-twelve or ten-in-twelve laws are baneful enough when applied to electric railway companies, but an eight-hour law which does not exempt utilities of this class will be a most serious matter for the average electric railway property. It will mean one of two things. If such legislation contemplates that eight hours work is the maximum that should be performed by any employee, the result for a utility corporation with its peak loads separated by more than eight hours will be a greatly augmented force of trainmen. Where these men are guaranteed a minimum day's wage the financial burden is likely to prove disastrous.

It appears, however, that the unions want a basic eight-hour day as the basis for a full day's wages with time and a half or double time for "overtime." The effect of such a measure on the hard-pressed electric railways would be no less distressing. Such legislation is not intended to meet the demands of reformers who are looking to the conservation of human energy. Its real purpose is to give a bonus to those employees whose duties cannot be properly performed in eight hours.

We do not here argue for or against a general eight-hour day. We simply call the attention of electric railway interests to the possible menace in the pending bills. The industry is already carrying its limit of the wage burden, and until its revenues are in better shape the public must be warned to block such legislation or any other measures which may add to the constantly growing list of electric railway receiverships. The public cannot afford to have these essential utilities crushed.

Good Salesmanship Needed in Promulgating Association Standards

THE most important task which lies before the American Electric Railway Engineering Association is in capitalizing the very considerable investment of time and money which has been made in preparing various association standards. This would seem to require the services of a vigorous committee, which would follow up the work of a similar committee appointed some years ago for the same purpose. In this work it should be borne in mind that standardization accomplishes its full purpose only when it does these three things: Fixes upon such devices as represent the best development in the art with due regard to the harmonizing of theoretical perfection with practicability. Secures the acceptance of the standards by the users of similar material. Secures the protection of the standard material by the manufacturers in place of a large number of similar devices.

Complaint has been heard to the effect that the manufacturers' catalogs of supplies for electric railways contain few references to A. E. R. A. standards in the way that M.C.B. and A.S.C.E. standards are referred to in the fields covered by the Master Car Builders' Association and the American Society of Civil Engineers respectively. This is, of course, due largely to

the fact that electric railways seem not to want A. E. R. A. standard materials; otherwise the manufacturers would "play up" the fact that certain products comply with the association's standard specifications.

As a matter of fact, in many cases the stock designs of all the well-known manufacturers come well within the standard limitations. Under the circumstances such designs might well be cataloged as A. E. R. A. standard. If this were done many companies would be impressed by this heading, because they would know that the designs represent the best combined judgment of manufacturer and railway engineers.

Assuming then that the selections so far made for standardization have been wise ones, it behooves us all to push them so that the past work of the committees of the association may be conserved and future committees be encouraged to do even better work because sure of a better appreciation. Let's make them standards in fact as well as in name.

This Idea Is Not New But It Is Timely

EVERY electric railway needs one man, preferably the president or the general manager, who will spend a large part of his time studying the needs of the public, adapting the resources at command or obtainable to meet these needs, and explaining to the public the elements of the local transportation problem. A manager said to the writer recently that when he was in a subordinate position his chief criticism of the managers whom he knew was that they tried to do too much of the work that their subordinates were employed to do, while neglecting to get out among their patrons for the purpose of developing cordial relations between the railway and the public, individually and collectively. When he was appointed to a position in which he had a chance to apply his theory, he realized that it was "up to him" to do what he thought others should have done, and he has endeavored to carry out this policy, apparently with excellent results.

The above incident suggests that the duties of managers and other executives have changed in recent years. Time was when the head of an electric railway could know much of the detail of all departments, but as the complexity of the equipment and the organization has increased this condition has gradually become less and less practicable. At the same time the relations with the public have become more intimate and more difficult to maintain in a satisfactory condition. The result is that the situation in some cases is beyond the control of those in active charge because they continue to perform duties that should have long since been delegated to others.

The work of the modern manager is twofold: First, organizing the working force, with competent direction, so that the several departments will function effectively, severally and as a whole; second, personifying the utility to the public by word and deed in a way to win such confidence as is deserved. With the first of these duties accomplished the manager will have time for the second and can present the case of the railway as a business man to business men, through chambers of commerce and other business associations, clubs, etc., and by means of congenial personal relations with leading business men and public officials. The railway manager ought to be a welcome speaker at dinners and other gatherings of representative men, and the experience of many has shown that this can be so if he will first take the trouble to establish a point of contact with the public and will then give a presentation of the transportation situation that shows a broad grasp of the essential economic factors and a fine public spirit.

It Is a Good Time to Start Safety Work

THE PRESENT is an appropriate time to revive the safety campaigns which were such a feature of electric railway operations in 1913 and 1914. During the past four years there have been many reasons why popular interest could not be greatly attracted to the needs of safety. In the first place, there were many other demands on the popular attention because of the war. Liberty Loan drives and Red Cross and other campaigns for the benefit of our men in the service as well as international matters of various kinds made a stronger bid on the public mind. Then, the term "safety first" seemed somewhat incongruous in time of war, in spite of the fact that the best interests of our military forces abroad required the reduction to a minimum of casualties from industrial accidents at home.

The railway companies have also been handicapped during the last four years in carrying on an effective safety campaign because of the shortage of labor. This has tended to increase accidents, both because inexperienced trainmen had to be used and also because it was not always possible to give to equipment its proper inspection and maintenance. Yet it is a notable fact that in spite of these adverse conditions the accidents from surface cars in New York City have shown a constantly decreasing trend, and if the Malbone Street accident of the Brooklyn Rapid Transit on Nov. 1 of last year is disregarded, the same statement is true of the rapid transit lines in Brooklyn. This lessening of the casualty record in New York City is due largely, in the opinion of the Public Service Commission, to a greater use of safety devices and methods.

Now that the war is over the public should be receptive in a notable degree to the revival of safety precautions. It is the duty of all, after our tremendous but necessary sacrifice of life, limb and money in the war, to conserve to the uttermost these foundations of national wealth and prosperity. Safety is a duty which we owe to those returning from the battlefields of France, because where this country has to support the dependents of those injured through accidents at home it is unable, by just so much, to give to the families of those crippled or killed in its defense.

The time is appropriate for pushing safety campaigns also because inventors are paying more attention than ever to safety devices. The safety car itself is a notable example, but the trend toward safety has been equally marked in other types of cars and in other branches of the work. Finally, it ought to be more easy than formerly to interest the employees in the safety movement. They are receiving far higher wages than ever before and they can make it easier for the companies to pay these wages if they keep down the accident expenses.

The Safety Car Is Primarily a Frequent-Service Car

IT SEEMS STRANGE that when the electric railway industry desires to introduce so promising an improvement as safety car service, there should be so much opposition to this improvement in many quarters. The employees seem to feel that because one man per car is required rather than two the total number of men employed will be reduced. Another objection, we might almost say the other objection, to the operation of a car by one man is based on the fear that accident hazards will be increased. As a consequence of these two misconceptions a lot of ill-advised agitation is going on which, in so far as it is effective, will hamper the electric railways in giving the improved service which must be given if electric railway operation is to be profitable.

In the meantime, however, the safety car is making steady progress, and the year 1919 will show many service betterments due to its introduction. Attention was directed in this paper last week to the inauguration of safety car service on one line in Bridgeport, Conn., and in the current issue further information is given of the preparation for and introduction of the new service. The Bridgeport case is typical and, like others which are available for unbiased study, furnishes facts which controvert the objections mentioned.

The primary purpose of the safety car is not to reduce the working force of the electric railway but to permit it to be used to better purpose. The lesson of the jitney has been that the public wants frequency and speed in urban transportation. The safety car is the railway's answer to the public's question: "What can you do to save our time in getting around town?" This answer means that the company must have plenty of cars and must move them as rapidly as traffic conditions will permit.

It is ridiculous to insist that two men be kept on a car if only one is needed, particularly if the employer is willing to provide another car for the displaced operator, with higher wages for both. It is as useless to protest against the use of a labor-saving car as it is to object to the introduction of a machine which can perform some manufacturing operation with less labor. If the machine or the car is a success in accomplishing its purpose the worker as well as the public benefits. As far as safety is concerned, the small car will prove an accident reducer rather than an accident producer. It is under such perfect control, its momentum is so small and the safeguards which surround its operation are so many that fear on the public part for the safety of foot passengers and riders is not justified.

While the above is true, electric railways which operate safety cars or contemplete such operation should plan to utilize to the full the inherent virtues of these cars. In the first place the cars must be used in liberal numbers, thus furnishing as they glide by a constant reminder to the public of the service provided. Again, all slack must be kept out of the schedules so that the schedule speed may be maintained at the maximum value. Third, co-operation with the municipalities must be secured to give the cars as far as possible the right-of-way, avoiding traffic blocks. Above all, the little cars must be taken seriously by the management in spite of their insignificant appearance.

Good Maintenance Is Economy of the Wisest Sort

WE BELIEVE that electric railways are warranted this year in expanding their purchases on purely economical grounds. Before the war sent the prices of labor and materials skyrocketing, this was the season of the year when electric railway engineers and transportation men were busy preparing budgets for the approaching summer. During the past two years there has been a patriotic reason as well as an economic one to induce the railways to keep their budgets down to the minimum. Every ounce of material and hour of workmen's time available in this country were needed by the government in the work of national defense, so that all except the most essential work had to be abandoned. This condition has now changed. The bar against the employment of labor is removed; in fact, it is a patriotic act now to place orders and thus help to solve the non-employment problem. Hence the question of what policy should be adopted toward purchases is one which must be faced.

It may be said that railways have not enough money to begin an extended plan for improvements, and if they had they might better wait until prices are further reduced. As regards the first point, we are not advocating extensions at this time. Until the fare question is settled much new construction is out of the question. But every company should plan this year to put its operating equipment in as good working condition as it can and thereby save money on the principle that "a stitch in time saves nine." Translated into the language of the railway this means that insufficient paint on cars invites their rapid deterioration, neglect in track maintenance means rapidly mounting repair bills for a car equipment, and a few dollars spent in safety equipment will often protect against an accident costing many thousand dollars. Again, better facilities in the way of more comfortable service will often reconcile the public to an extra cent or 2 cents in fare. The physical condition of railway equipment is worse now than it has been for a long time because much of this work had to be omitted last year and the year before. But it is obvious that while cars continue to operate they must be maintained.

Finally, there is the question of prices. Are not they coming down? Perhaps so and perhaps not, or, if so, probably not so very much. Copper and some of the other metals have already decreased in price, and probably will go even lower within the next month or two. In fact, some metals, like copper and lead, are now close to the prices charged just prior to the war. Indications are, however, that producers are feeling out the market and that the low prices of this spring will be succeeded by considerably higher quotations as industrial expansion opens up. But no matter what the price situation may be, the real question is whether the deterioration which will result in equipment from lack of attention during this time, and the traffic which will be driven away because some inexpensive improvement is lacking, will not more than outweigh the saving to be effected by a slight drop in cost of the material required.

We believe that in most cases it will, and in any event the gain made by the change is definite and absolute while the saving from the drop in cost is entirely problematical.

Tie Renewal Cost Reduction Deserves Serious Study

By R. C. CRAM
Assistant Engineer, Department of Way and Structures, Brooklyn Rapid Transit System

TIES MAINTAINED LIKE THIS HAVE A LONG LIFE

The Place to Begin Is in Specification and Maintenance — Other Factors Are Use of Suitable Preservatives, Provision of Good Drainage, Liberal Spacing, Prompt Removal of Defective Ties and Insuring Full Life From Ties in Use

TIE RENEWALS represent the largest single item of cost in open track maintenance, if the general item of maintenance labor is excepted. When this fact is considered it becomes evident that every possible step should be taken which will tend toward economies in tie consumption. The force of this statement will be appreciated by those whose duty it is to purchase tie timber at the present time. In 1915 the total number of wooden ties purchased in the United States was 97,106,651. The electric railways bought nearly 9 per cent of these, or 8,607,996 ties. This was a decrease of nearly 300,000 from the number purchased in 1911. The 6-in. x 8-in. x 8-ft. tie contains about 32 ft., board measure, hence the electric roads used about 275,545,600 ft., board measure, which, at the prevailing price in 1915 of about $15 per thousand feet, represented an estimated expenditure of $4,131,840. Recently, tie timber has been quoted as high as $55 per 1000 ft., board measure, which represents an increase of more than 300 per cent in about three years. If this price prevails and consumption is anywhere near what it was in 1915 we may assume that electric railways will have to spend over $12,000,000 for wooden ties this year, unless maintenance is greatly restricted.

Aside from war conditions the exhaustion of local supplies had begun to force the cost of ties upward, and a peculiar form of blight had practically forced the abandonment of chestnut as tie timber in the northeastern part of the country where this timber has been fairly abundant and largely used. In order to overcome the increasing shortage of tie timbers, a few of the steam roads started tie plantations some years ago, but it is understood that so far the results obtained have not been entirely satisfactory, although the experiment has not been continued long enough to warrant very definite conclusions. In any event, the electric railways cannot afford to entertain the tie plantation proposition.

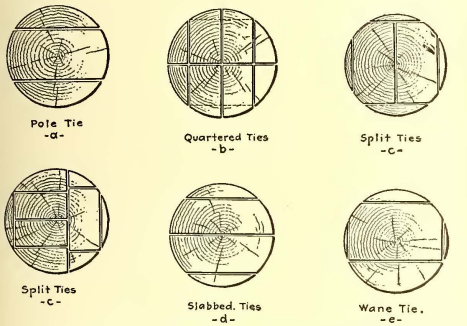
It will be seen that the existing supply of tie timber should be conserved and protected by all possible means and it is very certain that, while numerous substitutes for wooden ties have been tried, we shall continue to use a vast number of such ties for many years to come. Through the use of mechanical means to protect ties from wear, with preventatives and other means for protection against decay, the life of ties may be increased to a degree which warrants considerable extra expense in that direction.

It is not economical to use an inferior tie simply because it is comparatively cheap. Inferior ties when used should be protected in ways which will add to their life. It costs just as much to handle and install a cheap and inferior tie as it does a first-class tie, while

inferior ties will cause more frequent disturbance to track, as they require more attention to spiking conditions and more frequent renewals.

WHAT ARE "HEART" TIES, "SLAB" TIES AND "CULLS"?

The manner in which the tie is cut out of the tree is generally the basis for defining its kind. A tie cut from a tree from which not more than one tie can be produced from a section is called a "pole" tie and it is hewed or sawed on two parallel faces. When made from a tree of a size that two or more ties can be made from a section by splitting, the tie is called a "split" tie. An inferior tie, named a "slab" tie, is sometimes made from the first or outside cut of a log. A sawed tie has the two sides and two faces sawed. The upper or lower plane surface is called the "face." A "quartered" tie is one made from a tree of a size to yield four ties per section. A "slabbed" tie is one sawed on only two faces. If the two faces are of equal width, a slabbed tie is also a "pole" tie but should the lower face be wider than the upper, it is called a "half-round" tie. A "hewed" tie must be hewed on at least two surfaces other than the ends.



Tie specifications always limit the amount of sapwood, and if the section shows more than the specified amount the tie is called a "sap" tie. If the specified amount of sapwood is exceeded on only one or two corners, but does not measure more than 1 in. on either corner measured diagonally across the tie, it is classed as a "heart" tie. An "all-heart" or "strict-heart" tie has no sapwood. A "wane" tie is made from a tree too small to make a pole tie, by allowing the original surface of the tree to show on one or more corners. When a tie has been made from a tree from which the resin or turpentine has been extracted before felling, it is called a "tapped" tie.

Ties which do not conform to the specifications are "cull" ties. Those used under rail joints are called "joint" ties, and they are generally selected for this particular use because of size and other features which make them particularly suitable for the heavy duty at joints. "Intermediate" ties are those between joint ties. The tie or group of ties which is used to support switch operating mechanisms, is called a "head-block" and is usually of greater length than an ordinary tie. "Switch" ties are those used to support turnouts and are usually of special lengths and sizes for this purpose. A "treated" tie is one which has been subjected to some process intended to prevent decay. "Shakes" are separations of the wood fibers due to action of wind upon the standing tree. "Checks" are cracks in the wood usually caused by seasoning.

White-oak timber is by far the best for use as ties and is the most largely used. (See Table I.) It is but seldom treated and it has been stated that it is scarcely economical to do so, owing to its very high resistance to decay. The average life of white oak under heavy steam-road traffic is about nine years, while this is extended to from twelve to fifteen years for moderate traffic. Bur oak, rock oak, and chestnut oak will last from six to eight years. Other species of oak, such as black and red oak, pin or swamp oak and water oak are inferior woods and have a life of from four to five years if untreated. The several species of pine are used on steam roads in quantities second only to oak, but chestnut has taken second place on electric lines and the pines take third place. While it is a soft wood as

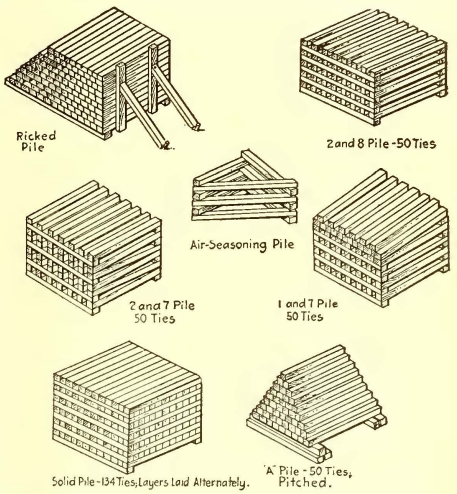


FIG. 1—TYPES OF TIES (WILLARD). FIG. 2—METHODS USED IN PILING TIES (WILLARD); UPPER TWO ROWS, UNTREATED TIES; LOWEST ROW, TREATED TIES

TABLE I*—PROPORTIONS OF DIFFERENT SPECIES OF WOODS PURCHASED FOR TIES BY ELECTRIC RAILWAYS IN 1915

Kind of Wood	Per Cent of Total Purchased
White oak †	26.7
Chestnut	21.8
Cedar	11.6
Southern pine ‡	10.3
Red oak †	10.3
Douglas fir	7.4
Redwood	3.3
Western yellow pine ‡	2.5
Cypress	1.2
Eastern tamarack	1.0
All others	3.9
Total	100.0

* Rearranged from a similar table in *Electric Railway Journal* for May 19, 1917, page 942.
† Total oaks combined equivalent to 37 per cent of total purchases.
‡ Total pines combined equivalent to 12.8 per cent of total purchases.

compared with oak, pine is quite slow in decaying and long-leaf heart pine life will average seven years and has been known to last twelve years. Some pines, if high in pitch, will check badly, but long-leaf yellow pine is much to be preferred for bridge timbers and bridge ties, since it does not warp as much as oak.

Chestnut is not used much for bridge timber because of its tendencies to split and check, but for ties it is nearly as durable as oak, having a life untreated averaging seven years. Cedar is a durable species of soft wood and will resist decay for from twelve to fifteen years, but it is apt to fail from spike driving and nail cutting. Cedar takes fourth place as to use by electric roads, and has an average life of ten years. Hemlock is a soft wood and is very short-lived when untreated, averaging not over four years. Its use continues to a considerable degree because of its cheapness. Tamarack and spruce have characteristics quite similar to hemlock and cost about the same but have an average life of from five to six years. Red and black cypress are soft woods, largely used in the South, and they decay rather slowly. Cypress has an average life of nine years. In California, redwood is used to a large extent. It is classed as a soft wood which resists decay quite well, lasting five years untreated and without tie plates and twelve years when used with tie plates and treated.

The foregoing information on life of ties is based on steam road conditions and experience and it may be stated that very few woods other than those mentioned are of much value as ties unless treated. The Chicago, Burlington & Quincy Railroad has found from its experience in eight different states that practically all untreated ties which it uses reach the end of their life in seven years for all species except white oak, chestnut and cypress. The percentage of these species removed after seven years of service were 10 per cent, 37 per cent and 51 per cent respectively.

Authoritative information as to the life of the several species of ties used by electric railways is very meager, but it is safe to estimate that for open track conditions the steam road data will apply, with some modification where traffic conditions are less severe. The following from a report on untreated ties for electric railways, presented before the American Wood Preservers' Association and published in the ELECTRIC RAILWAY JOURNAL for Jan. 22, 1916, has some bearing:

1. *Untreated Ties in Interurban Lines.* The following estimates were secured from officials of six companies operating in the Middle West:

Cedar	Untreated	No tie plates	7– 8 years	Michigan
			9–10 years	Michigan
Cedar	Untreated	With tie plates	12–15 years	Michigan
			15–16 years	Michigan
Cedar	Untreated	No tie plates	11–12 years	Illinois
White oak	Untreated	No tie plates	7– 8 years	Michigan
			10–12 years	Michigan
White Oak	Untreated	No tie plates	6– 7 years	Indiana

2. *Untreated Ties in Unpaved and Macadam Streets.* Officials of several companies operating in the Middle West supplied the following estimates:

Cedar	Untreated	11–12 years	Illinois
White oak	Untreated	8–10 years	Illinois

Oak and beech. Reported as badly decayed and removed after two years from track laid on gravel ballast in Illinois.

3. *Untreated Ties in Paved Streets.* A third and important condition under which ties are used is in tracks in paved streets. The situation is complicated not only by lack of authentic data, but by the variety of types of construction in use. Some light is thrown on the service secured from untreated ties in these types of track by the following tabulation of opinions expressed by officials of a number of companies operating in the Middle West:

Locality	Species	Life Untreated Years	Remarks
Michigan	White oak	12–15	Life of tie equal to life of rail
Michigan	White oak	20	Life of tie equal to life of rail
Michigan	White oak	10	
Illinois	White oak	20–25	Equal to life of rail, provided tie is not disturbed
Indiana	White oak, Hemlock	20	Life of tie equal to life of rail
Illinois	Tamarack, Cedar	15–20	Life of rail

Further, in regard to life of ties in tracks in paved streets, cedar ties have been reported as having a life of eighteen years or more in such streets in Milwaukee, and long-leaf heart-pine ties have been reported as having an average life of eighteen and six-tenths years in paved streets in Brooklyn. In the latter case the in-

Specification for Cross-Ties*

Quality—All ties to be cut within ten months prior to the time of delivery; from sound, straight, live and thrifty timber, free from loose or rotten knots, dry rot, wind shakes or any other imperfections affecting the strength or durability of the timber.

Dimensions—6 in. thick, 8 in. width of face, and 8 ft. long. The allowable variation from the above dimensions may be obtained from the following table:

	Hewed	Pole	Sawed
Ties known as No. 1.			
Depth not less than....	6 in.	6 in.	6 in.
Face not less than.....	7½ in.	6 in.	8 in.
Length .....8 ft. to 8 ft. 2 in.		8 ft. to 8 ft. 2 in.	8 ft.
Ties known as No. 2.			
Depth not less than....	5½ in.	5½ in.	5½ in.
Face not less than.....	6 in.	5½ in.	7½ in.
Length	7 ft. 10 in.	7 ft. 10 in.	8 ft.

Ties that do not conform in size to No. 1 or No. 2, or have any other defects, will be classed as cull ties and will not be accepted.

White and Bur Oak and Chestnut—Hewed ties must be stripped of bark, hewn smooth and clean of all splinters, deep scar marks, and must be straight, with faces true and parallel, and of uniform thickness with ends sawed off square. Ties hewn from one-half or one-quarter logs, or sawed from large timber, will not be accepted.

Yellow-Pine Heart Tie—Ties must be of good long-leaf Southern yellow pine and must be hewn smooth on all sides with faces parallel, and of uniform thickness with ends sawed off square. Ties must be free from rot, worm holes, wind shakes, loose or unsound knots, red heart and other defects that will impair their strength and durability.

Ties should be hewn so that the heart will be at or near the center of the tie and must not have over 1 in. of sap on each corner, which means the tie must show 6 in clear heart on the 8-in. face and 4 in. of clear heart on the 6-in. face.

No short-leaf yellow pine ties will be accepted.

Sound and Square-Edge Yellow Pine— Ties must be of good long-leaf Southern yellow pine, or, in other words, must have the same qualities and must pass the same inspection as the heart pine ties regardless of the sap.

Cypress— Hewn cypress must be free from wane, rot, dote, honey-comb and other defects, to show one heart face; allowance, 1 in. sap on two opposite corners.

Ties must be hewn smooth on all sides with faces parallel and of uniform thickness and saw butted at both ends.

Inspection—All ties shall be subject to the inspection of an agent of the maintenance of way department at the point of shipment.

The expenses of the inspection shall be equally apportioned between dealer and railway companies.

Freight must be prepaid on all shipments.

*From 1910 report of committee on way matters, American Electric Railway Engineering Association.

formation was given in 1914 and the ties then reported on were replaced in service so they now average more than twenty-two years.

It is apparent that the life of tie timber will vary greatly under the conditions of service. Even the same kind of timber, cut from the same forest, will act differently on different parts of the same road. Ballast conditions and average moisture content as controlled by rainfall will create widely varying results. The following are some of the factors which affect tie life: (1) Kind of soil, ballast or foundation upon which the tie is placed; (2) size of tie and species of wood; (3) whether the tie is treated or untreated; (4) whether tie plates are used or not; (5) kind of spikes used; (6) care taken of ties while in service; and (7) mechanical wear due to traffic. Consequently it is almost impossible to make even a general statement as to the kind of timber which makes the best ties for universal service. Local conditions largely control and it might be better to use a cypress tie in one part of the country rather than an oak or yellow pine tie. Meanwhile, the utmost attention should be paid to the continued maintenance of proper shape of the ballast section between the ties, as a longer tie life will result if the ballast is arranged so as to provide ample drainage. This should be assisted by adequate ditching and cross-drains.

TABLE II—C., B. & Q. R.R. CLASSIFICATION OF TIE TIMBER ON BASIS OF HARDWOOD AND SOFT WOOD AND FOR USE TREATED AND UNTREATED

HARDWOODS

UNTREATED: 1 white oak, 2 bur oak, 3 chestnut, 4 locust, 5 black walnut, 6 mulberry, 7 sassafras.

TREATED: 1 red oak, 2 black oak, 3 pin oak, 4 water oak, 5 turkey oak, 6 Spanish oak, 7 black-jack, 8 beech, 9 hickory, 10 ash, 11 elm, 12 hard maple, 13 cherry.

SOFTWOODS

UNTREATED: 1 cedar, 2 cypress.

TREATED: 1 short leaf pine, 2 loblolly pine, 3 lodge-pole pine, 4 Douglas fir, 5 tamarack, 6 hemlock, 7 tupelo, 8 birch, 9 sycamore, 10 soft maple, 11 hackberry, 12 butternut.

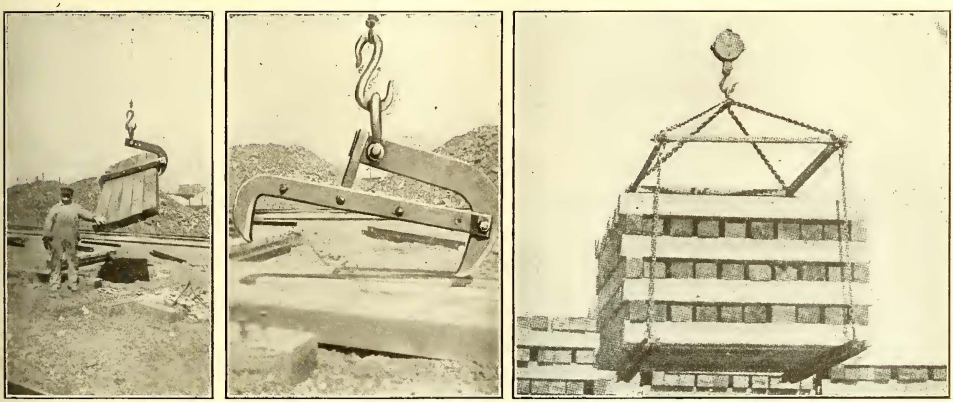


FIG. 3—DEVICES WHICH ARE EFFECTIVE IN DECREASING COSTS IN TIE HANDLING

Classification of Woods for Use as Ties

Notwithstanding the long period during which wooden cross-ties have been used there is no standard rating of woods which are suitable for this service. It is apparent that different species will vary in natural durability and in capacity for preservative treatment, but aside from these qualities there are three important characteristics which the wood should possess: (1) It should be sufficiently strong to withstand ordinary strains due to center binding, etc.; (2) it should be sufficiently dense to resist spike pulling and lateral pressure on the spikes, and (3) it should be sufficiently hard to furnish a proper resistance to rail wear.

It is desirable that a classification of the different species of woods as ties be established on a basis of their relative mechanical properties, and the United States Forest Products Laboratory has suggested such a classification based upon a composite figure involving the following mechanical properties: Static bending, impact bending, compression parallel to grain, compression perpendicular to grain, and hardness. Such a tentative classification is given in Table III. Meanwhile the C. B. & Q. R.R. has adopted a classification based on its experience with treated timbers and some tests which it conducted for determination of the spike holding power of different woods. (See Table IV.) This railroad now broadly divides woods into two classes: hardwood and softwood. Each class is subdivided into those for use without a preservative and those to be used only when treated. This classification is given in Table II and is fairly representative of the use of woods, treated and untreated, on the important steam roads. Generally the electric roads follow

TABLE III—TIMBERS ARRANGED IN ORDER OF THEIR MECHANICAL VALUE AS TIES

Species	Average Composite Value
Black locust	1,666
Sugar maple	1,140
White oak	1,050
Red oak	972
Beech	955
Long-leaf pine	914
Red gum	825
Short-leaf pine	800
Western larch	790
Tamarack	740
Eastern hemlock	700
White fir	610
Lodgepole pine	590
Western yellow pine	560
Northern white cedar	420

NOTE.—Figures are for average forest-grown material, and individual prices may vary 30 per cent above or below the average.

the same practice in this respect for their open tracks. Redwood, untreated, is used extensively in the West, and long-leaf heart yellow pine is often used untreated although better service is obtained when treated, at least for open tracks in ballast.

Sizes and Spacing of Ties

The proper sizes and spacings of ties are functions of condition of track and traffic. An easier-riding track will result from the use of smaller ties spaced close together than from larger ties spaced farther apart. Hence, spacing should be considered as of more importance than size. Two advantages are obtained by decreasing the spacing: (1) The unit pressure on all track material is decreased, and (2) the carrying capacity of the roadbed is increased correspondingly. There are so many controlling elements that it has so far been impracticable to follow any fixed rule for spacing ties, but the minimum spacing should not be less than the width of track shovels used. The usual spacing varies from sixteen to eighteen for a 30-ft. rail or eighteen to twenty for a 33-ft. rail, indicating a variation of from 2640 to 3200 per mile.

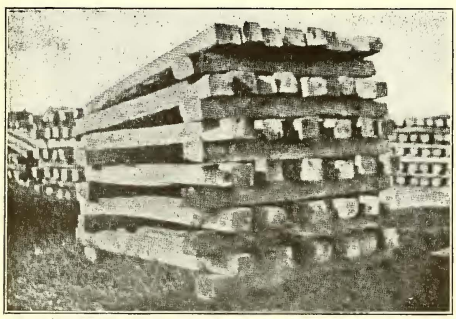
The thickness of ties used varies from 6 to 8 in.; the width from 6 to 12 in. and the length from 8 to 10 ft., the greater length being for bridge ties and tracks over marsh land. Electric railways use a size of 6 in. x 8 in. x 8 ft. almost universally while 7 in. x 9 in. or 7 in. x 8 in. x 8 ft. to 8 ft. 6 in. long are sizes being used more and more by steam roads. Bridge ties are usually 8 in. x 8 in. x 10 ft. spaced from 12 in. to 16 in. centers.

Tie Renewals Should Be Carefully Controlled

Aside from the recent sharp rise in cost of tie timber due to war conditions there have been other causes at work which have increased the cost of tie renewals in recent years. Some of these causes are: (1) The constantly increasing price of ties, due to the steady rise in price of timber as the supply decreases, and the increased length of haul due to greater remoteness of sources of supply; (2) the use of the best grades of lumber for other purposes, leaving the inferior qualities for use as ties; (3) carelessness in drawing specifications and making inspections, causing acceptance of inferior material; and (4) increased mechanical wear due to inferior timber and heavier traffic which result in excessive rail-cutting and spike-killing.

Careful attention to item No. 3 will repay the trouble several times over. Both the purchasing agent and the engineer should realize that a tie is something more than "just a tie," and the fact that all ties of a species look more or less alike is no warrant that they are all equally serviceable. The quality of the wood is of much more importance than exact sizing, and an undersized all-heart tie is usually more durable than an oversized sap tie. For many reasons it is just as necessary to buy ties in accordance with strict specifications and to inspect them rigidly thereunder as it is to buy rails under a specification. The inspections should preferably be made at the points of shipment, as the dealer will avoid freight charges on "rejects" and the tendency to accept inferior material by the purchaser, because much-needed ties are on the ground, will be absent. This applies more to ties obtained from distant sources, since dealers who deliver along the railway lines generally know the specification and what will pass inspection. A specification for untreated oak, chestnut, yellow pine and cypress ties is presented on page 310.

It is obvious that the inspections should be made by men thoroughly versed in lumber, and in the tricks of the trade, and if the railway has no such person available it can well afford to hire the services of an expert in this line. The purchase and inspection period is the



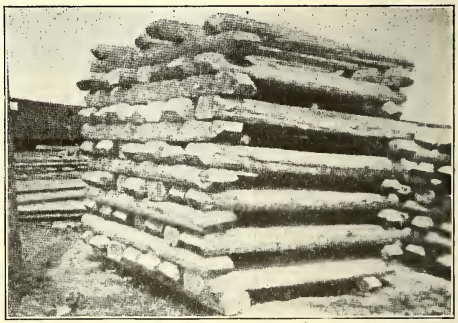


FIG. 4—SQUARED TIES PILED TO SHED WATER DURING SEASONING. FIG. 5—POLE TIES PROPERLY PILED FOR SEASONING

TABLE IV—SPIKE-HOLDING POWER OF VARIOUS WOODS *

Kind of Wood	Maximum Pulling, in Pounds Untreated	Resistance to Pulling, in Pounds Treated	Resistance in Per Cent of That of White Oak Untreated	Resistance in Per Cent of That of White Oak Treated
White oak	7,870	.....	100	...
Water oak	.....	6,780	...	86
Black oak	.....	7,230	...	92
Red oak	6,460	7,730	82	98
Bur oak	.....	9,210	...	117
Ash	.....	7,750	...	98
Chestnut	5,190	5,200	66	66
Elm	7,290	7,500	93	96
Beech	8,180	8,900	104	113
Poplar	4,920	5,670	62	72
Loblolly pine	3,630	4,210	46	55
Sweet gum	5,040	5,300	64	67
Hemlock	5,633	4,200	72	53
Soft maple	6,513	5,887	83	75
Hard maple	10,177	8,960	129	114
Hickory	10,153	10,433	129	133
Cypress	3,163	2,840	40	36
Birch	6,337	5,907	80	75
Cottonwood	2,810	2,743	36	35
Northern hard maple	10,393	.....	132	...
White cedar	1,467	.....	19	...

* From *Railway Age Gazette*, June 16, 1911.

first place to exercise the true principles of economy.

The actual cost of tie renewals is divided into three principal elements, as follows: (1) cost of new ties delivered along the track; (2) cost of removing and disposing of old ties, and (3) cost of placing new ties in track. Items Nos. 2 and 3 are labor costs and have a most important relation to total expense. Together these two items will run from 20 to 60 per cent of the first item, depending on the kinds of tie and ballast used. The lower the first cost of the tie, the higher is the ratio of the labor cost to the first cost of the tie. Hence it is easy to see that the actual labor cost of tie renewals will be greater with inferior ties than with ties of first grade because renewals will be more frequent on account of the shorter life. By the use of tie plates and treated ties, the life of inferior ties can be greatly increased and labor costs reduced in consequence.

With untreated ties and no tie plates the yearly renewals on steam roads average from 250 to 350 per mile of track. Some trackmen consider that normal tie renewals should average two ties per 30 ft. rail yearly under moderate traffic. This would require about 700 ties per mile or about 30 per cent annually. There is no doubt but that the practice of making single renewals ("spotting in") is more advantageous in the long run than the practice of renewal "out of face" or in continuous stretches. The trackmen should be instructed in proper methods of piling ties for seasoning and as to the proper time for making renewals; the proper places to use hardwoods, softwoods and treated ties and where to use culls and second-hand ties. The yardmen in storage yards should also be advised as to methods of piling ties. Some of these are shown in an illustration on page 309. For instance, untreated ties should be piled in a way which will allow free circulation of air about each tie, after the manner shown in Fig. 2. The ricked pile so often used for large quantities of untreated ties should be avoided as it prevents or retards air seasoning and is apt to assist in growth of fungi because of the greater percentage of moisture retained by timbers in contact.

The tendency of certain woods to check in the seasoning process may be largely overcome by the use of "S" irons driven into the ends. Season checks are serious defects, in that they permit moisture to reach the interior of the tie, thus assisting in promoting decay and causing a liability to split when spikes are driven. The type of ties known as "split" ties check badly because the heart is exposed on one face. For this reason trackmen should be instructed always to place the heart face downward in the track.

FIG. 6—TREATMENT WOULD HAVE MADE THESE CEDAR TIES LAST LONGER

Ties should not have any bark on them when placed, as the bark holds water and loose bark offers little frictional resistance to ballast, thus rendering the tie liable to shift readily. Hewn ties are generally considered better for use untreated because the hewing process closes the pores of the wood and tends to prevent absorption of moisture. Untreated sawed ties decay more rapidly because the saw cut cannot be kept parallel to the grain and a larger end area of fiber is exposed than in hewed ties. Decayed ties should be disposed of as soon as possible to prevent spreading of fungi to sound ties.

Ties should not be removed from the track until it is certain that not another year of safe life remains. Nevertheless it is poor economy to leave badly decayed ties in service because they make the adjacent good ties do more than their share of work and cause more rapid failure. The decision as to just what ties present conditions requiring renewal requires experience and judgment. More waste can be caused at this point than at any other. The objects of proper tie inspection for renewals are to secure uniform practice, to prevent unwarranted removals before safe service is past and properly to distribute renewals. Tie inspection for renewals is too often left to the sole judgment of the section foreman. He likes to use up all the ties on hand regardless even if some of the ties removed would have lasted a year or more longer. The best way to inspect for renewals is to have the work done by one man who is thoroughly versed in the work. His work should be checked by the roadmaster, and the engineer should give close attention to this work also. A fair check can be had by comparing average renewals over a series of years, combined with personal inspection of sections here and there. In no case should ties be removed without orders and they should be piled near by for inspection by proper authority before disposal. It may be well to quote here the observations of W. F. Carr, engineer of maintenance of way, Chicago, Ottawa & Peoria Railway, on tie renewals. He said in an article in the JOURNAL for March 31, 1917:

> Ties, according to our experience, cannot be too carefully inspected. Untreated red oak, black oak, beech, elm or gum ties had better be left out of the track than put in. They will decay inside of three or four years, and, in the case of elm or gum, will check so badly in a short while that they are unfit for use. An undersized tie should not be bought. It is not capable of performing its proper duties as a bearing surface. Pole ties or ties cut from young white oak should have a width of face not less than 6 in.; otherwise the sapwood portion of the tie will rot off in a couple of years and the result is a fence post about 4 in. in diameter.
>
> Another point that should be watched very carefully is

that treated ties are cut from live, sound wood. I have seen well-treated ties which were so brashy that, when they were thrown from the car to the ground in unloading, they broke like sticks of punk. Just as good ties are needed for sidings as for main track, because a siding usually cannot and does not receive the same amount of attention that main tracks do, and when a siding is tied up it should be tied up with good, sound timber.

It is well to bear in mind that the life of a tie is always determined by the length of time that it will hold a spike. This life may be prolonged by pulling the spike when it begins to work up, driving in a tie plug and redriving the spike. It is worth while to do this in a great many cases, and in every case where a railroad is well maintained, as it will prolong the life of ties for a year or two. Economy in maintenance forbids the removal of a tie that will give service for six months, except at public or private road crossings. This rule can be adhered to in ordinary maintenance without any risk, because the average track foreman is too much inclined to make a clean sweep of tie renewals, and a check like this should be placed upon him.

When inspection tests are made for soundness, the ties should not be mutilated more than is necessary. Ties should not be tested on top except for decay around spikes and tie plates. To test a tie for strength, one end of a pick should be inserted under the end and used as a lever. A broken tie will usually show up under this method. Sap rot alone should not condemn a tie for service. Removal for rail cutting need not be done as a rule unless the cut extends more than 1 in. into the face. The most careful attention should be paid to red oak, pin oak and all other woods which decay from the heart as these are apt to leave a hard shell which tends to hide the true condition of the tie.

In connection with inspection for renewals, those interested will find an excellent set of rules governing this work, as done by the Buffalo, Rochester & Pittsburgh Railway, in Willard's "Maintenance of Way and Structures," page 78. These rules furnish a guide from which rules for use under electric railway administrative conditions may be readily adapted and used with beneficial results.

Maintenance Can Be Greatly Reduced by Use of Treated Ties

The use of treated ties has been increasing quite rapidly on the steam roads, but the electric railways have not paid as much attention to this subject in the past. The last available statistics (1911) indicate that only 15 per cent of the ties purchased by electric railways were treated while the steam roads treated 24 per cent. That more attention is being given to treatment is evidenced by the recent installation of a treating plant by the Boston Elevated Railway. Only two or three other companies have their own treating plants. Generally it is not economical for them to make the investment, but this fact should not prevent a far greater use of preservatives, since there are many private plants which do this work. Where companies do not feel able to afford either a plant of their own or to purchase treated ties from commercial pressure treating plants, the open-tank method is available, and although the results from open-tank treatments are not considered equal to those from pressure treatments, they will provide a preservative treatment which will amply repay the investment. Where treated ties are purchased, a good specification covering the treatment

TABLE V—ESTIMATED AVERAGE LIFE OF TIES

Kind of Timber	Estimated Life of Untreated Years	Estimated Life Treated With 10 Lb. Creosote per Cu.Ft. Years	Annual Charge Untreated	Annual Charge Treated
Longleaf pine	7	20	$0.159	$0.108
Chestnut	7	15	.145	.13
Spruce	6	14	.175	.13
Tamarack	5	15	.187	.123
Hemlock	5	15	.169	.115
Red oak	4	20	.240	.101
Beech	4	20	.214	.094
Maple	4	18	.240	.107
Gum	3	15	.338	.134
Elm	5	20	.196	.101
Loblolly pine	2	15	.381	.109
Sycamore	4	15	.239	.127

This table was taken from H. F. Weiss' book on "The Preservation of Structural Timber," and it must be borne in mind that the durability of untreated timber of any species is influenced by a great variety of factors. Among the most important of these are the species and quality of wood used, climate, soil, drainage, ground cover, etc. Since different combinations of these factors will occur in different cases, the durability of a given species cannot be expected always to be the same. Any estimate on the durability of timber must, therefore, be judged with considerable latitude.

may be found in the report of the way committee in Proceedings of the American Electric Railway Engineering Association for 1916. There is no longer any question as to whether tie treatment is an economical measure for greatly prolonging the average life of ties, thus reducing maintenance charges. The report of the way committee above mentioned indicates this clearly. Table V is taken from that report and gives information as to estimated life treated and untreated and annual cost reductions due to treatment.

The results of seven years service tests by the Chicago, Burlington & Quincy Railroad also clearly show the comparative results in tie life between treated and untreated ties, with a comparison of results obtained with the three principal treatment processes in use. These results are summarized in Table VI. The several treatments mentioned in this table include the straight creosote process, whereby creosote oil is forced into the wood under pressure until the absorption is from 5 to 10 lb. of oil per cubic foot of timber. The Card process consists, briefly, in the use of a mixture containing about 80 per cent zinc-chloride solution and 20 per cent creosote, injected to an absorption of about ½ lb. dry zinc chloride and 2 or 3 lb. of creosote per cubic foot of timber. The Burnett process involves the use of zinc-chloride solution alone applied under pressure, after preliminary subjection to vacuum, until the wood refuses to absorb more, the absorption ranging from ¼ to ½ lb. of dry zinc chloride per cubic foot of timber.

In connection with timber treatment it is absolutely essential that fuel specifications covering the kind of tie to be used be strictly enforced, and it is very important to have adequate inspection at the treating plant. When the purchaser has no one available for this service the commercial inspection bureaus will supply inspection at a very reasonable cost.

It should also be noted that the way committee states in the 1916 report that while zinc chloride is an effective wood preservative the experience of several companies indicates that it increases the conductivity of the timber and gives an impetus to the corrosion of spikes,

TABLE VI—INFLUENCE OF TREATMENT ON LIFE OF TIES AS SHOWN BY C., B. & Q. R.R. SERVICE TESTS

Treatment	Total Ties Placed 1909–10	Total Ties Removed Up to 1917	Per Cent Removed Up to January, 1917
Creosote	3,264	16	0.5
Card process	15,817	455	3.0
Burnett process	2,488	100	4.0
Untreated	3,270	2,626	80.0

tie plates and rail bases. The recent article in the JOURNAL by E. R. Shepard on leakage resistance of electric railway roadbeds also states that the use of zinc chloride and similar preservatives should be avoided where escape of stray currents is objectionable.

SOME OF THE PRINCIPAL COST-REDUCING FACTORS SUMMARIZED

The foregoing matter has been compiled from many sources, principally from the reports of appropriate committees of the American Railway Engineering Association and the Electric Railway Engineering Association; Willard's "Maintenance of Way and Structures," and the files of the ELECTRIC RAILWAY JOURNAL. It may be well to summarize as follows:

1. The first place to secure tie economy is in connection with purchases. These should be made only on proper specifications and adequate inspection.

2. The utmost care should be exercised when inspecting for tie renewals and regularly qualified tie inspectors are to be preferred to the section foremen.

3. Methods of placing, piling, handling and seasoning ties should be covered by proper instructions.

4. Great care should be exercised to see that ties are adequately drained in the ballast.

5. The use of preservatives presents the best field for reducing tie renewal charges, and the present cost of ties, even of inferior grades, almost forces the adoption of preservative treatment as the chief measure by which costs may be reduced. Care must be taken to see that tie plates are used with all treated ties and with all inferior untreated ties.

Maintenance of Edison-Type Storage Batteries

BY OTTO GOTTSCHALK
Master Mechanic Richmond Light & Railroad Company, New Brighton, N. Y.

WHEN Edison batteries were first used by the writer in connection with low-voltage control equipments serious conditions developed. Cells were found short-circuited due to the metal containers bulging so as to come in contact with adjacent cells. The trouble was found to be due to the depositing of the alkali in the solution around the vent caps. This deposit would build up in sufficient quantities and develop sufficient density to prevent the vent caps from opening, thus preventing the gas from escaping.

If it had been possible to give the batteries attention each day this condition would not have occurred, as the opening and closing of the vent caps would have broken the deposit. These batteries, however, were maintained on a mileage basis and in consequence from six to ten days elapsed before they received attention.

To overcome this trouble it was suggested to the company's representatives that they develop an oil for use in the vent caps which would not be destroyed by the electrolyte or prove injurious to the same. The Edison Company's chemists accordingly developed this oil, which was spread on the surface of the metal inside the vent caps so that the oily surface would not hold the globules of solution containing alkali which rise with the bursting gas bubbles. When this oil was used it was found unnecessary to clean the batteries oftener than four times per year.

In connection with the maintenance of this type of battery some further details may prove interesting. At each inspection distilled water was added to the cells to bring the solution up to the prescribed height. A check of the specific gravity of the solution was made once a month. I found that the length of time that the solution could be continued in service before complete renewal was necessary depended on the work which the batteries were required to do. It was found possible to use the same solution in some instances for three years. To determine when it should be renewed various readings of specific gravity were taken and when the gravity was found as low as 1130, it was found best to replace the solution.

As it is essential that all water used for filling batteries should be pure, where any uncertainty existed as to the purity of the distilled water employed I used the following simple tests with entire satisfaction: The material used in carrying out the tests comprised a 10 per cent solution of silver nitrate to which a few drops of nitric acid had been added, a 10 per cent solution of barium chloride and two test tubes about ½ in. in diameter by 5 in. long. The silver nitrate solution should be kept in opaque or amber glass bottles. The reagents can be obtained in any drug store.

In the test for sulphites the test tubes were rinsed out thoroughly several times with the water to be tested. Finally, one tube was two-thirds filled with water and three or four drops of the barium chloride solution were added. After thorough mixing this solution was compared with a sample of the same water in another tube to which no reagent had been added. A white cloud or precipitate indicated the presence of sulphites.

To apply the test for chlorides, the tubes were thoroughly rinsed out as already described. After two-thirds filling one tube with a sample of the water to be tested, three or four drops of the silver nitrate solution were added and the mixture was thoroughly stirred. This as before was compared with a sample of water to which no solution had been added. A white cloud or precipitate indicated the presence of chlorides.

Boston Transit Commission Issues Report

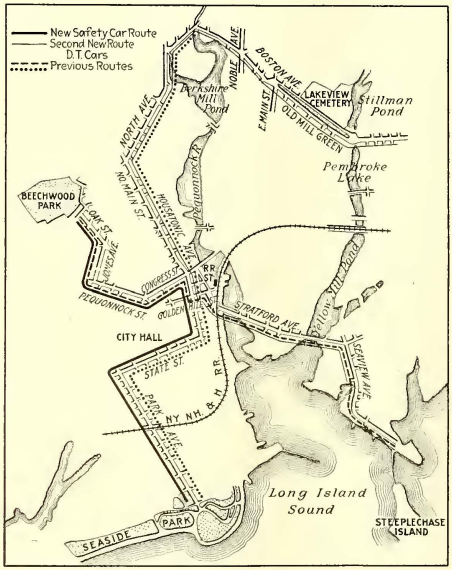
The Boston Transit Commission has issued its twenty-fourth annual report for the year ended June 30, 1918. In view of the expiration of the term of office of the commission and the taking over of its powers by the City of Boston, this report is also the final one for the commission. Since March 28, 1895, this commission built the following subways and connections: Tremont Street Subway, 1.68 miles; East Boston Tunnel, 1.42 miles; Washington Street Tunnel, 1.16 miles; Cambridge connection, 0.47 mile; Boylston Street subway, 1.50 miles; East Boston Tunnel extension, 0.41 mile, and Dorchester Tunnel, 2.26 miles. The approximate total cost involved was $34,954,000.

It is reported that the Vienna municipal authorities are much worried by a daily loss of $9,000 in electric car receipts due to the fact that the conductorettes are entirely unable to collect from those who crowd the buffers and footboards of the cars. The authorities hope that this crowded condition on the surface cars will be speedily relieved when the subways are reopened.

Bridgeport Well Pleased with Safety Cars

Pioneer Safety-Car Service in East Was Inaugurated on Feb. 2 on Nine-Car Line Through Business Section of City—Special Precautions Were Taken to Safeguard Initial Service to Insure Freedom from Interruption

BRIDGEPOFT, CONN., is a center of very great manufacturing activity and is the seat of a number of industries which were especially important in the prosecution of the war. The local electric railways, which form part of the system of the Connecticut Company, were greatly overtaxed by the influx of munitions and other industrial workers. As the Connecticut Company was not in a position to finance track extensions and increase in rolling stock necessary to care for the augmented traffic, the United States Housing Corporation undertook to do this. The corporation, among other things, purchased twenty one-man safety cars for the Connecticut Company, and of these eleven were assigned to the Bridgeport division. These cars were put into service on Sunday, Feb. 2, and since then have been operating very satisfactorily. Nine of the cars are used in regular service and two are held in reserve for emergency operation. With the new cars at its disposal the problem before the management of the Connecticut Company was so to use them as to produce the greatest relief for the congestion at Bridgeport (and elsewhere on the system). No one existing line in the city seemed exactly adapted to the new cars so that parts of two lines were selected and combined to produce a new route, the one over which the cars are now operating. The accompanying map has been prepared to show just how the rerouting was done as an incident to the inauguration of safety-car operation. Previous to the rerouting one route (dotted line on map) was from the end of Park Avenue at Seaside Park via South Park Avenue, State Street, Main Street and North Avenue to Boston Avenue. A second line (shown by dashes on the map) traversed Seaview Avenue, Stratford Avenue, Housatonic Avenue, Golden Hill Street, Main Street, Congress Street, Pequonnock Street, Jones Avenue and Oak Street to North Avenue.



OUTLINE MAP SHOWING SAFETY-CAR LINE IN BRIDGEPORT TOGETHER WITH THE ROUTING CHANGES INCIDENT TO ESTABLISHING NEW SERVICE

In selecting the route for the safety cars the object was to avoid as far as possible such sources of possible delay as would prevent the cars from demonstrating their real capacity for service. The new line is shown on the map by a heavy solid line. It connects Oak Street with the Seaside Park end of South Park Avenue, traversing Main Street, which is the principal business street of the city for several blocks. The other new route is indicated by the light solid line on the map. For sake of completeness it should be stated also that coincident with the rerouting a track extension on Boston Avenue, constructed with funds furnished by the Housing Corporation, was put into commission. This track extension played an important part in the preparation for the new service, as will be explained later in this article. The new safety car line taps two residence sections of the city, connecting them with the business center, and in the past the traffic between these sections and the business center has not been sufficient to warrant very frequent service with the large standard double-truck cars of the company. On one part of it, indeed, only fifteen-minute headway was considered warranted with the large cars during a considerable part of the day. The consequence was that much possible traffic was lost through lack of frequent service and experience has already demonstrated that the small cars are picking up this traffic. On the Oak Street line, the one just referred to, fifteen-minute service was given for nine hours and ten-minute service for the balance of the day. This line has now five-minute service all day. On the other former line, the South Park Avenue line, there was a straight ten-minute headway. This line has now, of course, five-minute service also.

In preparation for inaugurating the new service, J. K. Punderford, general manager The Connecticut Company, laid out a threefold program. This included first, the selection and training of the car crews who were to operate the new cars together with instruction of the supervisory and shop forces; second, the acquainting of the public with the changes in the lines to minimize inconvenience to patrons and at the same time to explain the characteristics of the new

cars so as to obtain the full advertising value of the improvements; and third, the testing and inspection of the cars, track and overhead so as to avoid the occurrence of preventable interruptions to service. These three parts of the program are discussed in the following paragraphs which also include comments upon the results secured. In carrying out this program Mr. Punderford has had the hearty co-operation of Joseph S. Goodwin, manager, and F. L. Kibling, superintendent of the Bridgeport division, who are in direct charge of operation and who have been untiring in their efforts to make the new service a success.

The first task was the selection and training of the car crews. It was decided to train twice as many men as would be needed for the operation of nine cars, a total of thirty-six, in order that there might always be available a supply of men competent for the purpose. A list of 100 men was selected by the manage-

After preliminary instructions on the special track the men received training on the through route after 1 a.m., when no regular cars were in operation. Finally, on Friday, Jan. 31, the cars were put on the new route in the daytime, sandwiched in among the regular cars and carrying "No Passengers" signs. The safety cars followed the regular cars and were operated by the day men from 10 a.m. to 2 p.m. and by the night men from 3.30 p.m. until after 6.30 p.m. It should be stated that while on the test track the training consisted in operating the cars in turns, the men not so engaged playing the rôle of passengers. In the training special attention was given to fare collection, particularly the developing of skill in making change.

Prior to the starting of operation in Bridgeport, in addition to the above the managers and superintendents of all divisions on which it is proposed

SAFETY CAR ON MAIN STREET IN BRIDGEPORT, CONN.

ment from those considered well suited for the new work, including both motormen and conductors. This was arranged in order of seniority and posted to give the men an opportunity to "bid in" the runs. The statement was made that the safety car operators would be paid 5 cents per hour more than the regular rates and if enough men were not secured from the first list a supplementary list would be posted. The new work proved popular and the runs were promptly bid in.

The men were broken in on the North Avenue extension on Boston Avenue, previously referred to. This track was put in to provide transportation for workers at the Remington Arms plant and it was possible to defer putting it into commission until after the safety car training period had been completed. Regular service began over this track on the day on which the safety cars were first operated.

eventually to operate safety cars were called into Mr. Punderford's office for general conference so that there might be unanimity of information and enthusiasm. Sets of instruction sheets were also made up for the guidance of all men who would be engaged in the operation and maintenance of the new cars so that the experience of manufacturers and other railways which have these cars in operation might be available to all. Credit is due particularly to C. H. Beck of the Westinghouse Electric & Manufacturing Company, for compiling this material. The full information was furnished to master mechanics, starters and instructors, while a condensed set of rules was prepared for the guidance of the car operators.

The result of all this preparation was that on Sunday when the cars went into operation everything worked smoothly and, then and since, no accidents of any moment have occurred.

In preparing the public for the new service change-in-route signs, as reproduced on a small scale herewith, were posted in the cars some days in advance of the change. Advertisements, of which a sample is reproduced also, were run in the papers, and the local newspaper men were invited to accompany the inspection party which went over the line in special cars on the day preceding the formal opening.

For the purpose of enlisting the co-operation of the

PLEASE HAVE EXACT CHANGE FOR YOUR FARE

IT MAKES THE SERVICE FASTER AND GETS YOU TO YOUR DESTINATION QUICKER

THIS NOTICE WAS CARRIED ON THE CARS

city officials and demonstrating to them the improvement in service which would result from the use of the new cars, the traffic committee of the city was invited to study them during the instruction period. This was done and the chairman of the commission personally operated a car. On the afternoon of Feb. 1, Mayor Clifford B. Wilson, who is also lieutenant-governor of the State, together with members of the Board of Alderman and representatives of the press, made a trip over the route and expressed themselves as well pleased with the rapid acceleration and stopping of the cars. They were particularly impressed with the shortness of the time needed for making emergency stops and with the lack of jar to the passengers when such stops were made.

LIMBERING UP THE EQUIPMENT

To insure smooth working of the physical equipment no pains were spared to have everything connected with the new line in perfect operating condition. Mr.

CHANGE in SERVICE

Beginning Sunday, Feb'y 2, 1919

the North Bridgeport line will run through Golden Hill Street, Stratford Avenue and Seaview Avenue

TEN-MINUTE SERVICE WILL BE GIVEN ALL DAY

Passengers will greatly help in maintaining this improved service by having the exact fare ready when they board the cars

THE CONNECTICUT COMPANY

CHANGE in SERVICE

Beginning Sunday, Feb'y 2, 1919

the Oak Street line will run through Main and State streets to South Park Avenue

FIVE-MINUTE SERVICE WILL BE GIVEN ALL DAY BY THE NEW SAFETY CARS

Passengers will greatly help in maintaining this improved service by having the exact fare ready when they board the cars

Please ask for transfer when LEAVING Safety Car

THE CONNECTICUT COMPANY

CAR POSTERS USED IN ADVERTISING CHANGES IN ROUTING

Beck, already mentioned, W. G. Kaylor and E. G. Deso of the Westinghouse Traction Brake Company, and J. C. Thirlwall of the General Electric Company, gave personal attention to the cars, and every car was given an exhaustive operating test before it went into service. In order that there might not be any trouble at switches, special attention was given to seeing that all electric track switches and signals were in first-class order so that the car operators would not be obliged to leave their cars. Of course some little attention had to be given to the matter of drawing sufficient current to operate track switches with the light cars. The switches are set up so that the lighting and heating currents of the ordinary cars will not trip them. As the safety cars draw very small current normally it is necessary to cause them to draw somewhat more than normal in order to trip the switches. The overhead was also carefully inspected to provide against trolley wheels leaving the wire and thus causing traffic delays. As 14-ft. poles were used on these cars, whereas the standard on the large cars is 12 ft., there was a possibility that the "overhead," adjusted for the shorter poles would not be suitable for those on the safety cars. The track was also inspected to be sure that tangents, curves and special work were adapted to the 26-in. wheel. Extra sand boxes were provided along the route as it was expected that the new men would use sand very liberally, which proved to be the case. In fact, free use of sand is necessary with the safety cars on account of the very rapid rate of acceleration and braking which are used.

As described in the issue of the ELECTRIC RAILWAY JOURNAL for Sept. 7, 1918, the new cars were purchased from the American Car Company and they are equipped with the full complement of now-familiar safety devices. The cars are 27 ft. 9½ in. over all in length and 8 ft. wide. The height from rail to top of roof is 9 ft. 9⅝ in. The platform floor is on the same plane as the body floor, and air-operated folding doors and steps are provided. The equipment includes two 25-hp. motors, ten pairs furnished by the Westinghouse Electric & Manufacturing Company, and ten by the General Electric Company. The armature bearings are of the Gurney ball-bearing type. The total weight equipped, but without load, is about 7¼ tons. The general appearance of the car is similar to those used in other parts of the country, but the trolley pole is mounted directly on the roof instead of upon a light framework as has been customary. The outside finish is the standard Connecticut Company's yellow, and except for the length and height there is no striking difference in appearance from the company's double-truck cars.

Safety Car Service Begins Tomorrow in Bridgeport

This Improvement by The Connecticut Company means faster, better trolley service for Bridgeport.

Safety cars will be operated every five minutes all day long on the new Oak Street-South Park Avenue line.

Passengers will facilitate this service by having the exact fare ready when they board the cars.

The North Bridgeport line will be changed to run through Seaview Avenue, giving 10-minute service all day.

The co-operation of the public in making this new service effective is solicited.

THE CONNECTICUT CO.

TYPICAL NEWSPAPER ADVERTISEMENT EXPLAINING ADVANTAGES OF SAFETY CAR

RESULTS SECURED TO DATE

As this article goes to press the safety cars have been in operation more than ten days. During this period the service has been remarkably good, cars being kept very close to schedule. As they are obliged to go through a congested section of Main Street, which is quite narrow, a few traffic delays have occurred, but these were not of great moment. As the safety line is double-tracked throughout, the cars have

had excellent opportunity to make up time, and by stationing starters at the ends of the line the company was able to keep them fairly well distributed. Some bunching occurred at first as would be expected in view of the short headway. The management was especially anxious to have the first day's operation perfectly smooth, which was the reason for selecting Sunday as the day. At this time of the year the Sunday travel is lightest and there is little vehicular traffic to interfere with smooth operation.

The cars are now making a schedule speed of about 8½ m.p.h., and it is hoped later slightly to increase this. The average daily mileage on Sunday is slightly more than 120, and on week days more than 130. Receipts the first day were about 20 cents per car-mile and this gradually increased to more than 22 cents.

By means of special posters, used in all cars on the division, the company asked the co-operation of the public in having exact change ready as far as posible. As a result comparatively few passengers have asked for change on the safety cars. Both management and

SAFETY CAR OPERATION ON A BUSY STREET IN BRIDGEPORT, CONN.

public are pleased with the cars, as on the one hand they are proving their ability to develop business, and on the other hand they are furnishing a service impossible under former conditions. The cars in Hartford and New Haven have not yet been placed in operation but they soon will be. Of course in those cities results as striking as those obtained at Bridgeport are not to be expected, because only a few cars are available in each place, and complete lines cannot be equipped with them.

In the second monthly news letter of the electric railway section of the National Safety Council, H. B. Adams, safety supervisor Chicago, Aurora & Elgin Electric Railroad, Aurora, Ill., makes a constructive suggestion. This is that when electric railways get out printed matter along safety lines 150 copies of each piece be sent him for distribution to the members of the section with the monthly letters. This will conduce to economy in mailing expense and will greatly facilitate the safety work of members.

Treatment of Loose Railway Drum Controller Cylinders

By R. S. Beers
General Electric Company, Schenectady, N. Y.

THE body castings of all K-type railway controllers are made of brass. This is to prevent as far as possible the distortion of the magnetic blowout field. For the same reason the older types of controllers, without the individual finger blowout, have a brass cap plate. In drum controllers for direct current at lower voltages, as well as in those for alternating current, cast iron has been successfully used for the body castings.

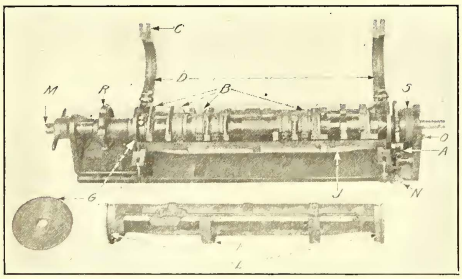
The first K-controller cylinders were made with the segments and body castings insulated from the shaft by means of a wood drum. As the art developed molded insulation replaced the wood, reducing the diameter of the cylinder casting and allowing a better separation of adjacent fingers and segments by the arc deflector plates. Cylinders made in this manner eventually loosen on the shaft from the hammer blow of the segments striking the fingers, as well as from the jar when the cylinder is turned to the "off" position. On account of the body castings becoming loose a third type of controller cylinder has been devised and used for a number of years. This is known as the "hexagon-shaft type," and is now furnished with all K-type controllers. It consists of a hexagon steel shaft wrapped with a tough insulation that is molded to the shape of the shaft. The body castings are provided with a hexagonal hole and are held firmly to the shaft by set screws and keys. This type of construction effectually prevents the body castings from becoming loose.

When cylinders of the hexagon-shaft type are assembled it is essential that a felt or cloth washer be used at each end of the body casting, as otherwise small particles of copper from the fingers and segments will work their way between the body castings and shaft and eventually cause a short-circuit between two adjacent body castings.

When the body castings on a cylinder of the round-shaft molded-insulation type become loose, either one of two methods may be used to correct it. The first is to replace it with a cylinder of the hexagon-shaft type and prevent a repetition of the trouble. While this is the most expensive method it is urgently recommended, particularly where there are but few cylinders to be repaired. Where there are many controllers to be repaired and a man can be well trained in the repair work the second method of reinsulating the old cylinders is the most economical. While reinsulating old cylinders costs little for new material, since only the the insulation has to be purchased, a considerable original expense for a heating fixture must be incurred, and skill in manipulation must be attained by long practice before satisfactory results can be expected.

The usual practice is to heat the old cylinder sufficiently so that the body castings can be easily removed; then all the old insulation is cleaned from the shaft and body castings. The new insulating bushings and keys are put on the shaft and the body castings are slipped over the bushings, enough bushings are used to give an over-all length of about 2½ in. more than the length of the insulation on a completed cylinder.

Referring to the accompanying illustration which is for a K-28 controller, it will be noted that the cylinder is put in the lower half of the cradle *J* and turned until the off-position star-wheel notch is approximately in line with the parting line of the cradle. Then the body castings are shifted until the segment screwholes register with similar holes in the cradle, and the body castings are fastened to the cradle by screws through these holes. The clamps *D* should be put on the cylinder and screwed up tight. These clamps form a solid wall between the adjacent body castings so that pressure



HEATING FIXTURE FOR REINSULATING K-28 CONTROLLER

can be applied to force the compound into all the space between the shaft and body castings. When sufficient compound has been forced in this is indicated in a general way by its squeezing out through the cracks between clamps and body castings. The disk *G* and the collar *S* should be put on the shaft and the cylinder and cradle placed in the fixture.

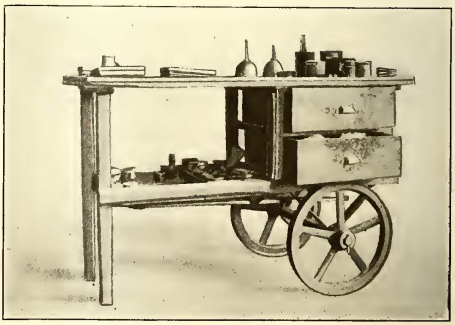
The shaft should then be centered by means of screw *M* which will bring the star wheel in line with the pawl *A*. The pawl should be placed in the off-position notch of the star wheel, and the wing nuts *N* and *O* tightened to hold the shaft firmly in place. The upper half of the cradle *F* is now put on, the halves of the cradle are fastened together, and the cradle and castings on the insulation are turned until pins *D* register with holes *L* in the cradle *F*. The clamps containing the pins should then be fastened. This completes the setting up operation and the cylinder is ready for heating.

Originally a gas fixture was used for heating. This has the disadvantages of poor heat control and the likelihood of overheating the compound on the outer surface without softening it around the shaft. The best heating device is a simple electric oven made of sheet steel lined with asbestos and in the shape of a controller cover. If its dimensions are about 13 in. long, 13 in. high and 13 in. wide, and the ends are open, it can be easily placed over the heating fixture and the ends closed with loose pieces of sheet steel or transite. An oven of these dimensions will cover about half the cylinder as it should because the compound cannot be forced to the far end of the cylinder with sufficient pressure if the entire cylinder is heated on account of the leaks between the clamps *B* and the body castings. For this reason the section nearer the star wheel and farther from the pressure wheel *R* should be heated first.

The heating element can be made up of resistance wire wound like a coiled spring and cleated to the inside of the oven. Five or 6 ft. of flexible lead should be used to connect the oven to the current source so that it may be moved readily. The resistance should absorb about 1600 watts, or 3 amp. from a trolley circuit. The oven should have a small hole in the top near the center so that a thermometer can be put in, and a temperature of between 90 and 110 deg. C. (195 and 230 deg. F.) maintained while heating the cylinder. This temperature will soften the insulation in from ten to fifteen minutes so that it will readily flow when pressure is applied by the handwheel *R*. Pressure should be applied gradually until the compound is forced out between the clamps and body castings. The oven should now be moved over the lower half of the cylinder and this section heated and pressure applied. As the cylinder is thoroughly warm only about ten minutes will be needed before the insulation is soft enough to flow under pressure. With this operation the pressure wheel *R* should be turned up until the disk *G* strikes the clamping ring *C*. This completes the heating operation, but the cylinder should remain in the heating fixture for fifteen or twenty minutes so that the compound may cool and harden sufficiently to hold the body castings in place when the fixture and cradle are removed.

Handy Portable Table for Car Painters

THE accompanying picture shows a form of table which has proved to be a great convenience to the finishers in the paint shop of the Rhode Island Company, Providence, R. I. The top is covered with a heavy



PORTABLE WORK TABLE FOR CAR FINISHER OR SIGN PAINTER

glass plate, and the shelf and drawers provide convenient receptacles for waste, sand paper, etc.

The tables are run into the oil room or the sign room at night, where they are out of the way and always available for immediate use.

The Sheffield (England) *Daily Telegraph* recently printed results of an interview with the city surveyor who paid a tribute to the electric welding process in enabling the Sheffield Tramways to maintain track through the war period. Upward of 8000 joints have been made and these have stood up very well.

Single-Side Storm Guy; Live Guy from Next Pole at Base

Examples of Pole Guying from Other Fields

Four-Way Storm Guy on Trolley Line

This Article Deals Especially with Protection Against Strains Due to Storms—It Refers Also In An Introductory Way to the Subject of Pole Preservation

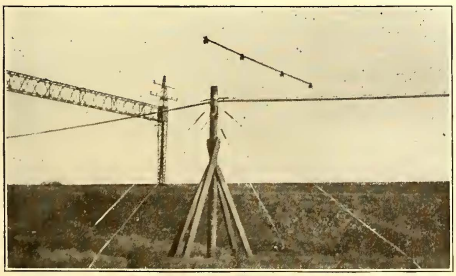
BY CHARLES RUFUS HARTE
Construction Engineer, The Connecticut Company, New Haven, Conn.

THE reader of this series of articles, on observing the title of the present one, may be inclined to ask as did the man who fell asleep in the midst of a curtain lecture, and was waked for further words by the angry lady, "Yet or again?" but the subject is of sufficient importance to warrant considerable attention, particularly since, although it has been carefully worked up and standardized by the oldest and largest users of pole lines, very little of the details seems to be known outside of telegraph and telephone circles. That any considerable body of men follow a given practice does not necessarily prove that it is right, but where question of its correctness does arise the fact of such general use is helpful evidence that it is not a previously untried and therefore questionable procedure; while the fact that it has been continued for some time is at least reasonable ground for the presumption that it is successful. It frequently happens that the authorities having jurisdiction possess ideas of their own as to what is proper construction, or that the owner of a paralleling line or an abuttor becomes concerned over possible dangers from the line, or it may be that the line has a neighbor dangerous because of scanty guying. In such times knowledge of what "the other fellows" do is invaluable, for to the average commission or court actual satisfactory practice is worth any amount of calculations.

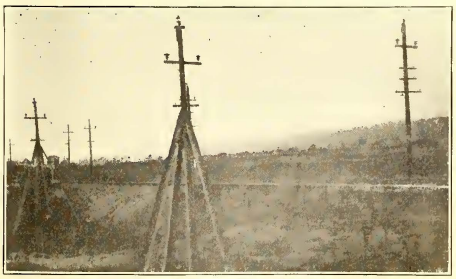
Storm guying, to protect the line from damage by wind and sleet storms, is in general applied to straight sections, or to curves so gradual as to require no guying to meet the "pull;" it is in addition to such guying as has been discussed heretofore, and while primarily intended to meet the special stresses of storms, it also serves to strengthen the line very materially against other disturbances.

It is evident that there are three factors in the effect of a given storm on a line: (1) The length of the section between main anchor points, (2) the lengths of the individual spans in the section and (3) the number of wires in the line. The first two are constant for any given line, practically throughout its life. The third is quite likely to be materially increased in the course of time with the development of business, particularly in the case of the communication companies. As will be seen by reference to the accompanying table the Western Union and the American Telephone & Telegraph companies provide for this contingency by reducing practically by half the distances between existing storm guys as soon as the number of wires carried increases beyond certain limits. In a few instances in addition the guying at the old points is increased.

Storm guys do not in any way differ from other guys in make-up, except that it is considered desirable to give them independent anchors, and not to attach them to the butts of other poles of the line; for the same reason, that is, that they may be unaffected by storm troubles, they should not be attached to trees. The Western Union employs 4000-lb. strand for lines of 12-wire capacity, carrying at least seven wires, 6000-lb.



FOUR-WAY STORM GUYING ON CABLE POLE WITH LARGE SHOE



A GOOD EXAMPLE OF STORM BRACING OF A TRANSMISSION LINE

strand for larger lines carrying from eleven to fifty wires, and 10,000-lb. strand for lines carrying from fifty-one to eighty wires, except that, if the increase in loading normally would require 10,000-lb. strand on a pole already guyed with 6000-lb. strand, these latter are not disturbed, but are reinforced by additional 6000-lb. strand guys. The A. T. & T. Co. uses 6000-lb. strand, as a rule, on lines of from 40- to 60-wire capacity but employs 10,000-lb. strand on such lines if the guy "lead" is limited to one-fifth or less of its "height," and it also employs the stronger strand on all seventy and eighty-wire lines.

In the point of attachment there is a little difference between the practice of these two companies. The Western Union places all storm guys for 12-wire lines under the first (the top) gain, but for lines of greater

Storm Guy Spacing, Telephone and Telegraph Practice

Poles per Mile	Spans, Feet	Size of Line, Wires Ultimate	Size of Line, Wires Present	No. of Spans in Section	Length of Section in Feet	Location of Storm Guys—Spans Apart	Location of Storm Guys—Feet Apart	Limits of Odd Group Spans	Limits of Odd Group Feet
					WESTERN UNION				
Under 40	Over 132	40	10 or fewer	Unlimited	Unlimited	None required			
			11 to 20	63 or fewer	8,316 or less	None required			
				64 or more	8,448 or more	Every 32	4,224	17 to 48	2,244 to 6,336
			21 to 30	31 or fewer	4,092 or less	None required			
				32 or more	4,224 or more	Side every 16; full every 32	Side 2,112; full 4,224	9 to 24	1,188 to 3,168
			31 to 40	31 or fewer	4,092 or less	None required			
				32 or more	4,224 or more	Every 16	2,112	9 to 24	1,188 to 3,168
40 to 49	132 to 107	60	10 or fewer	Unlimited	Unlimited	None required			
			11 to 20	79 or fewer	10,428 or less	None required			
				80 or more	10,560 or more	Every 40	5,280 to 4,280	21 to 60	2,247 to 7,920
			21 to 30	39 or fewer	5,148 or less	None required			
				40 or more	5,280 or more	Every 20	2,640 to 2,140	11 to 30	1,177 to 3,960
			31 to 50	19 or fewer	2,508 or less	None required			
				20 or more	2,640 or more	Side every 10; full every 20	Side 1,320 to 1,070 Full 2,640 to 2,140	6 to 15	642 to 1,980
			51 to 60	19 or fewer	2,508 or less	None required			
				20 or more	2,640 or more	Every 10	1,320 to 1,070	6 to 15	642 to 1,980
50 or more	106 or less	80	10 or fewer	Unlimited	Unlimited	None required			
			11 to 20	111 or fewer	11,766 or less	None required			
				112 or more	11,872 or more	Every 56	5,936	29 to 84	3,074 to 8,904
			21 to 30	55 or fewer	5,830 or less	None required			
				56 or more	5,936 or more	Side every 28; full every 56	Side 2,968; full 5,936	15 to 42	1,590 to 4,452
			31 to 40	55 or fewer	5,830 or less	None required			
				56 or more	5,936 or more	Every 28	2,968	15 to 42	1,590 to 4,452
			41 to 50	27 or fewer	2,862 or less	None required			
				28 or more	2,968 or more	Every 14	1,484	8 to 21	848 to 2,226
			51 to 80	13 or fewer	1,378 or less	None required			
				14 or more	1,484 or more	Side every 7; full every 14	Side 742; full 1,484	5 to 11	530 to 1,166
					A. T. AND T.				
46	130	40	10 or fewer						
			11 to 20	Fewer than 80	Less than 10,400	None required			
				80 to 96	10,400 to 12,480	Middle pole	5,200 to 6,240		
				97 or more	12,610 or more	Every 40 from each end	5,200	9 to 48	1,170 to 6,240
			21 to 30	Fewer than 31	Less than 4,030	None required			
				31 to 60	4,030 to 7,800	Middle pole	2,015 to 3,900		
				61 or more	7,930 or more	Every 20 from each end	2,600	11 to 30	1,430 to 3,900
			31 to 40	Fewer than 16	Less than 2,080	None required			
				16 to 30	2,080 to 3,900	Side only on middle pole	1,040 to 1,950		
				31 or more	4,030 or more	Side every 10; full every 20	Side 1,300; full 2,600	11 to 15*	1,430 to 1,950
46	130	50	21 to 30	Fewer than 80	Less than 10,400	None required			
				80 to 96	10,400 to 12,480	Middle pole	5,200 to 6,240		
				97 or more	12,610 or more	Every 40 from each end	5,200	9–48	1,170 to 6,240
			31 to 40	Fewer than 31	Less than 4,030	None required			
				31 to 60	4,030 to 7,800	Middle pole	2,015 to 3,900		
				61 or more	7,930 or more	Every 20 from each end	2,600	11–30	1,430 to 3,900
			41 to 50	Fewer than 16	Less than 2,080	None required			
				16 to 30	2,080 to 3,900	Middle pole	1,040 to 1,950		
				31 or more	4,030 or more	Side every 10; full every 20	Side 1,300; full 2,600	11 to 15*	1,430 to 1,950
46	130	60	21 to 30	Fewer than 112	Less than 14,560	None required			
				112 to 124	14,560 to 16,120	Middle pole	7,280 to 8,060		
				125 or more	16,250 or more	Every 56 from each end	7,280	7 to 62	910 to 8,060
			31 to 40	Fewer than 46	Less than 5,980	None required			
				46 to 62	5,980 to 8,060	Middle pole	2,990 to 4,030		
				63 or more	8,190 or more	Every 28 from each end	3,640	7 to 45	910 to 5,850
			41 to 50	Fewer than 20	Less than 2,600	None required			
				20 to 34	2,600 to 4,420	Middle pole	1,300 to 2,210		
				35 or more	4,550 or more	Every 14 from each end	1,820	7 to 17	910 to 2,250
			51 to 60	Fewer than 10	Less than 1,300	None required			
				10 to 17	1,300 to 2,210	Side only on middle pole	650 to 1,105		
				18 or more	2,340 or more	Side every 7; full every 14	Side 910; full 1,820	7 to 9†	910 to 1,170
53	100	70	21 to 30	Fewer than 112	Less than 11,200	None required			
				112 to 124	11,200 to 12,400	Middle pole	5,600 to 6,200		
				125 or more	12,500 or more	Every 56 from each end	5,600	7 to 62	700 to 6,200
			31 to 40	Fewer than 46	Less than 4,600	None required			
				46 to 62	4,600 to 6,200	Middle pole	2,300 to 3,100		
				63 or more	6,300 or more	Every 28 from each end	2,800	7 to 45	700 to 4,500
			41 to 50	Fewer than 20	Less than 2,000	None required			
				20 to 34	2,000 to 3,400	Middle pole	1,000 to 1,700		
				35 or more	3,500 or more	Every 14 from each end	1,400	7 to 17	700 to 1,700
			51 to 70	Fewer than 10	Less than 1,000	None required			
				10 to 17	1,000 to 1,700	Side only on middle pole	500 to 850		
				18 or more	1,900 or more	Side every 7; full every 14	Side 700; full 1,400	7 to 9†	700 to 900
59	90	80	21 to 30	Fewer than 112	Less than 10,080	None required			
				112 to 124	10,080 to 11,160	Middle pole	5,040 to 5,580		
				125 or more	11,250 or more	Every 56 from each end	5,040	7 to 62	630 to 5,580
			31 to 40	Fewer than 46	Less than 4,140	None required			
				46 to 62	4,140 to 5,580	Middle pole	2,070 to 2,790		
				63 or more	5,670 or more	Every 28 from each end	2,520	7 to 45	630 to 4,050
			41 to 60	Fewer than 20	Less than 1,800	None required			
				20 to 34	1,800 to 3,060	Middle pole	900 to 1,530		
				35 or more	3,150 or more	Every 14 from each end	1,260	7 to 17	630 to 1,530
			61 to 80	Fewer than 10	Less than 900	None required			
				10 to 17	900 to 1,530	Side only on middle pole	450 to 765		
				18 or more	1,620 or more	Side every 7; full every 14	Side 630; full 1260	7 to 9†	630 to 810

The odd group is kept within the limits marked * or † by omitting nearest guys if these reduce it too much, or by putting side guys on middle pole, if otherwise it would be too long.

capacity puts the first head guys under the first gain, the first side guys under the second gain, the second set of head guys, if such are required, under the third gain, and the second side guys under the fourth gain. The A. T. & T. Co. places all guys under the second gain, except at terminal poles taking two 6000-lb. guys, where the second guy goes below the fourth gain.

Where it is difficult or impossible to place side guys for storm protection, if the nature of the right of way permits, "H" fixtures consisting of two matched-as-to-size poles are often employed, the Western Union in general limiting their use on 41- to 60-wire lines to points where the side-guy lead would be less than one-quarter the height, and on 61- to 80-wire lines to points where the lead would be less than one-third the height. The Western Union sets the poles vertical and 6 ft. 3 in. apart center to center, and braces the crossarms with one strap from each pole, located on the inside. The A. T. & T. Co. sets the butts about 7 ft. apart, center to center, and rakes the tops toward each other to about 18 in. apart. The crossarms have a single strap brace from each pole, all but those on the bottom arm being on the outside. The bottom arm is braced inside. The crossarms themselves take standard spacing. If the poles are vertical, standard arms can be used, although the pole pins are apt to be too close; with raked poles there is almost certain to be interference unless special arms are employed, or unless where two are close together one is not used.

The H-frame is considered the equivalent of side guys in both directions; if it requires head guys these, if in both directions, are attached to the same pole. If there are two or more adjacent fixtures the head guys are placed on alternate poles, right and left.

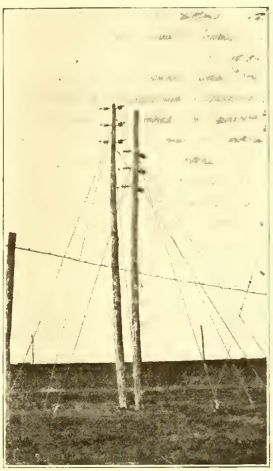
Coming now to practice, the Western Union does not storm guy 12-wire lines, except on gradual curves eight or more spans in length on which the average pull is between 2 ft. and 5 ft. (between 1.6 ft. and 3.9 ft. A. T. & T. basis) and then only when more than six wires are installed. With such a curve, between eight and fifteen spans in length, the middle pole is side guyed away from the curve; with a length of more than fifteen spans, every eighth pole, counting from one end, takes such a side guy away from the curve, except that if the last eighth pole leaves only three or fewer spans to the end it is omitted. On lines of more than twelve wires capacity storm guys are employed only upon straight sections and upon curves, the poles of which have a pull not in excess of 3 ft. (2.3 ft. A. T. & T.). The first pole of heavier pull, however, is considered in counting as belonging to the section.

Although at first glance at the storm-guy table there would seem to be marked difference between the Western Union and the A. T. & T. practice, this is largely due to the different classifications of the two companies. The actual results in the main are much the same, the chief difference arising from the fact that the Western Union counts through from one end to the other, making the further end group the old one, unless the section contains just an even number of groups, while the A. T. & T. Co. counts in from both ends, making the middle group the odd one. On lines carrying nearly their ultimate capacity, if laying off the prescribed groups leaves the center group too small, the nearest guys are omitted; if too large, the middle pole is given side guys. The particular limits for both companies are shown in detail on the guying table. The Western Union omits the nearest guy if the odd end group is otherwise too short.

A Few Words on Pole Preservation

Up to now we have considered elements common to all kinds of overhead construction and before taking up cross arms and pins, which differ according to the nature of their use it may be well to turn back to the subject of preservative treatments for poles.

A comparatively few poles are destroyed by fire or by mechanical injury, but by far the most important agent for mischief is decay, in which fungi play the leading part, although bacteria also are involved, but in a way as yet but little understood. Different species of fungi have different methods and results, but in general the spores, which correspond to the seeds of the higher plants, get into the sap wood through some mechanical injury, and, getting the air, moisture and heat without which they cannot develop, extend the thread-like "hypæ," which form the real fungus between the cells forming the wood. In life these cells, the walls of which are cellulose, are first filled with fluid, which gradually dries out while various substances are deposited which tend to color it and to make it waterproof while at the same time it is being covered with increasing thicknesses of newer cells. As time goes on, therefore, these cells become less and less subject to decay, other things being equal, their walls resisting the action of such hyphæ as may extend to them while the layers of cells outside help keep the hyphæ out. Under favorable conditions, however, the hyphæ force their way between the cells, and feeding first upon the sugars, starches and oils in the cells, presently attack and break down the cell walls, converting them into a structureless mass with no strength at all. Bearing in mind the fact that this action can occur only when the fungus has air, moisture and heat, it is obvious that the best way to prevent decay is to keep the fungi out; that next to this would be the elimination of air, moisture and heat, so the fungus could not attack the cell contents; and finally so to treat the cell or the cell contents that the fungus would be poisoned or at least prevented from causing trouble.



COMBINED STORM AND ANGLE GUYS

Whatever may be the form of the offensive against the fungus, it is clear that reducing the amount of food is a good defensive step and this is effected by "seasoning," or the drying out of as much as is practicable of the fluids, which, however, must not be done too rapidly, for in that case the wood is apt to split and "season check" very badly. The actual time required, and the percentage of moisture which can be removed depends upon the kind of wood, and to a lesser extent, to the time when cut, and the character of the soil in which it grew. Spring-cut wood gets the benefit of all the hot weather; fall-cut wood goes through the winter with but a fraction of the seasoning obtained in the same length of time in the summer, Government records showing that chestnut, spring-cut, reduced its moisture content from 83 per cent to 51.7 per cent in 180 days, while winter-cut stock in the same length of time had reduced its moisture content from 85.6 per cent to 56.8 per cent, and fall-cut stock had gone from 85.4 per cent to 62.2 per cent, requiring 360 days to reduce the moisture content to 47.8 per cent.

Where time permits, natural seasoning is much the best, but it is not infrequently necessary to accelerate the work by artificial drying in kilns or ovens, or by steaming. Wood so treated, however, reabsorbs moisture very rapidly and is liable to be weakened by overheating, particularly in steam drying.

If the poles are to be air dried they should be peeled free of all bark and then spread out on skids sufficiently high to keep them clear of any brush or vegetation, and the poles should not touch each other, in order to give free circulation of the air about them. The Government found that under such conditions various kinds of poles at different points required the following periods in which to season air-dry:

Kind of Pole	Place of Test	— Months Required to Season — Spring Cut	Summer Cut	Autumn Cut	Winter Cut
Chestnut	Parkton, Md	5	4	8	7
Southern white cedar	Wilmington, N. C.	3	3	8	5
Northern white cedar	Escanaba, Mich	12	9	7	6
Western red cedar	Wilmington, Calif	4+3	5+6	3+7	3+4
Western yellow pine	Madera County, Calif.	5	3	9	6

(From Forestry Service Bulletin 84.)

With this brief introduction the subject of pole preservation will be left for the time. In a later article it will be taken up in some detail.

Important Committee of C. E. R. A.

THE following committee on interurban freight and motor-truck competition has been appointed in accordance with the resolution adopted at the Indianapolis meeting of the Central Electric Railway Association on Nov. 22, 1918 (see issue of this paper for Nov. 30, page 953): Indiana members—Bert Weedon, Interstate Public Service Company, Indianapolis; J. A. Greenland, Fort Wayne & Northern Indiana Traction Company, Fort Wayne; James H. Drew, Drew Electric & Manufacturing Company, Indianapolis. Michigan members—W. S. Rodger, Detroit United Lines; F. W. Brown, Michigan Railway, Kalamazoo; F. N. Root, Root Spring Scaper Company, Grand Rapids. Ohio members—F. R. Coates, Toledo Railways & Light Company; E. F. Schneider, Cleveland, Southwestern & Columbus Railway, Cleveland; S. D. Hutchins, Westinghouse Traction Brake Company, Columbus.

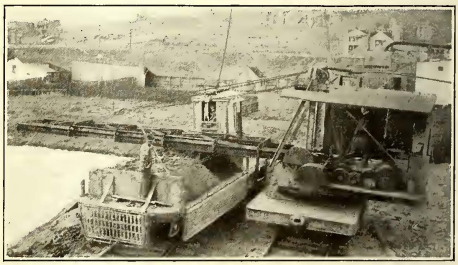
Unloader Empties a 22-Cu.Yd. Car in Fifteen Minutes

An Unloading Machine Made From an Ordinary Five-Ton Portable Crane Is Also Used to Level Off Dirt at the Dump

By W. D. CHAMBERLIN
Assistant Chief Engineer United Railroads of San Francisco

THE United Railroads of San Francisco operates several types of construction cars, including hopper-bottom, side-dump and flat-bottom, the last-named being largely used on track reconstruction jobs for hauling earth from the track trench to the dump. The same dump has been used for several years and is located in the low marsh lands of the city, where a track is run along the edge of a bank about 15 ft. high over which the debris from the car is dumped. Up to about eight months ago the cars were unloaded by hand, a crew either being stationed at the dump all day or being taken to and from the dump on the car. The expense of unloading was considerable, as a gang of six to eight men was usually employed at this work.

The cost of unloading has been greatly reduced by the introduction of an unloading machine designed and

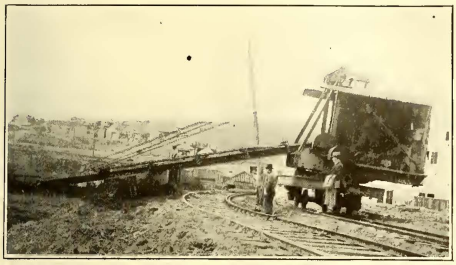


UNLOADING A CAR BY USING THE CAR UNLOADER

built by the United Railroads' engineering department several months ago. This unloader is illustrated in the photographs reproduced herewith. An ordinary 5-ton portable crane, which this company converted into an electric shovel in 1907, is used. The shovel, boom and bucket were removed and replaced with a special 30-ft. boom equipped with a "pusher plate" which rolls along the full length of the boom on four wheels. This pusher plate is actuated by two steel cables attached to the top and bottom of the crane drum which give the plate a forward and backward motion along the boom as desired. The boom and "pusher" are made of two 9-in., 106-lb., steel rails, old cable-slot rails and other second-hand material, the general design being shown in the photographs. The inside base flange of the 9-in rails forms a track on which the "pusher" wheels run. The boom can be raised or lowered and swung in a complete circle as is found necessary. It is attached to the main drum shaft of the crane.

Two parallel tracks are located along the dump, the car to be unloaded being placed on the track nearest the edge of the bank and the unloader being placed on the other track opposite the car. The car shown has

a cab in the middle. Other cars have a cab at each end, and either type can be used. To unload a car the side boards are dropped and the unloader boom is swung across the car in a horizontal position with the "pusher" at the crane end. The "pusher" is moved forward over the edge of the car floor and the boom is then lowered until the plate rests firmly on the floor. The "pusher" is then moved forward, pushing off one-sixth of the load or nearly 4 cu.yd. The crane



LEVELING OFF THE EARTH AT THE EDGE OF THE DUMP

is then moved to a new position. Six movements usually unload a 22-yd. car in about fifteen minutes.

When five or six cars are unloaded each day, the car operator and two helpers handle the car to and from the construction job and also do the unloading. If more cars are handled it is necessary for the operator to stay at the dump all day.

The earth from the car does not immediately roll down the dump bank, as the track is usually too far from the edge. It is forced over the bank by lowering the boom after the car has been removed and moving the "pusher" forward as shown. As the track is 300 ft. long it is necessary to do this only when earth has been dumped all along the track, which may require several days. The dump can be used several months without moving the track nearer the bank, as the 30-ft. boom makes it possible to use the dump with the car track 20 ft. from the edge of the bank, thus also reducing track moving expense.

The device is also used successfully to assist in moving the track out on the new embankment after the material has been scraped off to the proper level. This is done by putting a chain around a tie and thence to the "pusher plate." The boom is then raised slightly and the pusher plate is advanced toward the end of the boom. With usual track spacing and with the unloader on the inner track the outer track can be moved out on the embankment 10 ft. or 12 ft. at a single lift. Recently 120 ft. of track was so moved in several consecutive lifts, the entire operation taking only about twenty minutes. This same work done by the usual hand methods would have taken a crew of six or seven men at least a half day.

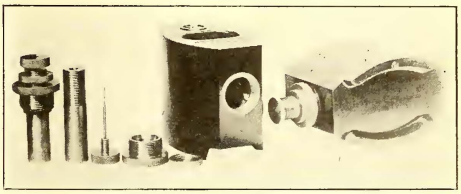
The unloader has also been used for shifting the track on which it stands. This is accomplished by putting the pusher plate at the extreme end of the boom and chaining it to a tie. The boom is then swung sidewise. The track can be moved 2 ft. or 3 ft. at a single operation and this process is repeated as the unloader moves along the track. This operation, however, leaves the track in such shape that the unloader cannot again operate on the moved rails until the track has been worked down to its new bed.

There may be questions as to why the unloading process could not be as successfully done by hopper-bottom cars or side-dump cars. Hopper-bottom cars require that the materials be afterwards spread by hand; side-dump cars often require that the men shoveling into the cars lift the material 7 to 9 ft. Even with the side dump cars it is still necessary to level off the dumped material by hand. The flat cars shown in the pictures are only 3½ ft. to 4 ft. above the rail.

The cost of work at the dump has been reduced by the new apparatus to about one-third of the former cost by hand labor. The crane is still available for shovel work if desired, as the unloader boom can be replaced by the shovel boom in a short time.

Device for Use in Measuring Dielectric Strength of Oils

IN MEASURING the dielectric strength of oil it is necessary to immerse a spark gap in the oil. To do this ordinarily requires a large sample of oil and a high voltage for use across the gap. The Westinghouse Electric & Manufacturing Company has just developed a device for the purpose of securing reliable indications with a minimum sample of oil and a relatively low testing voltage. It consists of a molded cup in one piece, with brass electrode bushing threaded to receive packing glands. Electrodes are made from brass cylinders

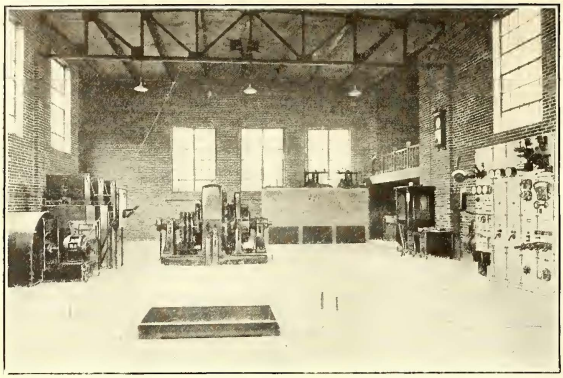


PARTS OF OIL TESTING CUP AND COMPLETE CUP FOR USE IN MEASURING DIELECTRIC STRENGTH OF OIL

1 in. in diameter, threaded at one end to receive a lock nut, with a binding post on the outside end for connection to the transformer leads. A steel feeler gage for setting the gap at exactly 0.1 in. is provided and is attached to one of the binding posts when not in use.

The testing cup weighs 6½ leb. net and requires a 4-oz. sample of oil. A voltage of 25,000 is sufficient for reliable testing, and seldom more than 30,000 volts would be required to discharge across the standard gap (0.1 in.) through any insulating oil.

The subways in New York are not the only railways which have trouble in handling the crowds at the rush hour. In reply to complaints of congestion on the London Underground Railways and the London General Omnibus Company, H. E. Blain, operating manager, stated that the Underground Railways are carrying 30 per cent more passengers than in the pre-war days. To insure public safety it has been necessary at times to limit the rate at which passengers are admitted to the underground stations.



INTERIOR VIEW—NOTE PROVISION FOR ADDITIONAL UNITS. HIGH-TENSION BUS STRUCTURE ON CONCRETE BENCH

A Well-Lighted and Well-Ventilated Substation

New Substation of Kansas City Railways Is Fourth in Rehabilitation Program, Is of Pleasing Architecture and Has High-Tension Equipment and Oil Switches Advantageously Located

By S. H. GRAUTEN
Electrical Engineer Kansas City (Mo.) Railways

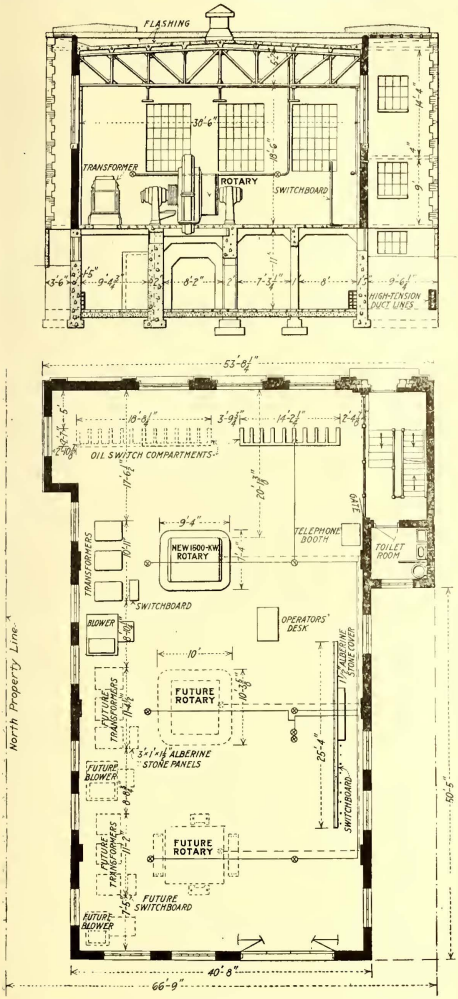
THE Kansas City Railways recently placed in commission a new substation located at Thirty-first Street and Montgall Avenue, in the rapidly growing southeast section of the city. It is the fourth of seven substations included in the rehabilitation program of the distribution system of this company. It is within 300 ft. of the intersection of the Thirty-first Street and Prospect Avenue car line, which intersection was the theoretically best location. Considerable expense was saved, however, by selecting a lot around the corner from this intersection, back to back with the ideal site.

The substation is designed for three units with ample space for the largest units manufactured. The initial installation consists of one 1500-kw. unit, which is the first unit of less than 3000-kw. capacity purchased by this company in several years. The use of the smaller unit is, however, in line with the tendency to locate substations at more frequent intervals. As the building is located on a residential street it was necessary to provide an exterior which would harmonize with the immediate surroundings. The services of an excellent firm of architects were secured to insure an attractive building facade. The general plans were prepared by our draftsmen. The front of the building is shown in the accompanying elevation. The front and the returns are of brown matt-finished brick of mingled shades, with cornice, coping, sills and entrance details of Carthage limestone. The sash are of steel with maximum ventilator sections. The roof slab is of concrete carried on steel trusses. The shape of the building insures light and air regardless of the building up of the adjoining property, and at the same time is well suited to the future development of the site. The entrance is located in the southeast corner of the building, one short flight leading up to the main floor and a slightly longer flight down to the basement from the landing on the entrance level. In the same wing is located the toilet, and the room directly below is used as a battery room. A gallery is installed in the area above the entrance and toilet and this will serve for lightning arresters for future overhead high-tension lines. A feature of the layout is the location of the high-tension equipment and oil switches at the front end of the building instead of the usual position back of the transformers. This arrangement has the advantage of removing the high-tension equipment from the confines of the air chamber and also places the oil switches within easy vision of the operator. The air chamber is thus left clear of the equipment

A SUBSTATION SUITED TO A RESIDENCE DISTRICT

which usually largely fills it, the only high-tension equipment in the chamber being an end bell under each bank of transformers and the leads to the transformer terminals.

The substation was laid out with a view to providing ample operating space, light and ventilation. The



VERTICAL SECTION AND FLOOR PLAN OF NEW SUBSTATION

rotary foundations, instead of being the usual solid walls, are constructed of heavy columns and girders, allowing free circulation of air to the machines. The main floor is sufficiently above grade to permit the use of windows in the basement for the entrance of light and air while the windows on the main floor have been placed unusually high. Three ball-bearing ventilators are installed on the roof. There is thus provided a definite natural circulation of air, the cool air, entering through the basement windows, rises through the rotary openings and passes out through the upper sash and ventilators.

The oil switches used are the General Electric type H-3 with sub-cell disconnect switches. As the arrangement places all of the operating equipment on the main floor—there is no need for the operator to go to the basement during switching operations. This saves time and cuts down the risk of mistakes. The high-tension bus structure, of gray pressed brick with horizontal slabs of reinforced concrete, is built on a concrete bench 5 ft. 5 in. high, raising the bus from the floor and shortening the leads to the oil switches located directly above.

The rotary at present installed is of the latest design General Electric 1500-kw., six-phase, 25-cycle machines, with commutating poles. It is arranged to start from a single tap with resistance grids in the starting leads to limit the starting current. The transformers are of the single-phase air-blast type, wound for both 6600 and 32,000 volts with two 2½ per cent taps and four 2½ per cent taps below these voltages. They have an inherent reactance of about 12 per cent. The transformers are at present operated at 6600 volts, the 13,200-volt winding being provided for future increase in transmission voltage.

The switchboard consists of the usual rotary alternating-current and direct-current panels, high-tension panels, a battery panel and 600-volt feeder panels. The feeder panels are equipped with an auxiliary bus and double-throw switches, allowing cleaning of breakers or repair without interruption of service, and without the use of jumpers on the back of the panels. The oil-switch control circuits are supplied from an Exide D-7 control battery, which is of sufficient capacity to carry the emergency-lighting circuits. The battery is arranged to charge nominally from a 4-kw. motor generator set but may be charged through a fixed resistance from the 600-volt bus. The control circuits may also be carried on the motor-generator set. An automatic throw-over switch is provided, which, on failure of usual 600-volt lighting, automatically energizes the emergency lights from the battery. This switch also protects the battery from discharging back into the feeders, should the battery happen to be on charge at the time of loss of 600-volt power by opening the 600-volt charging circuit to battery.

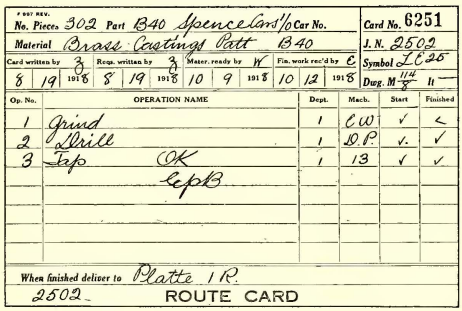
The 600-volt feeders now leave the building overhead through the alley at the rear although provision is made so that they can be taken out underground in the future.

The Engineering Experiment Station of the University of Illinois, Urbana, Ill., maintains a number of research graduate assistanships in engineering in connection with which there is an annual stipend of $500 with freedom from all except matriculation and diploma fees. One-half the assistant's time is available for graduate study, and the assistantship must be accepted for two consecutive collegiate years at the end of which period the degree of master of science will be conferred if earned. Additional information can be secured by addressing the director of the station.

Routing a Job Through the Shop

The Denver Tramway Develops a New Plan for Making an Accurate Comparison of Costs on Shop Work

IT IS an essential to every railroad company to know accurately the cost of every repair and manufacturing job put through the shop. It is not sufficient to determine the daily cost by adding the cost of material used to the wages of the force plus a certain percentage for overhead charges. Certain methods of doing a piece of work may be so costly as to make it advisable, in the case of manufacturing small equipment, to purchase the finished article and in the case of repair jobs, either to find a new method of doing the work or to have it done outside. There is no way to determine these facts without some systematic record of every job, and incidentally this checks on the work of each man and enables the superintendent or foreman to "separate the sheep from the goats" as it were, and know what men are in line for promotion and higher pay. The Denver Tramway has developed such a systematic record in the form of a work-order route card, the first cause of its origination having been the trouble



No. Pieces 302 Part B40 Spence Cars % Car No. — Card No. 6251

Material Brass Castings Patt B40 — J. N. 2502

Card written by 3 — Reqs. written by 3 — Mater. ready by W — Fin. work rec'd by C — Symbol LC25

8 / 19 / 1918 — 8 / 19 / 1918 — 10 / 9 / 1918 — 10 / 12 / 1918 — Dwg. M 114/8 It

Op. No.	OPERATION NAME	Dept.	Mach.	Start	Finished
1	Grind	1	CW	✓	✓
2	Drill	1	DP	✓	✓
3	Tap OK Sept B	1	13	✓	✓

When finished deliver to Platte 1 R.

2502 ROUTE CARD

DENVER TRAMWAY SHOP ROUTE CARD

experienced in properly making charges against unauthorized work. This route card, a sample of which is here reproduced, offers protection against lost charges, gives an accurate record of the cost of any piece of work and makes it possible to compute operating expenses covering any certain period. It also gives a method for comparing costs, and for determining whether it is cheaper to buy or to manufacture a given article.

When any department or person wants work done, a detailed description of the work and number of pieces wanted is sent to the mechanical department office. Here the clerk writes out the card in duplicate, filling in the number of pieces to be manufactured or repaired and, if it is some part of a car which is to be worked on, the number of the part and the number of the car are given. A complete description of the part follows and below this the clerk initials the card, giving the date. If the same clerk makes the requisitions he writes his initials under that heading, also giving the date. On the card the clerk fills in a list of the operation for completing the work, and in the upper right-hand corner he places the card number, job number, storeroom symbol under which the finished product is listed, and the drawing number, "M" distinguishing the mechanical department from the engineering department, and "It" indicating the item, as more than one item is often shown on a blueprint. Material is prepared by the stockroom, and whoever moves the card to the "material-ready" files initials that space with the date. The original card is then filed in the office.

No Work Can Be Done Without A Card

The duplicate route card with the material is sent to the department doing the work, where it is assigned to a workman by the foreman. Before a workman can start any job he must have such a route card for that particular piece of work. When the workman is ready to start the job he takes his route card to the shop telephone and reports the route-card number, his department number and his name to the time clerk. The time clerk enters this on the time card, together with the route-card number, a description of the work and the job number, stamping the card "Start." The workman in turn fills in his duplicate with department number, his own initials, and checks the column "Start." When the workman has finished the job he again calls the time clerk, who stamps the card "Finished," and places the exact time it has taken to do the work on the time card. The workman in turn checks his card in the "Finished" column. This process follows for each operation through which the piece, or pieces of material must go to complete the work.

At the end of the day, the time cards are checked up and sent to the timekeeper in the auditing department and from these the payroll is made up. When the timekeeper has finished with the card, he forwards it to the cost clerk in the cost department, where the total costs of material and labor are entered on the job sheet.

When the finished work is turned into the storeroom the column "Fin. work rec'd. by....." is checked and the date given, and when the workman calls in "finished" the time clerk writes a move slip which is turned over to the move gang. The finished product is then moved to the destination indicated at the bottom of the route card, and the card is sent to the office where the original is filed for future reference. This card was recently described in the *Tramway Bulletin* by T. H. H. Zebal, chief clerk at the Broadway shops in Denver.

A recent issue of the *New York Railways Employees' Magazine* contains a very interesting report by the head nurse of that company and of the Interborough Rapid Transit Company on the practice followed in fighting the Spanish influenza epidemic in New York last fall. Great hardship was suffered throughout the city because of the lack of nurses but a number of former nurses were found among the company's female employees and they and other employees volunteered to help. During four days of the epidemic, the welfare department had 100 new cases a day among the employees, but after the organization mentioned had been effected, it was possible to handle every case. The great handicap was the inability to get outside assistance, but through volunteers this was taken care of.

Some Mysterious Car Ailments

Little but Important Troubles That Tend to Keep Equipment Men Interested in Their Work

CONTRIBUTIONS ARE INVITED FROM THE FIELD

A Car That Showed a Preference for 600 Over 1200 Volts

A CERTAIN railway property located in one of the Southwestern states received a shipment of newly equipped cars. Among them was one which gave trouble. This road used both 600 volts and 1200 volts for operating. The car referred to operated all right on 600 volts but as soon as it passed over to the 1200-volt section everything "went dead" (lights, compressor and control), although the dynamotor was running and apparently in good condition. These circuits were fed from the dynamotor through a relay which acted as an overload circuit breaker. This relay would close as the dynamotor started up but would drop out almost immediately. There was a momentary brilliancy of the car lights just before the relay dropped out which indicated a heavy rush of current with corresponding overload.

The equipment manufacturer's engineer, who was assisting in the initial operation of the equipment and following its performance, set out to solve the difficulty. There was no wiring diagram of the circuits available so all control, compressor and lighting circuits were "rung out" for grounds. This proved to be a long, tedious task and was without any beneficial result in solving the trouble. Next the connections on the dynamotor were carefully checked over and it was discovered that some of these were reversed. This mistake in connections caused the voltage for the circuits to be stepped up to 2400 instead of being stepped down to 600 as was intended. This high voltage had caused the overload which made the relay drop out.

A Peculiar Combination that Caused Erratic Operation

A MOTORMAN on a high-speed electric line employing train operation reported his train for irregular functioning. The equipment would operate smoothly for a considerable distance when suddenly the power would die out, and after a short interval the control equipment would suddenly pick up again and operate satisfactorily. He arrived at the terminal several minutes late and the train was taken out of service and turned over to an inspector for examination.

The inspector found one of the receptacles for the train-line jumpers with the cover open and the interior partly filled with snow. There had been a driving snowstorm the night previous and the receptacle cover, which was provided with a closing spring, had not closed due to rust on the hinge pin and an accumulation of ice. One of the receptacle contacts was also found to be bent so that there was barely $\frac{1}{16}$ in. clearance between the contact and the receptacle casting. As the snow melted, the water ran down the inside of the receptacle casing and caused a momentary short-circuit from the bent contact. The cover in its open position also touched the buffer iron at the end of the car and thus grounded the casing, which was ordinarily insulated by bushings. The combination of all these various elements caused a momentary grounding of the control line, which would thus drop off the power from the motors. The ground immediately cleared as the water ran away and normal operation was again restored.

To prevent a recurrence of the trouble all terminal men were instructed to make frequent inspections of receptacles during stormy weather and to be sure the covers were closed properly. A periodic oiling of the hinge pins prevented rusting. The operating department was also cautioned to use more care in inserting and removing jumpers.

How One Class of Circuit-Breaker Trouble on Multiple-Unit Equipments Was Remedied

ON ONE large system in this country, considerable trouble was experienced with the circuit breakers used with multiple-unit equipments. This control equipment was so arranged that the circuit breaker opened the motor circuit every time the controller was shut off. Due to the large motors which it was necessary to use on this equipment, the service on the circuit breakers was very severe and a great deal of trouble was experienced with the contact tips becoming loose. These tips were fastened to the stationary and movable head in the circuit breakers by means of countersunk head screws, and when the contacts would become loose severe arcing and burning resulted. It was then extremely difficult to remove the screws and fit on new contacts as the screws became welded to the bases and the heads were often burned away. In many cases contacts were blown entirely off the bases, and even those which remained in place until worn out had to be replaced every three or four months. These conditions

resulted in a number of breakers being badly damaged and burned every month, and at times as many as four or five circuit breakers would be burned out in a week. These had to be entirely rebuilt.

To eliminate this trouble it was proposed that the contact tips be soldered to the fingers in addition to being held by means of the screw. The objection was immediately raised that this would make it a great deal more difficult to replace the contacts and would require additional help and facilities to carry on the extra work. The man who made the suggestion of soldering maintained that with the good contact the tips should wear for many months, and while there would be more work in renewing a tip when worn out the number to be renewed would be reduced to such an extent that no more help would be required in the long run and the number of breakers burned up would be greatly reduced. After careful consideration the plan was put into effect and its value was clearly demonstrated within a few weeks. Instead of replacing contact tips in the inspection houses every three or four months, these tips now run for an entire overhauling period, and have to be renewed only when the car comes into the main shop for overhauling. The annoyance of loose tips has been eliminated and the destruction of one of these circuit breakers is now a very rare occurrence.

Some Uncommon Causes for Blown Fuses

FUSES are the safety-valves of electrical equipment and when they blow the cause is usually sought as a short-circuit or ground in the circuits which they protect. The following cases of fuses blowing occurred on a large railway property using a third-rail contact system. The cars were equipped with multiple-unit control and were operated in trains. A bus line of No. 00 cable ran throughout the train and a 750-amp. copper ribbon fuse on each car was connected in series with the bus line.

Considerable trouble was experienced due to these fuses blowing. In several cases the leads to the fuses were blown out of their terminals. The number of such troubles was greatest during the rush hours when there was a heavy peak load. Tests made on the equipment showed everything in normal condition with no signs of grounds or short-circuits that would be expected to cause such trouble. A further investigation was made by installing an ammeter in the bus line and by taking frequent readings of current while the train was in service It was found that the bus line frequently carried current far in excess of that taken by the car equipment and greater than the capacity of the 750-amp. fuses. This excess current came from the bus line carrying part of the third-rail current due to its being connected in parallel with the third-rail. Overloads were also caused by the bus line bridging sections of third-rail which were fed from different substations.

After discovering the cause a remedy was applied in the form of a high capacity low resistance which was installed in the bus line so as to limit this current to a safe value.

Another peculiar case of fuses blowing was experienced due to these same conditions. The shoe fuses were blown on a line of fourteen cars which were out of service at the time due to a track laborer accidentally dropping a crowbar across the third-rail and running rail. The tremendous current that followed found an easy path through the car wiring in which the fuses were installed and the blowing of the fuses resulted.

A Train That Insisted on Going in the Wrong Direction

A TRAIN fully loaded with passengers was waiting at the terminal for the signal to proceed. The starting gong rang, the motorman threw his master-controller handle to the starting position and the train started, but in the opposite direction from that expected. It was moving rapidly toward the bumping block and a serious accident impended when the motorman threw off his power and gave an emergency application to the brakes. After bringing the train to a sudden stop the motorman blew his whistle for an electrician. This worthy personage came on the run and looking up at the number of the first car of the train recognized it as a "jonah." This car had been reported for several days previously as giving trouble, but nothing wrong could be found with it. The electrician first looked at the reversers on the train and found them thrown to the reverse position. Next he opened up the controller, which was of a multiple-unit type, on the head car which had previously been reported for trouble. On examining the interlocks he found one four-point interlock short-circuited by a washer at the end of the interlock contacts. This particular interlock governed the operation of the reversers and was the immediate cause of the trouble. By operating this interlock by hand the electrician found that the fingers were "stubbing." The contacts did not move to their proper position and the cylinder to which they were attached rebounded. The electrician bent the ends of the fingers slightly with a pair of pliers to overcome the immediate trouble and then allowed the train to go into service.

As a result of this and similar troubles with this type of interlock it was found necessary to redesign the contacts and fingers. The point of support for these latter was moved out so as to decrease the danger of stubbing and the length of the fingers and their shape were changed to provide easier approaches for the contacts and greater flexibility in their movement. These remedies effectually eliminated trouble of this class.

The Banner Mystery Solved by a Green Inspector

THE length of the long line of stalled cars was increasing rapidly. The passengers were beginning to show their uneasiness at the duration of the detention and employees of the railway were running around endeavoring to locate the source of the trouble. A green inspector ran up the line and found an old single-motor car at the head of the string. The motorman said he did not know what the trouble was, but the car would not start. The inspector looked underneath and seeing but one motor said: "Sure it won't run, you've dropped a motor."

Moral: "Appearances are sometimes deceptive."

Making Emergency Gears to Keep Cars in Service

Gear Was Constructed by Shrinking a Steel Rim Made from Car Wheel Tires On Center Portion of Wornout Gears

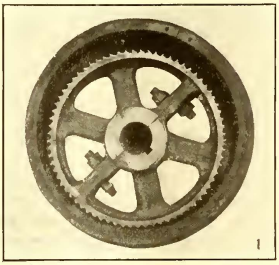
BY W. C. BUTLER
General Manager, Pernambuco Tramway & Power Company, Ltd.

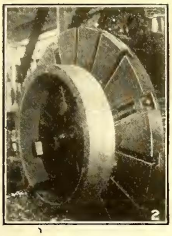
NEVER in my experience with electric traction has it been so difficult to keep the wheels turning, as during the last twelve months. This has been especially true with South American railways where the limitation placed on exportation, the present difficulty of ocean shipment, and the attendant delays, have made it exceedingly difficult to obtain any material at all. The Pernambuco Tramways have been subjected to particular hardship, as when the war broke out in 1914 they were in the early stages of construction, with only a few miles of track in actual operation, and with practically no maintenance material on hand. Some construction material had been imported before the war, and due to this we have 65 miles of track, 100 motor cars and fifty trailers in operation. There are still some 20 miles of track to be constructed and additional rolling stock is badly needed, but this must wait until conditions become more nearly normal. Due to our shortage of material while maintaining the equipment in service, we have had to resort to all sorts of schemes and ideas to help us through the emergency. Scrap heaps which have lain for years and had been considered entirely useless have been returned to life and usefulness in a way that would never have been considered a few years ago. The manufacture of home-made gears from worn-out material was one of the things to which we resorted in order to keep our cars in service. Accompanying illustrations show the various stages of manufacture and the construction that was necessary in this work.

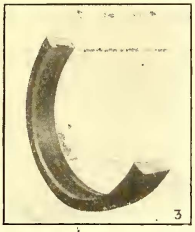
We were fortunate in having a number of scrapped locomotive tires available from a defunct steam railway, which had been eliminated by electrification. These tires, together with the worn-out gears removed from our equipment, constituted the raw material which we used. The locomotive tire was first roughed out in a wheel lathe to the approximate dimensions necessary for the new gear rim. After this rough turning the tires were cut into two pieces and reduced in the blacksmith shop to the proper radius for gear rims. After this they were turned inside to finished dimensions ready to be shrunk on the half center portion.

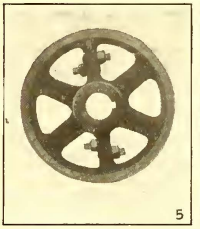
The old teeth were turned off from the worn-out gear and arranged with a dovetailed construction for receiving the band. In assembling the half bands were heated uniformly to a cherry red, and put into a vise, when the cold half center was slid into the dovetail and the band was allowed to shrink on. The rim thus gripped the center by means of the dovetail section in such a way as to render it impossible for it to loosen. By referring to the illustration showing a completed blank it will be seen that the ends of the band are machined off to conform to the split of the gear, which prevents the slipping around of the rim in service. A well finished stop-plate is put in these ends, as shown in the illustration. The completed blank was next taken to the milling machine where the teeth were cut. Our milling machine was not intended for such heavy work, and had to be blocked up to take the gear and several cuts had to be taken off before the finishing tool was put through to avoid straining the machine.

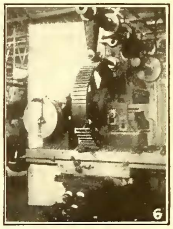
No attempt was made at heat treatment for fear of destroying the fit and grip of the band on the center. The old tires used were of very good quality steel and so far these gears have given excellent results with no more appreciable wear than our factory-made cast-steel gears. While home-made manufacture of gearing would not be considered under normal conditions, it was absolutely necessary with us in this case, as by this expedient we were able to keep our cars in service, which would otherwise have been laid up.



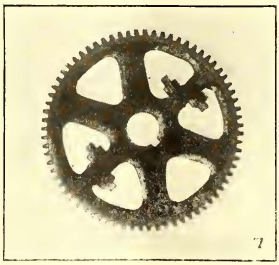








No. 1—Worn-out gear and locomotive tire.
No. 2—Locomotive tire in lathe for turning.
No. 3—Half rim made from locomotive tire ready to shrink on center casting.
No. 4—Half center ready to receive rim.
No. 5—Completed blank ready for milling teeth.
No. 6—Gear in machine having teeth cut.
No. 7—Finished gear.



Copper-Clad Wire for Use as Span Wire

BY G. H. MCKELWAY
Engineer of Distribution, Brooklyn Rapid Transit System.

THE use of galvanized iron or steel wires for spans has for so many years been universal practice that when anyone hears span wires spoken of the thought of material other than galvanized iron or steel being used does not enter his mind. There have been good reasons for this, as the galvanized wire has, almost without exception, been satisfactory for ordinary service and so cheap that a more expensive wire, even with a longer life, would not be considered because the greater first cost could not be offset by lessened maintenance cost.

The war, however, has changed so many of our ideas that it is possible that, if present prices for material and labor continue long, it will be advisable to substitute another material for the galvanized-iron or steel wire.

The writer became interested in the use of copper-clad wire for spans several years ago when he had the opportunity to observe its use on the lines of two different companies. In both cases the wire was used at points where galvanized wire had not been entirely satisfactory owing to the severe conditions that had to be met. In one location damp, salt air was very hard on the wire while at the other the life of the wire was greatly reduced owing to corrosive fumes in the air.

Accurate information in regard to the performance of the new type of wire can be given for only one of these lines. There the wires have been up for eight years in a location where iron or steel wires would have rusted so badly as to need renewal several years ago. A recent inspection of the copper-clad wire showed it to be in perfect condition and with no signs of rusting.

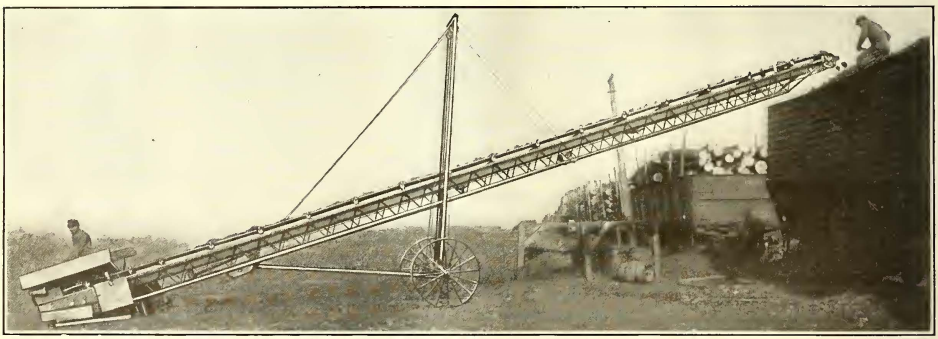
While the ultimate life of the wire cannot be determined from an eight-year test it seems certain that the life will be more than twice that of galvanized wire under the same conditions.

At the time that these installations were made the writer did some figuring on their cost as compared with ordinary span wire, and came to the conclusion that a more extensive use of the copper-clad wire could not be justified except where abnormal conditions existed. Since then, while prices of both kinds of wire have gone up to record figures, a much greater increase has occurred in the labor cost of installing the spans, so that recent figures would appear to justify the use of the copper-clad wire. As conditions and the prices of both labor and material vary so much in different sections of the country, it would be best for each engineer to make sure for himself as to whether or not the installation of the new wire would pay. But it would be well to look into the matter, as the writer is convinced that in many places considerable money could be saved by the adoption of the higher-priced wire.

In conclusion it should be said that the manufacture of the wire referred to in this article is not confined to any one company, as it is produced by at least two manufacturers. The suggestion as to its possible field of usefulness is made only for the reason that it may help someone else to learn of a way to save money.

Portable Belt Conveyor Used for Coal Unloading

IN AN ARTICLE on equipment of the Harvard Avenue yard of the Cleveland Railway, printed in a recent issue of the ELECTRIC RAILWAY JOURNAL, mention was made of a portable belt conveyor which is used there for various loading and unloading operations. In this connection a similar equipment, made by the Barber-Greene Company, Aurora, Ill., and used by the Western United Gas & Electric Company for coal unloading, etc., will be of interest. This equipment is shown in the accompanying halftone and is in use at the Joliet, Ill., plant of this company. The statement is made that with the outfit the company is able to load a car with coke in from two to four hours depending upon the type and size of the car, where formerly it was impossible to load a car in less than from seven to ten hours. At the same time the cost of loading per ton has been reduced approximately 50 per cent.



PORTABLE CONVEYOR IN USE FOR LOADING COKE; ALSO USED FOR UNLOADING COKE AND FOR UNLOADING AND RELOADING COAL

This particular conveyor utilizes a boom 18 in. square and 51 ft. long and is operated by a 5-hp. electric motor. As shown in the illustration the conveyor is loading cars from the coke stock pile. A more frequent use for the same conveyor is the reverse of this process, in receiving coal direct from the car hoppers and discharging it at the storage pile.

LETTERS TO THE EDITORS

Dr. Wilcox on New York City Situation

NEW YORK CITY, Feb. 11, 1919.

To the Editors:

In the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 8 a statement appears with respect to the action taken by the City Club of New York in the matter of the local transit problem. A synopsis is given of what purports to be a protest by the committee on public service of the City Club embodied in a letter sent to Mayor Hylan and to the Board of Estimate and Apportionment. My name is mentioned as one of the members of the committee. In order that there may be no misunderstanding of my position in the matter, I wish to make the following explanation. The questions of public policy involved in the application of the local transit companies for increased fares were referred by the board of trustees of the City Club to the committee on public service for a report. After a good deal of deliberation the committee submitted a report which was then modified by the board of trustees in certain important respects and embodied in a letter from the president of the club to the Mayor. Upon two important points covered by the summary published in your JOURNAL, my views are at variance with the recommendations of the City Club.

1. It is pointed out that "municipal ownership does not mean municipal operation." Personally I believe that the logical result of municipal ownership is municipal operation. The difficulties of effective public control over a private operator using public property are in some respects even greater than the difficulties of control where the private operator is using his own property for public service. In advocating municipal operation I do not mean that the utilities should be thrown to the political wolves, but that some special form of administration must be worked out that will be directly responsive to the will of the community which it serves. My philosophy of municipal ownership and operation is not the philosophy of the last resort. I believe that urban transit is a public function and that if we are not ready to attend to our own business it is time for us to get ready; that our efforts should be not to postpone the inevitable as long as possible but rather diligently to set about the necessary preparation for doing what has already been too long postponed.

2. The City Club recommends, among other things, "the necessary legal steps to enable the city to issue income bonds as a first lien against the net revenue of the lines which it may acquire." The committee's report was to the effect that these income bonds should be a first lien against the *gross* revenue. It was the committee's opinion, in which I shared, that a security based upon net revenue would be wholly insufficient to provide a market for municipal transit bonds. This is obviously true in the case of a city which adopts the fundamental policy of the New York subway contracts, by which a low fare is guaranteed on account of the social and civic benefits believed to be involved in cheap transportation at uniform rates. The use of public utility certificates secured by a first lien on the gross revenues of the utility, is, I believe, an invention of the State of Washington. Everything possible should be done to give security to the bonds issued for the purpose in order that the necessary cost of capital may be kept down to a minimum. One of the stock arguments in favor of municipal ownership has been the superior credit of the cities as compared with private companies, and now that the problem of financing the street railway business upon any terms has become most acute, it is this possibility of utilizing public credit where private credit has failed that is driving many men who were formerly staunch advocates of private ownership into the municipal ownership camp. To make municipal utility bonds dependent upon the net earnings of the utility would be to give them even less security than the bonds of conservatively financed public service corporations now have, for under this scheme the entire cost of the property would be represented by municipal utility bonds, whereas under conservative private management the bonds outstanding represent only a percentage of the total investment. For these reasons, I believe that municipal bonds issued to provide funds for the acquisition or construction of public utilities should either be a lien against the general credit of the city on a par with all other bonds or else should be a first lien against the gross earnings of the particular utility, leaving the deficits, if any should occur, to be made up from taxes.

DELOS F. WILCOX.

Bangor Chamber Urges Study of Utility Question

BANGOR CHAMBER OF COMMERCE

BANGOR, ME., Feb. 8, 1919.

To the Editors:

The following is a copy of resolutions adopted by our organization.

RESOLUTIONS ADOPTED BY THE BANGOR CHAMBER OF COMMERCE

Whereas, the Bangor Chamber of Commerce feels that the country is facing a grave situation in regard to public utilities,

And, Whereas, they feel that all citizens are vitally interested in the wellbeing of the public utilities,

And, Whereas, they feel that on their organization and on similar organizations throughout this entire country rests a grave responsibility in this regard,

Now, therefore, Be it resolved:

That the Bangor Chamber of Commerce, realizing that their duty is to study the question both in the State of Maine and elsewhere, desires to make known to their members and to the citizens of this community the result of their study.

That as a result of such study the Bangor Chamber of Commerce finds that a substantial part of the funds of the savings banks is invested in bonds of public utilities; that the depositors of Mutual Savings Banks are in reality part owners of every such investment. That the same is true of the life insurance companies both as to investment and ownership. That the present and future wellbeing of every community is directly dependent upon the successful running and further development of the public utilities operating in their locality. That every such community should be anxious to see that the conditions under which such public utilities are operating are such as to allow the companies sufficient revenue to properly protect the public from accidents, to keep their lines in good condition, to render efficient service to the public, to make further needed developments, and to safeguard the property ownership of the investing public.

The Bangor Chamber of Commerce feels that a much graver responsibility rests with the Public Service Commissions; that their sworn duty is to see that the public utilities are properly and efficiently run; that they are

responsible for the credit, continuity and general wellbeing of the public utilities. That every public service commission should be upheld and backed where they have recognized such responsibility. That where commissions have not so recognized this duty the public should insist that they do so.

The Bangor Chamber of Commerce urges every board of trade in the State of Maine to start at once a study of this question, to urge the National Chamber of Commerce at Washington to give space in *The Nation's Business* to this question, to ask the National Chamber of Commerce to urge every member of the National Association to study this question and to make known through publicity in the same channels the result of this study.

The Bangor Chamber of Commerce also urges the Bangor Rotary Club to take this up with their National Association in the same manner. The Bangor Chamber of Commerce feels that an intelligent study of this question by the business men of the country, with a campaign of publicity as to the result of this study, will aid greatly in solving rightly this very grave problem.

Our principal desire is to aid in getting people generally to study this question. We are sending copies of this resolution to similar organizations throughout the United States. The Bangor Rotary Club is sending them to all Rotary Clubs throughout the States. We have also taken this up with the United Commercial Travelers. JAMES Q. GULNAC, President.

AMERICAN ASSOCIATION NEWS

Speakers for Mid-Year Meeting

AT THE DINNER to be held in connection with the mid-year meeting of the American Association in New York City on March 14 the speakers will be Hon. Warren G. Harding, United States Senator from Ohio; Hon. Lindley M. Garrison, former Secretary of War, and now receiver of the Brooklyn Rapid Transit System, and B. A. Hegeman, Jr., representing the manufacturer members of the association. J. H. Pardee, president of the association, will preside. The dinner will be held at the Waldorf-Astoria at 7 p.m., preceded by a half-hour reception.

Progress is being made on the list of speakers for the technical sessions, who will cover the topics given in the outline program on page 215 of the issue of this paper for Feb. 1.

Lieut. Frank Roszel Speaks at Newark

AN ENTHUSIASTIC "get-together" meeting of the Public Service company section was held in Newark, N. J., on Feb. 14. The speaker was Lieut. Frank Roszel, an employee of the Public Service Railway, who had just returned from the western front in France. The lieutenant was range-finder for a big gun, having served in an advanced position with the heavy artillery. The meeting was enlivened with music, and refreshments were served,

Panama Canal Construction Reviewed

THE Rhode Island Company section held a meeting on Feb. 3 in its new gathering place, the Pythian Temple. The feature was a "movie" film showing the building of the Panama Canal. The remainder of the program was of an entertainment character, principally instrumental and vocal music.

Transportation and Energy Transmission Are Intimately Related

Inclusion of Power Lines Among Common Carriers Is Recommended by the Smithsonian Institute as an Economic Necessity

THE Smithsonian Institute of the United States National Museum is issuing a series of bulletins prepared by the division of mineral technology. Several relate to fuel and the power situation, and one shows how the problems of transportation are tied in with those of electric power transmission. Among the conclusions reached the following are significant.

Transportation difficulties are threatening to throttle the economic life of the country. If unrelieved the situation will entail a deterioration in the standard of living. The issue cannot be adequately met by furthering the development of the railways alone, but the logical way to correct the transportation unfitness of this country is to attack the matter through improvement in power usage. The three principles of transportation which underlie industrial growth are (1) the employment of suitable facilities for transportation, (2) the advance elimination of superfluous weight, and (3) the full utilization of the material transported. National experience has shown (1) that a transportation system of countrywide scope serving a comunity interest must be of a common-carrier order subject to public regulation; such has been the lesson of the railways; (2) that in the realm of production, which has to do with the advance elimination of superfluous weight, competition is desirable and should be as unhampered as possible; (3) that in the field of manufacture and consumption the attainment of full utilization stands in need of constructive help.

Applying these conceptions to power we find that the situation is at fault, because (1) there is no common-carrier system for the transmission of energy, although the development of electricity permits the power materials to be freed of weight at the source and enables the energy of water power to be utilized; (2) the presence of the railways, in the absence of special facilities for electric transmission, has prevented competition from becoming effective in the direction of the advance elimination of weight; and (3) the failure of this country to recognize the principle of multiple production and vitalize its latent force has held private initiative impotent to use fully the energy materials provided.

The provision of a common-carrier system of transmission lines, in brief, is the key to the whole problem. Its establishment will remove the retarding influence of high interest rates and antagonistic misunderstanding that has blocked water-power development, and will afford the point of departure from precedent in favor of coal-field generation of electricity.

Specific action in respect to establishing a common-carrier system adapted to the power needs of the country will not only go far toward solving the problem of transportation, but it will improve the fuel supply, correct the economic fallacy of drawing upon capital resources while neglectful of income, contribute to the recovery of the values now lost in the consumption of raw coal, and constitute a potent contribution in the stimulation of a constructive economic policy.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Seattle Lines Stopped

General Strike Results in Complete Suspension of Privately Operated City Lines

The sympathetic strike on Feb. 6 of approximately 130 unions in Seattle, following the walk-out of 25,500 shipyard workers on Jan. 21, involved more than 60,000 union employees and tied up the city's industries.

The electric railway system of the city was completely paralyzed, with the exception of the two lines of the municipal railway. The trainmen of the Puget Sound Traction, Light & Power Company voted unanimously to join in the general strike, and no cars were operated from Feb. 5 until Feb. 10.

Following the announcement of Mayor Ole Hanson that every city employee was regarded as a civil service employee, and that if such workers joined in the general strike their positions would be filled by others, and would not be open to them upon the cessation of the strike the trainmen of the municipal lines reconsidered their decision to strike and remained at work. The trainmen are affiliated with the local trainmen's union, and the union would not grant them exemption. A. L. Murphine, Superintendent of Public Utilities, and Mayor Hanson had announced that if the trainmen walked out the municipal cars would be operated with outside help, but that they would be kept going.

The interurban lines of the Puget Sound Traction, Light & Power Company did not cease operation. A statement made by the Pacific Northwest Traction Company and the Puget Sound Electric Railway, the former operating interurban lines between Seattle and Everett, and the latter between Seattle and Tacoma, Seattle and Renton, Tacoma and Puyallup, was as follows:

> This company operates interurban cars between Puget Sound points. The trainmen are members of steam road organizations, Order of Railway Conductors, Brotherhood of Locomotive Engineers, and Brotherhood of Railway Trainmen. The operation of our cars is analogous to the steam roads, and as long as the steam roads operate, we anticipate no cessation of our operation.

The city jitney men also voted to join the general strike. In consequence the Seattle public from the morning of Feb. 5 until railway service was restored were dependent solely upon private automobiles for transportation, with the exception of the Lake Burien and Ballard districts served by the municipal lines.

The strike was exceptionally orderly, with complete arrangements by the union officials to feed the public, and precautions taken in the way of police co-operation.

The sympathetic strike was ended Feb. 11 by official order of the general strike committee. The end of the general strike was virtually assured on Feb. 9 when trainmen of the Puget Sound Traction Light & Power Company, Seattle & Rainier Valley Railway and Municipal lines returned to work.

An ineffectual attempt was made on Feb. 10 by the general strike committee to have the trainmen walk out a second time and return to their jobs on Feb. 11 with the remainder of striking unions. The trainmen were influenced in refusing by notice served by the traction company officials and city authorities, who stated that trainmen striking a second time would be dropped from the payroll permanently.

The street railway operators violated the agreement with the traction company by striking, as they had agreed to arbitrate all disagreements, remaining on the job in the meantime. Railway service in Tacoma has also been resumed.

Service on the Municipal lines was interrupted for only twenty-four hours. Service on the traction company lines was at a standstill from the morning of Feb. 6 until the afternoon of Feb. 8, when company officials operated cars on several important lines from 3 o'clock until midnight. Service was restored to normal on all lines on Feb. 9. It is generally admitted that the return of electric railway trainmen was the most important factor in breaking the general strike.

Texas Bill Reported Favorably

Passage of the public utilities bill, now pending before the House and Senate of the Texas Legislature, is indicated by favorable committee reports on the measure. The bill, introduced by Senator Dorough of Texarkana, proposes to place electric interurban lines, city railways, electric light systems, and other public utilities under supervision of the Texas Railroad Commission, with the exception of those utilities owned by municipalities and companies having the so-called service-at-cost franchises. The local lines in Dallas would not be included, as the company operates under a service-at-cost franchise. The right to fix rates, service rules and regulations and practices is delegated to the Railroad Commission. An appeal may be taken from the ruling of the Railroad Commission to the District Court of Travis County. Such appeal may be taken by either the city or the utility affected by such decision. City authorities are opposing the bill on the ground that it will interfere with the rights of cities.

For Unified Power Supply

Secretary Lane Recommends Investigation for District between Boston and Washington—Of Use to Railways

Secretary Lane of the Interior Department has sent to Congress requests for two appropriations for special investigations and reports on the power supply. One of these is a request for an appropriation of $50,000 for a survey of the power resources all over the United States. The other is for an appropriation of $200,000 for a report on the power supply for the industrial region of the northern Atlantic seaboard, extending in general from Boston to Washington. The latter has been approved by the Secretary of the Treasury and has been forwarded to Swagar Sherley, chairman of the House committee on appropriations. The power capacity in this territory now aggregates for central stations and railway plants about 4,000,000 hp. and for industrial plants about 4,500,000 hp. In a letter to Mr. Sherley explaining the necessity for this appropriation, Secretary Lane says, in part:

> I believe the investigation will form the basis for a constructive national policy of the highest economic and industrial significance. In a few months, and especially in the regions mentioned, I anticipate a greatly increased demand for energy, for which present facilities are inadequate. If the country is to reap the full benefit of this returning wave of activity it must be prepared to furnish industry and transportation with an adequate, dependable and economical power supply.
>
> This result will be accomplished through the interconnection of existing power centers by means of a trunk-line transmission system of high efficiency. Into this trunk line energy will be fed from hydroelectric plants and steam power stations located at tidewater and near the coal mines. From it will be taken the power required for each principal industrial center and for the electrification of trunk-line railroads and of such branch lines as may be located in metropolitan districts.
>
> Such a comprehensive system of power supply, making use as it would of unutilized or undeveloped water power and of fuel now wasted at the mines, will result in large savings in coal. A very large amount of coal now consumed by steam power plants can be replaced by the development of water power. Fuel power can be developed near the mines and the wasteful transportation of coal by railroad to that extent avoided. I am reliably informed that as a conservative estimate 50 per cent of the fuel now used by the railroads in this territory can be saved through the operation of trains by electricity instead of by steam locomotives, because of the much higher efficiency that can be obtained in the economical central station in comparison with the wasteful steam locomotive.
>
> The transmission of this energy as electricity instead of the hauling of coal by rail will relieve the railroads of this territory of an enormous freight burden, thereby making available transportation for the hauling of other commodities. This is a matter of far-reaching importance. Not only would the railroads in the immediate territory be relieved of hauling the coal for their own locomotives but other railroads supplying them with coal would be relieved proportionately. This easing of the present strain on trackage and equipment would result automatically in an increase in transportation facilities, the necessity for which the country is now facing.

Developing Latent Talent

Suggestion Made that Government Use Its Machine-Tool Equipment for Industrial Training

If the bill introduced by Representatvie Charles Pope Caldwell, New York, on Feb. 4 becomes a law, every high school in the United States may be equipped with a first-class machine shop for industrial training. The machines with which to equip these schools are now in the possession of the War Department, and Mr. Caldwell proposes that "the Secretary of War shall lend them to trade and technical schools, universities and other recognized educational institutions, which in the discretion of the Secretary of War should have such equipment." It is provided, however, that each institution so equipped shall be responsible to the government "for the proper care and safe return of such equipment when demanded, ordinary wear and tear excepted." The plan has the indorsement of the *American Machinist*, the leading machine tool paper.

There is estimated to be between $200,000,000 or $300,000,000 worth of government-owned machine tools, bought on account of the war, of which amount perhaps one-third may be absorbed by existing arsenals. The remainder, according to the terms of the appropriation bill under which they were bought, must be sold to bring the greatest possible returns to the government. There is no ready market for these tools at the present time, machine shops throughout the country being overstocked on account of their expansion during the war. Therefore, the sale of these tools unless made at a considerable loss will be strung over a number of years which will have the effect of demoralizing the machine-building industry and also entailing the storage of these tools at the government expense, and storage charges on this class of machinery approximate 20 cents per square foot per annum.

One of the leading legislators has said of this proposal: "The government can well afford to give this machinery outright to schools that will put it in good use, as it then would go back to the use of the people who have paid for it in the first place."

Fair Play for the Home Buyer

In connection with the recent strike of the employees of the Kansas City (Mo.) Railways there is a feature which the public does not generally understand, although many of the employees do. In the interests of its workers the company some years ago organized a building association which purchased comfortable homes for the men and allowed easy payments without interest. There were originally about 800 in the association and all but about 300 have paid up and have their homes free. None of the latter, who are among those who "ceased work," have been dropped from the list. Their homes are secure if they keep up their payments, even if they never return to the railway.

Another feature is the pension system. Any worker who has been with the company a few years and is obliged through disability to retire, receives a pension, small, of course, if he has been employed a short time. The minimum, however, is $240. If he remains twenty years he receives 40 per cent of his wages; if twenty-five years, 50 per cent; and if thirty he receives $750 to $800 a year.

"Co-operate!" Says Public Trustee

Earle P. Carlton, a trustee of the Eastern Massachusetts Street Railway, which will succeed the Bay State Street Railway, Boston, Mass., in a statement relative to the electric railway situation lays stress upon the necessity of the public aiding the work of rehabilitation by the trustees. He said in part:

The trustees may be depended upon to do their best for the railway and the public. Whatever they decide to do, the public should understand will be done because the trustees fully believe it needs to be done. The public should accept the fact that the trustees will act for their best interests. It should support them. If fares are increased it will be because the trustees find it necessary to secure money absolutely required for operating and maintaining the service. If fares are raised, they will be reduced again as soon as returns from the traffic make it possible. The public is going to get the best treatment that is possible and it can help by not knocking.

The present condition of railway service in the State is undoubtedly due in part to mismanagement. State control has been proposed as a remedy, but State control would mean increased cost, whether or not it brought the remedy needed. Corporation management is preferable and corporation management under trustees such as has been decided upon should bring about the improvement needed.

Random English Notes

The London County Council is in a state of virtuous indignation against the Ministry of Munitions because the latter has subsidized a privately owned service of ombnibuses in the southeast of London. The subsidy was temporary in order to increase facilities for workmen in Woolwich Arsenal getting to and from their work. The war being over, the subsidy has ceased, but the bitterness of it was that some of the subsidized ominbuses ran over tramway routes.

G. W. Halford, general manager of Salford Municipal Tramways, has been appointed Honorary Secretary of the Municipal Tramways Association, in succession to Mr. Clough, who has left the tramway industry to become manager of a paper-making business. The extremity of the transition from one industry to another of a leader like Mr. Clough in his field of effort is more characteristic of the United States than of England.

The question of nationalization of British railways is still being agitated, W. Churchill, Minister of Munitions, having indicated that the late government is in favor of that course.

Minneapolis Draft Presented

Proposed Franchise Provisions Will Be Considered in Weekly Meetings

An outline draft of the service-at-cost franchise for the Minneapolis (Minn.) Street Railway has been submitted to the committee of the City Council on street railway matters by City Attorney C. D. Gould and Stiles P. Jones, who were retained by the city as franchise experts. The basis of the proposal is service at cost, starting with a 5-cent fare with universal transfers plus a division of earnings between the city and the company and complete city supervision over service and extensions.

The proposed franchise provisions will be considered by the committee in a series of weekly meetings. At its last meeting the committee decided to take the C. L. Pillsbury valuation of $24,346,113 on the company's property, and allow the company 7 per cent earnings on that valuation, instead of on the $25,914,307 figure fixed by City Engineer F. W. Cappelen.

The fundamental purposes of the franchise grant, as stated by Messrs. Gould and Jones, are as follows:

To furnish the Minneapolis public with adequate railway service at all times, at a rate of fare sufficient to provide the facilities for such service, meet the legitimate costs of operation, maintain the property continuously in first-class condition and pay the company its fixed minimum return upon investment.

To provide for effective public control of service and extensions.

To provide for such public supervision of the property as will assure honest, efficient and economical management in the public interests.

To provide for an equitable division of the surplus earnings between the city and the company.

To provide for the purchase of the property by the city, and the terms, times and conditions thereof.

Important provisions of the grant as proposed are as follows:

The company shall surrender its present franchise and waive all rights thereunder upon the taking effect of this ordinance.

The city shall have the right to purchase upon agreed valuation and subsequent additions giving one year's notice of its intention to purchase, at expiration of any five-year period.

The fare shall be 5 cents, with universal transfers; children under six years of age, free. Policemen and firemen may ride at reduced rates, as provided by the State law.

The company may adopt reasonable regulations governing the use of transfers, subject to the approval of the City Council.

Safety Device Inquiry Put Off

Officials of the Brooklyn (N. Y.) Rapid Transit System who are under indictment on account of the Malbone Street accident have declined to take the stand in the investigation undertaken by the Public Service Commission for the First District involving the proposed installation of safety devices on elevated and subway lines of the system. Until the criminal proceedings in which they are involved have been concluded these officials decline to appear as witnesses in any proceeding of this sort. The company has asked for a delay in the proceedings, and the commission adjourned the hearing to consider the company's application.

Government Placing Men

For the first time in the history of America's development, employers have an opportunity of selecting from a large and varied list of highly educated and experienced men those individuals especially equipped to meet their particular requirements. Engineers, executives, men of college training and practical experience in business and technical fields are now being released from the Army, Navy and war work. The professional and special section of the United States Employment Service, a branch of the Department of Labor, has been organized for the benefit of employers in need of these men. The service is entirely free of charge. I. W. Litchfield, the head of the professional and special section, was one of the organizers and directors of the United States Public Service Reserve which supplied high-grade engineers and business men to the government for war work.

The United States Employment Service is now divided into two great zones for the purposes of the professional and special section. The New York office, headquarters for the Eastern zone, at 16 East Forty-second Street, is in charge of the following states: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Ohio, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida and Alabama. The Chicago office, headquarters for the Central zone, at 63 East Adams Street, is in charge of all remaining states. Later zone offices will be established to take charge of part of the territory now in the Chicago zone. The employment service is also represented in each of the forty-eight states by the federal director for that state. The United Engineering Societies, composed of the four great engineering organizations, are co-operating with the professional and special section in placing men in the engineering professions.

The types of men and women registered in the professional and special section are indicated by the following partial list: statistical workers, stenographers, accountants, advertising and publicity workers, auditors, bankers and brokers, cost experts, draftsmen, electrical engineers, executives, librarians, mechanical engineers, purchasing agents, real estate and insurance workers, safety engineers, social workers, traffic managers and inexperienced college graduates.

Ottawa States Its Position

The city of Ottawa is buzzing with talk of the offer of sale made by the Ottawa Electric Railway, referred to briefly in the ELECTRIC RAILWAY JOURNAL for Feb. 8, page 298. So that there may be no misunderstandings Mayor Fisher has made this statement:

Toward the end of last year some negotiations were entered into in connection with the purchase of the railway. The railway expressed a willingness to fix a price and the board of control intimated that they were willing to have an offer from the company. Beyond this no further progress was made.

We now have an offer from the company which means that we are to pay for the assets of the Ottawa Electric Railway, the par value of the shares of the Ottawa Traction Company—that is, according to the letter received—$5,630,700. We also are to assume the outstanding obligations. I understand we are to assume that there are outstanding $400,000 of 4 per cent bonds. There is also a fluctuating liability to the bank, amounting now, as per the statement of the Ottawa Electric Railway, to $370,000.

The board has no opinion to express as to the price. As a matter of fact, there is no one outside of the officials of the company who is in a position at present to say what the value of the road is. I think it would be well if we all abstained from expressing any views on this subject until we have full information.

A special meeting of Council will be held in order that authority may be given to the board to obtain the necessary advice. When we have a report from the persons employed, it will be for the Council to say whether the offer of the railway is at such a figure that it should be submitted to the people. If they think the price at which the railway is offered is reasonable, then a vote must be taken.

In the meantime it may be necessary to go on with legislation so that it may be available if action is taken later.

The company was asked for a price by Dec. 13, but a definite offer was not received by the representatives of the city government till Jan. 29.

Examiners Interpret Chicago Award

The questions arising from a dispute over the meaning of the terms of the wage award in the case of the Chicago (Ill.) Surface Lines which were submitted by the officers of Division 241 of the Amalgamated Association to the examiners of the National War Labor Board for decision, have been decided by Arthur Sturges and M. Joseph Chiesa, examiners for the board, who found as follows:

1. The receivers are to get an increase of 23.07 per cent over the hourly or monthly rates in effect at the time of the submission of the case.

2. Men operating night cars are to receive an increase of 23.07 per cent over the rate of $3.25 a day of eight hours or less fixed by the contract between the company and the association.

3. The day and night foremen of car repairers are to receive an increase of 23.07 per cent above their rates in effect at the time of the submission of the case for adjustment.

4. The tunnel and bridgemen are to receive an increase of 23.07 per cent above their rates in effect at the time of the submission of the cases, and if this does not bring any adult male employee in this classification up to the minimum rate of 42 cents an hour, he is to receive said minimum of 42 cents an hour for the actual number of hours worked up to ten hours a day.

5. Employees who are incapacitated from doing a normal day's work by reason of age or physical disability may be paid a special rate, less than is granted by the award, by agreement between the representatives of the company and of the association. In case the parties are unable to agree, any specific case may be referred to the examiners of the National War Labor Board whose decision, which decision is subject to appeal to the arbitrators as provided in the award.

6. About half of the flagmen and crossing tenders employed by the company at steam railroad crossings are under the jurisdiction of the United States Railroad Administration. The arbitrators did not intend to interfere with the wages of these men and therefore all the flagmen and crossing tenders employed by the company at railroad crossings should be paid in accordance with the rates prescribed by the aforesaid United States Railroad Administration, beginning as of Aug. 1, 1918.

The original award in this case was handed down some months ago.

Merchants for Private Control

The Merchants' Association of New York has reaffirmed its position in opposition to government ownership and operation of public utilities and has declared emphatically in favor of private ownership under government regulation. This declaration was made in accordance with the recommendation of a special committee appointed by President William Fellowes Morgan in pursuance of action taken by the board of directors for a re-examination of the question of government ownership and operation in view of the prominence that the matter has assumed since the beginning of the war. The special committee consisted of Frank R. Chambers, chairman; James G. White, Otto H. Kahn, Frank H. Sisson, H. H. Porter and Prof. Joseph French Johnson. The gist of the findings of the committee is contained in the following extracts from the report:

While we are not unmindful of the defects that not infrequently characterize the operation of corporations of public utilities, we do not believe that these defects can be cured by substituting another method which in every respect of efficiency is much below the standards that generally prevail under private management. In so far as the evils which are popularly assumed to exist in private management are found to exist in fact, other remedies than the substitution of methods abounding in greater evils should be found.

We believe that the public can best be served by utilizing the efficiency, enterprise and energy of private corporations for the continued operation of public utilities, under such public control as shall protect the public in its right to efficient service and fair rates; and at the same time assure to private capital invested in public utilities a fair return upon such capital.

We do not find any change of conditions resulting from the war which warrant or require the previous position of the association, in opposition to government ownership and operation, to be modified.

On Feb. 5 the Merchants' Association adopted resolutions favoring the return of the railroads and the telegraph and telephone systems to private control and operation under such conditions as will render them as serviceable to the public as when the government took possession of them.

Must Carry Out Improvement Program

The City Commissioners of Dallas, Tex., have granted to the Dallas Railway an extension of nine months in which to carry out the provisions of the franchise involving the expenditure of $1,200,000 in improvements and betterments.

The company asked an extension of twelve months, but Mayor Lawther and the members of the commission held that a year's extension was not necessary and that the company should be required to carry out its agreement at an earlier date in order to provide employment for many discharged soldiers.

Under the original agreement, as embodied in the franchise, the Dallas Railways agreed to expend $1,000,000 in improvements by April 1, 1919. In consideration for the extension asked, the company made a voluntary commitment and agreed to spend $200,000 more in improvements, making the total

amount $1,200,000. Under the agreement embodied in the extension granted, this amount must be spent during 1919. The company will make a new bond to insure the carrying out of this agreement.

The improvements called for include extensions of several lines, two new lines, laying of heavier steel in connection with paving on several streets and betterments in the service in various respects. The new lines will be the Oakland Cemetery line and the Oak Lawn and City Hospital extensions.

News Notes

Boston & Worcester Award Announced.—Trainmen employed by the Boston & Worcester Street Railway, Boston, Mass., have been awarded a base pay rate of 42 cents an hour by the War Labor Board. The pay was fixed at 44 cents at the end of three months in service and 47 cents after one year. Employees other than carmen were awarded a minimum of 42½ cents an hour.

Bloomington Wages Must Stand.—The War Labor Board has dismissed without prejudice the complaint of the employees of the Bloomington & Normal Railway & Light Company, Bloomington, Ill., who asked an increase in the wages now paid the men under a contract between their union and the company. As the wages are definitely fixed by the contract for its full term the board could not make a change over the objection of the company.

Forty-two Cent Maximum in St. Joseph.—The War Labor Board, in the case of the St. Joseph Railway, Light Heat & Power Company, St. Joseph, Mo., has fixed the wages of motormen and conductors at 38 cents an hour for the first three months of service, 40 cents an hour for the next nine months and 42 cents thereafter. Existing working conditions and differentials paid for special services will be continued. The award is retroactive to Nov. 27, 1918.

Viaduct Agreement.—The contract between Kansas City, Mo., Kansas City, Kan., and the Kansas City Railways for the use of the inter-city viaduct awaits the signatures of officials of the city and officers of the company. Under the terms of the contract the agreement is effective until December, 1922, the time of the expiration of the franchise on the Kansas side, providing the city in the meantime acquires the inter-city structure by January, 1920. If the city has not acquired the viaduct by that time the contract ends. The Kansas City Railways is said to be ready to begin operating cars over the viaduct.

Unemployment on Increase.—The seriousness of the unemployment situation is again emphasized in figures made public on Feb. 8 by the United States Employment Service, based on official reports from its agents throughout the country on conditions of employment and unemployment. Figures based on the last information available show a much heavier increase in the area of unemployment than that shown in the reports for the previous weeks. The reports for last week showed the total unemployment amounted to nearly 265,000. During the current week this number has increased to 290,831. The total labor shortages reported amount to only 8000.

Mr. Allison Retained by International Railway.—James E. Allison, Jr., St. Louis, Mo., has been selected by the International Railway, Buffalo, N. Y., as its representative on the board of arbitration which will pass upon matters of finance in dispute between the city and the company as a step in the series of negotiations to bring the international Railway under the control of the municipal authorities similar to the plan in operation in Cleveland. The city's member of the board has not been designated by the City Council, but will probably be Harry D. Sanders, a former member of the staff of the city law department. Mr. Allison is an appraisal engineer. He was formerly on the Public Service Commission of Missouri.

Seven-Cent Wage Increase in Louisville.—Wages of men on city lines of the Louisville (Ky.) Railway are to be increased under an award of the War Labor Board to 41 cents an hour for men three months in the service; 43 cents for men six months employed, and 45 cents for men employed nine months. For the men on country lines wages are to be increased to 42, 44 and 46 cents an hour for those in service three, six and nine months, respectively. The board also recommended granting to the railway the right to increase fares. Increases in wages are to be effective and retroactive as of Aug. 12, 1918, and are to continue until the end of the war is formally declared by executive proclamation. The company has until July 17, 1919, to meet the back pay due under the award. The raise amounts to a straight increase of 7 cents an hour.

Looking for a Way Out.—Railway matters are again the center of interest in Norfolk, Va. This has come about through the recent reported willingness of those who control the Virginia Railway & Power Company to sell to the city and the more recent prospects for a renewal of the franchise negotiations. Officers of the company and city officials met recently in the City Manager's office to discuss the terms of the new franchise. Those in the conference were the City Manager, E. Randolph Williams, general counsel for the Virginia Railway & Power Company; W. H. Venable, local counsel for the company; I. Walke Truxtun, City Attorney R. W. Peatross, George Pilcher, former city attorney; H. H. Rumble and C. B. Buchanan, vice-president of the company. Mr. Williams stated that he saw no reason why the franchise could not be framed to the satisfaction of both parties to it.

Board of Estimate Relents.—The Public Service Commission for the First District of New York has received from the Board of Estimate & Apportionment an additional appropriation sufficient to enable it to re-employ practically all of the engineers on subway construction work who were laid off by the failure of the Board of Estimate & Apportionment to appropriate a sufficient sum for their salaries and expenses for the year 1919. It is now expected that much of the new subway work in process of construction which it was believed would have to be held up can be advanced. Plans are being made by the commission for the letting of several new contracts in the near future. However, the delay which has been occasioned by the practical cessation of work because of lack of supervision through January may be serious enough to carry over into 1920 the completion and beginning of operation of certain of the new lines which it was believed would be ready in 1919.

Program of Meeting

Central Electric Railway Association

The program has been announced for the annual meeting of the Central Electric Railway Association at the Hotel Cleveland, Cleveland, Ohio, on Feb. 27 and 28. The session will be opened at 9.30 a.m. At 2 p.m. the executive committee will meet. There will be an address by Mayor Davis, Cleveland, and F. W. Coen, president of the association and vice-president and general manager of the Lake Shore Electric Railway, Sandusky, Ohio, will make his annual address. There will be a business session and reports of committees, followed by a paper "Ethical Aspects of the Street Railway Situation," by R. T. Sullivan, general manager of the Mahoning & Shenango Railway & Light Company, Youngstown.

The session on Feb. 28 will open at 9 a.m. The business meeting and presentation of reports of committees will be followed by the presentation of a paper "Power House Economics," by G. H. Kelsay, electrical engineer of the Union Traction Company of Indiana, Anderson, Ind., and a paper "Development of Freight Traffic on Interurban Lines," by A. B. Cole, assistant to the manager of the department of publicity of the Westinghouse Electric & Manufacturing Company, East Pittsburgh. The presentation of these papers will be followed by a general discussion by members of the association. The meeting will be concluded with the reading of the annual reports of the secretary and treasurer and the election and installation of officers for the ensuing year.

Financial and Corporate

P. R. T. Net Earnings Fall

Traffic Revenues Gain in 1918, but Burden of Operating Expenses and Taxes Is Too Heavy

The results of operation of the Philadelphia (Pa.) Rapid Transit Company for the year ended June 30, 1918, reflected the tremendous industrial and economic developments of this country concentrated upon the prosecution of the war. The larger gross revenues indicated the expansion of the shipbuilding, munition and other essential or contributory war industries located in Philadelphia and vicinity, while the greater increase in operating expenses was the result of the war-time costs of labor and material.

Gross Earnings Increase 6.62 Per Cent

The gross earnings for the year ended June 30, 1918, showed an increase of $1,890,336 or 6.62 per cent. The passenger earnings rose 6.60 per cent and the receipts from other sources 7.26 per cent. The increase in operating expenses and taxes amounted to $2,578,410 or 16.1 per cent. The principal items contributing to this abnormal increase were the higher wages paid, the increased price of coal and other materials, the larger appropriations for maintenance and renewals, and the additional allowances to provide for federal war taxation.

Net Earnings Decline 5.5 Per Cent

The net earnings from operation, on account of the preponderating increase in operating expenses and taxes, fell off $688,073, or 5.5 per cent. The fixed charges showed a net decrease of $11,189, which was occasioned by the reduction in interest charges on car trust certificates, bonds, etc., maturing during the year or retired through the operation of sinking funds. The resultant surplus for the year, therefore, declined $676,884 or 24.3 per cent.

Two semi-annual dividends of 2½ per cent upon full paid stock of $29,985,800 were declared from the surplus earnings for the year ended June 30, 1918, as follows: Dividend No. 3, payable Jan. 31, 1918, 2½ per cent, $749,645; dividend No. 4, payable July 31, 1918, 2½ per cent, $749,645; total, 5 per cent, $1,499,290.

$4,884,077 in Surplus Account

The asset account for "leases, franchises, construction, equipment, advances to leased lines, sinking funds, etc.," showed a balance of $113,478,757 on June 30, 1918, this figure representing an increase of $381,959 for the year. The capital charges for additions and betterments amounted to $755,304.

The surplus of $4,884,077 as at June 30, 1918, represented the undistributed net earnings during the period of the Stotesbury management. Of this total surplus accumulation $2,653,438 was represented by additional cash or cash assets, the balance of $2,230,639 having been temporarily advanced to finance capital expenditures. A total of $1,382,000 of the 5 per cent bonds of the 1912 issue are held by the company available for sale to reimburse the treasury on account of such appropriations from surplus for capital requirements, besides which the abnormally large inventories should ultimately liquidate into much free cash.

During the period to June 30, 1918, $753,880 of the 1910 strike expense of $934,346 (incurred by the former management) was amortized through appropriations from surplus, these charges exhausting the initial surplus of $607,099, as of Dec. 31, 1910, and requiring in addition $146,780 of the surplus acquired during the period.

INCOME STATEMENT OF PHILADELPHIA RAPID TRANSIT COMPANY FOR YEARS ENDED JUNE 30, 1917 AND 1918

	1918 Amount	1918 Per Cent	1917 Amount	1917 Per Cent
Earnings:				
Gross passenger earnings	$29,318,138	96 30	$27,504,040	96 32
Receipts from other sources	1,125,813	3 70	1,049,574	3 68
Total earnings	$30,443,951	100 00	$28,553,614	100 00
Expenses:				
Maintenance and renewals:				
Maintenance	$3,544,219	11 64	$2,712,121	9 50
Reserve fund for renewals	1,022,373	3 36	1,570,921	5 50
Total appropriation	$4,566,593	15 00	$4,283,042	15 00
Operation of power plant	2,576,845	8 47	1,694,151	5 93
Operation of cars	7,843,021	25 76	7,129,739	24 97
General	1,750,668	5 75	1,498,826	5 25
Taxes	1,845,454	6 06	1,598,412	4 90
Total expenses	$18,582,581	61 04	$16,004,171	56 05
Net earnings from operation	$11,861,370	38 96	$12,549,443	43 95
Fixed charges:				
Interest	$2,268,492	7 45	$2,280,179	7 99
Rentals	7,365,891	24 19	7,365,393	25 79
Sinking fund, city contract	120,000	0 40	120,000	0 42
Total	$9,754,383	32 04	$9,765,573	34 20
Surplus	$2,106,987	6 92	$2,783,870	9 75

Receivership Plea Renewed

United Railways, St. Louis, Again Called Upon to Defend Itself in Receivership Action

The United Railways, St. Louis, Mo., on Feb. 7 filed a general denial of the allegations set forth in the petition of John W. Seaman, New York, a preferred stockholder, who asks that certain directors be ousted from office, the contracts which the company has for Keokuk water power through a distributing company, owned by the North American Company, be canceled or turned over to the company, and that a receiver be appointed for the United Railways to bring about these and other reforms.

The receivership petition had for its chief allegation that the water-power contracts cost the United Railways $400,000 yearly in excess of what a reasonable charge for the power would be and that they already had caused the company to lose in excess of $1,000,000; that certain practices of the legal department, notably in the mill tax case, were wasteful; that the company's claim department was unreasonably expensive and that a system of interlocking directorates make the operation of the company for the sole benefit of the North American Company, which is the holding company for the United Railways.

It is asked that the defendant directors (who are still directors) and the other individual defendants be made to reimburse the company for losses accruing to the company through their alleged mismanagement of the company's funds.

Defendant's Plea

The answer of the United Railways either is a clause-by-clause flat denial of the statements of the petition or else a plea that the company is ignorant of the allegations set forth.

It declares that the United Railways has no knowledge of what profits accrue to any other company through contracts which it has for electric energy. It sets forth that the United Railways has no connection with the distributing company and had no interest in that company other than to see that the power was delivered and that the price agreed upon was maintained.

The defendants in the suit are the United Railways, Richard McCulloch, as a director of United Railways in 1908 when the power contracts were made; Henry S. Priest, as director and general counsel in that year; Festus J. Wade, as director; Annie E. Huttig, as beneficiary and trustee under the will of Charles H. Huttig, a director; the Mercantile Trust Company, as executor and trustee of the will of James Campbell, a director, and John I. Beggs, director.

Early in 1918 a similar application was denied by the court on the ground that the allegations did not justify a receivership and showed no cause for action.

Heavy Loss in New York

Lines in Metropolis Lost $4,600,000 or 44 Per Cent of Net Income in Fiscal Year 1918

A falling off of $4,647,964 or 44 per cent in net income was the result of operation for the rapid transit and surface electric railways in New York City for the year ended June 30, 1918. Detailed figures are given in the accompanying statement.

The names of most of the surface operating lines have been omitted from this table, the New York Railways being the only one shown separately. The Third Avenue System is included partly in the totals for the Manhattan Borough surface lines and partly in those for the Bronx Borough surface lines.

Most of the loss in net corporate income, it is apparent, came from the decline of $4,222,599 for the Interborough Rapid Transit Company, on account of the operating expenses rising more rapidly than the operating revenues and on account of the taxes and fixed charges increasing substantially. The surface lines in Manhattan and the Bronx, unlike those in Queens, showed a smaller total deficit in 1918 than in 1917, but all the groups of surface lines reported deficits from the operation for 1918.

The total number of passengers carried for the twelve months ended June 30, 1918, was 1,975,511,690, a gain of 56,699,464. This gain was divided generally among the rapid transit lines and the Bronx, Manhattan and Brooklyn surface lines, the Manhattan surface roads coming first in the latter class with 31,348,175. The Brooklyn elevated lines carried 31,699,403 more passengers, but this gain was cut to 18,660,548 by the losses on the surface lines in that borough.

The revenue car-miles totaled 329,538,712, an increase of 2,329,664. The passenger car-hours numbered 28,939,839.

INCOME STATEMENT OF NEW YORK CITY ELECTRIC RAILWAYS FOR YEAR ENDED JUNE 30, 1918

Company	Railway Operating Revenue Amount	Railway Operating Revenue Increase	Operating Expenses Amount	Operating Expenses Increase	Railway Taxes	Gross Income	Deductions from Income	Net Corporate Income Amount	Net Corporate Income Increase
Hudson and Manhattan	$4,679,367	$437,090	$2,226,406	$469,999	$332,562	$3,056,790	$2,449,584	(c) $607,206	D $111,238
Interborough { Subway division	21,840,447	385,555	9,159,182	1,041,579	1,649,411 }	18,219,408	13,556,649	(d) 4,662,758	D 4,222,599
Interborough { Elevated division	18,657,280	246,026	9,954,154	1,488,463	2,109,171 }				
Brooklyn Rapid Transit Co	30,925,303	884,882	19,532,278	1,375,639	1,897,123	10,596,591	8,745,255	1,851,336	D 857,643
Manhattan Surface Roads	19,781,436	1,171,262	13,324,064	379,672	1,749,094	6,354,785	6,804,443	D 449,657	607,295
New York Railways	11,920,033	425,924	8,131,470	262,660	1,170,223	3,245,457	3,399,091	D 153,633	D 5,580
Bronx Surface Roads (a)	4,279,892	510,406	3,229,491	166,749	290,100	797,429	917,146	D 119,717	304,984
Queens Surface Roads (b)	2,258,616	D 321,629	2,194,320	D 127,148	121,845	D 43,546	627,302	D 670,849	D 208,569
Other companies	1,977,845	2,311	986,640	95,088	83,012	178,399	278,519	D 100,119	D 160,191
Grand total (a)	$103,500,189	$3,316,404	$60,606,538	$4,890,043	$8,232,321	$39,159,858	$33,378,901	$5,580,957	D$4,647,964

Note—D indicates a decrease or deficit.

(a) Excluding Yonkers Railroad. (b) Excluding Brooklyn Rapid Transit Company. (c) Balance applicable for adjustment income bonds. (d) Exclusive of $2,508,508 of "deficit accruals under rapid transit contracts.

Lackawanna Line Suspends

The Buffalo & Lackawanna Traction Company, Buffalo, N. Y., has suspended the operation of cars over its lines between its terminal in Lafayette Square, Buffalo, and the Lackawanna (N. Y.) city line. Failure on the part of the company to secure from the city the right to charge a higher rate of fare together with the action of the City Council in denying the company's application to abandon its transfer agreement with the International Railway are given as reasons by Harry Evers, receiver for the company, for the company's decision to discontinue service. The receiver says the company's income is not sufficient to pay operating expenses.

The Buffalo & Lackawanna Traction Company owns no rolling stock. It leases its cars from the Buffalo & Lake Erie Traction Company. The latter company will continue to operate half hourly service during the day and hourly service at night over the Buffalo & Lackawanna Traction Company's tracks into Buffalo from Lackawanna and points west.

In a statement notifying the public of the discontinuance of the service, the receiver of the Buffalo & Lackawanna Company says:

> The receiver is wholly without funds with which to meet operating deficits, and has no choice but to suspend the service. If the Public Service Commission or anyone else can show us how to operate the road without loss under the present circumstances, we will run the line.

Tax Case Before State Supreme Court

Argument was heard and decision reserved on Jan. 15 by the Supreme Court of Pennsylvania on the appeals of the Philadelphia (Pa.) Rapid Transit Company from the decision of Court of Common Pleas No. 3, which held it liable in ten cases of its underlying companies for the payment of the income and excess war-profit taxes levied by the government, under the war-revenue and tax measures passed by Congress.

The taxes in controversy amounted to upward of $360,000. As to three of the companies—the Continental Passenger Railway, the Philadelphia & Darby and the Green & Coates Street Passenger Railway—the Philadelphia Rapid Transit Company, which also leased these lines, won the decision of the lower court.

The amount of taxes in these three cases was only about $12,000. The provisions of the leases in the three cases did not specify that the Philadelphia Rapid Transit Company should pay all future taxes levied on the leased lines, as they did in the other ten cases, where it was held by the lower court the provisions of the lease were binding on the Philadelphia Rapid Transit Company.

St. Louis Valuation Plans

Commission Preparing to Carry Out the Work Before Present Six-Cent Fare Time Expires

The Public Service Commission of Missouri is proceeding with its plans for valuing the property of the United Railways, St. Louis. It will be necessary for the commission's entire accounting and engineering departments to remove to St. Louis during the work, and for that reason the men in these departments have been at work cleaning up the audit and valuation of the properties of the St. Joseph Railway, Light, Heat & Power Company at St. Joseph and of companies elsewhere before beginning work at St. Louis.

While the commission's accountants and engineers have never made an audit or valuation of the United Railways, the members of the commission held a hearing upon the valuation made by the city and the company, and the evidence offered by the parties, and put in the 6-cent fare as an emergency measure for a temporary period of one year, in order to enable the railway company to employ labor, purchase supplies and render service under war conditions.

In the emergency just mentioned there was not time for the commission to make an audit and valuation through its own expert departments and it accepted for the purpose of its temporary order the value of $60,000,000 which had been agreed upon between the city and the company, the commission apportioning $52,800,000 to the property within the city and $7,200,000 to the property outside of the city.

The commission's accountants and engineers plan to begin work by Feb. 15 and have their report completed in time for the further hearing proposed to be held by the commission on or before June 1, 1919, the date of the expiration of the temporary 6-cent rate.

In referring to the scope of the present inquiry the commission said:

> The commission feels it is fortunate in having very able accounting and engineering departments which have successfully audited the books and accounts, and valued the property of many large utilities in this State. They are men of long experience in their particular line of work, well qualified to duly classify proper and improper operating charges of any public utility, and their work in St. Louis will be thorough, complete, fair and impartial. The case will also be set down for a public hearing and investigation at St. Louis before the commission of the company's receipts and expenses, and the value of its property, and the commission hopes to be able authoritatively to settle these questions.

Receiver for Indiana Road

Robert M. Feustel, president of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., was appointed receiver of the company on Feb. 10, after a suit had been filed by the Evans Coal Company, asking that such action be taken. The demand of the coal company is for $12,000.

Mr. Feustel stated that for several years past the security holders of the Fort Wayne & Northern Indiana Traction Company have recognized that the earnings of the property were not sufficient to take care of operating expenses, taxes and the necessary fixed charges. For the last two years he said default has been made in the interest on more than 90 per cent of the bonded indebtedness of the company and this interest money has been devoted to operation and betterments.

During this period the security holders have been working on plans for a reorganization of the company, and the appointment of a receiver at this time, it is said, is for the purpose of bringing about some satisfactory reorganization.

Financial News Notes

New Director of Texas Electric Railway.—At the annual meeting of the stockholders of the Texas Electric Railway, Dallas, Tex., the former directors were elected with the exception that T. F. Bush, Waco, succeeds W. W. Seley, who died on Dec. 26.

Authorized to Junk Road.—The Exeter, Hampton & Amesbury Street Railway, Exeter, N. H., was authorized on Jan. 10 by the Public Service Commission to discontinue its lines to Hampton Beach any time after May 1 if a sale cannot be effected before that time which will bring more than the junk value of the road.

Value for Taxation Reduced.—A reduction of $743,662 in the valuation for assessment purposes placed by the Newark, N. J., tax board on cars of the Public Service Railway has been allowed by the Essex County Board of Taxation. The valuation fixed by the city board was $2,888,000. The reduction leaves a total of $2,144,338, upon which the company must pay taxes.

Ottawa Traction Company Report.—The Ottawa (Ont.) Traction Company, Ltd., during the calendar year 1918 received from its subsidiary, the Ottawa Electric Railway, the sum of $260,040 and paid this out in four quarterly dividends of 1 per cent and a bonus of 1 per cent. No figures are presented for the operating company in the 1918 annual report of the parent concern.

Interest Money Available.—A dividend of 50 cents was declared on the stock of the United Power & Transportation Company, Camden, N. J., payable on Jan. 31 to holders of record of Jan. 14. A Philadelphia paper states that this payment, together with other income received by the Inter-State Railways, will provide for the semi-annual interest requirements on Inter-State Railways 4's so that the Feb. 1 coupon could be paid as usual. In January, 1918, dividend of $1.32 was paid and in July $1.20.

A. E. & C. Deficit Increasing.—The deficit of the Aurora, Elgin & Chicago Railroad for 1918 was $251,193 according to a report made by the company to the city of Aurora, Ill. When the Council voted last summer to allow the company a 6-cent fare on the Aurora city lines it was agreed that a monthly statement of the company's finances would be furnished to the city officials. The latest report shows that for the ten months ended October the deficit was $185,898, while for the eleven months ended November it was $218,307.

Wants to Merge Short Line.—The New York State Railways has applied to the Public Service Commission for the Second District, for permission to merge the East Side Traction Company in Syracuse. The petition states that the stock of the East Side Traction Company is owned by the New York State Railways. The East Side Company was leased on Aug. 7, 1899, to the Syracuse Rapid Transit Railway and operated by it until Oct. 31, 1912, when the Syracuse line became a part of the New York State Railways. The road is 6.44 miles in length.

Majority Bonds Deposited. — The committee representing the 5 per cent first consolidated forty-year gold bonds of the Colorado Springs & Cripple Creek District Railway, Colorado Springs, Col., F. J. Lisman, chairman, announces that a substantial majority of the bonds has been deposited with the committee, and that the committee has extended the time for the deposit of additional bonds up to and including Feb. 21. Deposits should be made with the New York Trust Company, depositary, or the Mercantile Trust & Deposit Company, Baltimore, agent for the depositary.

Bonds to Settle Damage Claims.—The Southern Cambria Railway, Johnstown, Pa., recently filed a certificate of notification with the Pennsylvania Public Service Commission for the issuance of $100,000 of 5 per cent income bonds, dated Jan. 1, 1919, and due Jan. 1, 1929. The bonds are to be issued in payment of damage claims resulting from a wreck on the company's property in August, 1916. As a result of this wreck the company was placed in the hands of a receiver in 1917, but it is expected that the receivership will be removed as soon as the damage claims are settled.

New American Railways Issue.—The American Railways, Philadelphia, Pa., made a new issue of $3,000,000 of 7 per cent gold notes dated Feb. 1, 1919, due Feb. 1, 1922, $1,672,000 of which has been issued to retire a like amount of notes maturing on Feb. 1, 1919, and the balance for corporate purposes. The major part of the notes maturing on Feb. 1, 1919, was exchanged for the new notes dated Feb. 1, 1919. Newburger, Henderson & Loeb, Philadelphia and New York, and Bioren & Company, Philadelphia, have placed the remainder of the $3,000,000 new issue. These were offered at par and interest.

Two Weeks More for B. R. T. Claimants.—Judge Julius M. Mayer of the United States District Court, has resettled a previous order so as to permit the filing of claims of all kinds against the companies in the Brooklyn (N. Y.) Rapid Transit receivership up to April 1, 1919, an extension of two weeks. It was also provided that claimants need not go before ex-Judge E. Henry Lacombe, the special master, unless their claims have been disallowed by the receiver, Lindley M. Garrison. It was also made clear that no attempt would be made to prevent the bringing of suits for jury trials, a matter regarding which there has been some misunderstanding.

Idaho Deficits for 1917.—During the calendar year 1917, according to the latest annual report of the Idaho Public Utilities Commission, three of the six electric railways operating in the State showed deficits. The companies so reporting were the Boise Valley Traction Company, $534; the Spokane & Inland Empire Railroad, $462,002, and the Ogden, Logan & Idaho Railway (now the Utah & Idaho Central Railroad), $249,717. The Caldwell Traction Company showed net income of $10,959 for 1917, and the Lewiston-Clarkston Transit Company net income of $6,748. The Boise Railroad did not report. During the first half of 1918 two lines, the Sand Point & Interurban Railway, Ltd., and the Twin Falls Railroad were dismantled, as noted in the ELECTRIC RAILWAY JOURNAL of Jan. 4.

Seeking Deposits of New Orleans Notes.—A committee of which Clarence L. Harper, Harper & Turner, Philadelphia, Pa., is chairman is soliciting deposits of the one-year 7 per cent gold notes of the New Orleans Railway & Light Company, New Orleans, La. In order that the holders of the notes may have a general knowledge of the affairs of the railway, the committee is distributing a summary of a statement made by Francis T. Homer, president of the American Cities Company, which owns the greater part of the capital stock of the railway, and also a tabulated comparison of valuations placed on the properties of the railway. A bondholders' protective committee for the refunding and general lien 5 per cent gold bonds of the New Orleans Railway & Light Company, has also been formed. The committee is composed of George K. Reilly, chairman; John S. Newbold, Arthur Morton, George A. Colston and Lynn H. Dinkins.

Further Diversifies Its Holdings.—The Washington Water Power Company, Spokane, Wash., has taken over the Spokane Heat, Light & Power Company. It is understood that the deal was put through on a small cash payment, the creditors and security holders of the light and power company, which has been in the hands of a receiver for several months, agreeing to take an issue of $1,400,000 twenty-year unsecured debentures of the purchasing company, which will bear interest at the rate of 3 per cent for the first six years, 4 per cent for the next seven years, and 5 per cent for the remaining seven years. It is also understood that the Washington Water Power Company will continue the operation of the heating company's steam distributing plant and will operate the acquired property as a subsidiary. The Washington Water Power Company has heretofore done a general light and power business and operated 110 miles of electric railway.

Refinancing Progress of United Railroads.—The two committees representing holders of the securities of the United Railroads, San Francisco, Cal., have arranged for a syndicate to take up at par $5,200,000 of underlying bonds of the company. The bonds in question are $1,800,000 of Market Street 6s, $400,000 of Ferries & Cliff House 6s, $2,000,000 of Omnibus Cable Railway 6s and $1,000,000 of Sutter Street Railway 5s. As for the $23,500,000 of United Railroads general mortgage 4 per cent bonds, on which default was made on Oct. 1, 1916, and on subsequent coupons, Jesse W. Lilienthal, president of the company, has always contended that in order to place the United Railroads securely on its financial feet, it was necessary that the fixed charges should be reduced to a minimum, and that either preferred stock or income bonds or both, should be substituted for this issue. It is now understood that the committees have acquiesced in some such arrangement.

$10,000,000 of Notes Offered.—Lee, Higginson & Company, the First National Bank, the Chase Securities Corportion, Ladenburg, Thalman & Company, Montgomery & Company, Hayden, Stone & Company and Kean, Taylor & Company, have formed a syndicate to sell $10,000,000 Philadelphia Company three-year 6 per cent gold notes to be secured by 200 per cent in par value of a new issue of first refunding and collateral trust mortgage 5 per cent bonds. At a special meeting of the stockholders of the Philadelphia Company on Feb. 4 the stockholders authorized an increase in the indebtedness of the company to the aggregate amount of $100,000,000 and authorized a mortgage upon the property and franchises of the company to secure an issue of $100,000,000 of first refunding and collateral mortgage bonds, payable in twenty-five years and to bear interest at a rate not exceeding 6 per cent per annum and authorized an issue of $15,000,000 of three-year 6 per cent gold notes, of which $10,000,000 are to be issued at once.

Want Interest Payment Put Off.—All the receivers of the Pittsburgh (Pa.) Railways have joined in a petition to the court opposing the payment of the semi-annual interest due under the terms of the mortgage covering the Pittsburgh, Washington & Canonsburg Railway, of which the People's Savings & Trust Company is trustee. In opposing the payment the receivers point out that the total estimated net revenue of the company for 1919 would fall far short of paying fixed charges held against the company for rentals and bond and mortgage interest, if none of the net revenue was spent for improving tracks, equipment and service, or in meeting other municipal obligations or in paying the large items of taxes. The court was further informed that the receivers have completed a budget covering the entire railway situation and the problems confronting the receivers, and that they desire to submit this budget for consideration at the time a hearing is fixed by the court on the Pittsburgh, Canonsburg & Washington Railway Company's petition. They accordingly ask that action by the court be delayed until that time.

Public Service Corporation Notes Offered.—Drexel & Company, Philadelphia, Pa., and Bonbright & Company, Inc., New York, N. Y., are offering, at 98½ and interest (to yield more than 7.55 per cent), three-year secured convertible 7 per cent gold notes of the Public Service Corporation of New Jersey, Newark, N. J. The note issue is limited to the $12,500,000, all now to be issued. They are dated March 1, 1919, and are due March 1, 1922, redeemable at the corporation's option in whole or in part on sixty days' notice. The notes are convertible at the option of the holder at any time prior to Dec. 31, 1921, or until and including the date of any earlier redemption, into new 8 per cent cumulative preferred stock of the corporation on the basis of 100 per cent for the notes and 101½ per cent for the stock upon thirty days previous notice. The Fidelity Trust Company, Philadelphia, Pa., is trustee of the issue. The proceeds of the notes and of the preferred stock presently to be subscribed for will pay off maturing notes, discharge floating debt, provide additional working capital and diminish materially the annual interest charges. Approximately $32,000,000 has been expended on extensions and betterments in the last five years; $5,500,000 of this amount has been financed by the sale of bonds, the remainder being represented by $7,500,000 of notes maturing March 1, 1919, $5,000,000 of common stock of the corporation and short-term loans, etc. The present issue is part of the financial plan outlined in the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 1, page 250. The notes were all sold in a very short time after they had been offered for public subscription.

Electric Railway Monthly Earnings

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1 m., Dec., '18	$82,935	*$57,514	$25,421	$20,271	$5,150
1 m., Dec., '17	83,790	*45,341	38,449	19,665	18,784
12 m., Dec., '18	923,122	*596,735	326,387	239,096	87,291
12 m., Dec., '17	886,120	*502,053	384,067	228,442	155,625

CHATTANOOGA RAILWAY & LIGHT COMPANY
CHATTANOOGA, TENN.

1 m., Dec., '18	$177,162	*$134,029	$43,133	$32,683	$10,450
1 m., Dec., '17	132,286	*131,844	442	31,164	†30,722
12 m., Dec., '18	1,843,947	*1,441,613	402,334	376,118	26,216
12 m., Dec., '17	1,356,732	*1,138,693	218,039	360,087	†142,048

COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO

1 m., Dec., '18	$417,737	*$286,056	$131,681	$63,153	$68,528
1 m., Dec., '17	385,269	*290,974	94,295	49,535	44,760
12 m., Dec., '18	4,264,485	*3,113,068	1,151,417	695,457	455,960
12 m., Dec., '17	4,024,186	*2,943,929	1,080,257	558,589	521,668

COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY,
GRAND RAPIDS, MICH.

1 m., Dec., '18	$2,179,221	*$1,405,949	$773,272	$539,771	$233,501
1 m., Dec., '17	1,996,288	*1,338,117	658,171	454,220	203,951
12 m., Dec., '18	21,918,061	*14,929,845	6,988,216	6,037,313	950,903
12 m., Dec., '17	19,723,763	*12,285,005	7,438,731	5,289,106	2,149,625

EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

1 m., Dec., '18	$406,855	*$329,466	$77,389	$70,935	$6,454
1 m., Dec., '17	357,987	*243,634	114,353	69,883	44,470
12 m., Dec., '18	4,215,887	*3,303,317	912,570	813,289	99,281
12 m., Dec., '17	3,692,472	*2,481,520	1,210,952	785,382	425,570

GRAND RAPIDS (MICH.) RAILWAY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1 m., Dec., '18	$117,656	*$91,372	$26,284	$18,911	$7,373
1 m., Dec., '17	117,238	*87,260	29,978	19,945	10,033
12 m., Dec., '18	1,278,348	*1,020,487	257,861	233,087	24,774
12 m., Dec., '17	1,303,860	*910,176	393,684	218,215	175,469

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY,
LEWISTON, ME.

1 m., Dec., '18	$79,624	*$69,279	$10,345	$19,735	†$9,390
1 m., Dec., '17	62,331	*61,625	706	15,665	†14,959
12 m., Dec., '18	894,784	*791,106	103,678	227,610	†123,932
12 m., Dec., '17	898,378	*683,684	214,689	186,689	†28,000

NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.

1 m., Dec., '18	$277,227	*$198,661	$78,566	$38,381	$40,185
1 m., Dec., '17	223,117	*136,403	86,714	40,137	46,577
12 m., Dec., '18	2,866,213	*1,896,867	969,346	481,655	487,691
12 m., Dec., '17	2,458,321	*1,589,418	868,903	490,071	378,832

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

1 m., Dec., '18	$744,002	*††$445,324	$298,678	$188,894	$109,784
1 m., Dec., '17	594,020	*479,885	114,135	179,036	†64,901
12 m., Dec., '18	7,669,389	*††4,855,890	2,813,499	2,218,187	595,312
12 m., Dec., '17	6,023,510	*3,576,593	2,446,917	2,152,052	294,865

*Includes taxes. † Deficit. †† For the month $22,545 and for twelve months $230,307 included for depreciation.

Traffic and Transportation

Binghamton Wants More

Despite Claim by City of Fare Limitation Court Instructs Receiver to Apply to Commission

William G. Phelps, as receiver of the Binghamton (N. Y.) Railway, on Feb. 3 applied to the Public Service Commission for the Second District of New York for an order authorizing a 6-cent fare in Binghamton to be continued during "the war in which the United States government is now engaged with the German Empire and for two years thereafter." The petition was signed by Mr. Phelps as receiver. The commission will investigate and order a public hearing.

Mr. Phelps' petition recites that he was appointed receiver under an order of the United States District Court on Oct. 8, 1918, and that he is in possession of the company, which was incorporated on Dec. 6, 1901, by the consolidation of the Binghamton Railroad and the Binghamton, Lestershire & Union Railroad. The receiver says:

> That upon entering upon the duties of said receivership, your petitioner ascertained, and believes to be true, that on account of the changed financial and economic conditions brought about by the war in which the United States Government is now engaged, especially the great increase in the cost of fuel and materials necessary for its operation, the prices of which have increased 200 and in some instances 300 per cent, the advance in wages of labor, increase in taxes and operating expenses generally, together with a falling off in receipts, a surplus in earnings in 1917 was changed to a large deficit, by reason of which the Binghamton Railway Company was unable to pay its operating expenses, interest on its bonds and its outstanding obligations.

The company submits statements of its financial condition in 1914, 1915, 1916 and 1917, and the first half and the first nine months of 1918 and a schedule showing the increase in the prices of materials and supplies. The net corporate income follows:

1914, $51,924; 1915, $79,759; 1916, $102,535; 1917, $81,971; 1917, first half, $60,682; 1918, first half, $18,748 deficit; 1918, nine months, $32,717 deficit.

The road operates in Binghamton, towns of Port Dickinson and Union and Port Dickinson, Johnson City, Endicott and Union, and the receiver alleges that a 5-cent fare is insufficient to yield a reasonable compensation for the service rendered, is unjust and unreasonably low and does not give an average return on the value of the property, is confiscatory and unless the rate is increased to a reasonable and just rate operation of the road must cease. The receivership was brought about to conserve and protect the property and operate the road under the Federal Court until some means can be devised to relieve it from its financial difficulties.

Operating expenses, it is alleged, have increased from $321,473 in 1914 to $446,545 in 1917, and in the first six months in 1918 expenses increased $31,173 over the first six months in 1917. During the first six months of 1918 the road's revenues decreased $27,525, as compared with the corresponding period in 1917, and during the first six months in 1918 the company's deficit was $18,748 as against a surplus of $60,682 for the corresponding period in 1917. Taxes for 1919 will be at least $7,500 more than in 1918. Four increases in wages have been made within the past three years.

Receipts from Oct. 10, 1918, to Oct. 31, 1918, including the lighting plant, were $29,690; disbursements $29,791, a deficit of $100 not including interest on bonds, taxes, insurance or any existing indebtedness, claims for damages, betterments or necessary repairs.

The financial condition of the company, it is stated, has not resulted from waste, extravagance, over capitalization, excessive salaries or bad management.

The receiver says that on Oct. 29 he applied to the United States Court for instruction to apply to the commission for permission to ask for an increased fare, the city contending that the rate of fare was limited by ordinances restricting the fare to 5 cents. The city opposed the application in the United States Court. Trial was had and on Jan. 22 a decree was rendered in favor of the receiver and, it is claimed, is a final adjudication against the city and other municipalities, directing the receiver to make application to the Public Service Commission for the Second District, for an order authorizing an increased rate of fare to be charged by the Binghamton Railway.

The commission will hear the petition in Binghamton on Feb. 21.

Would Repeal Rate Restriction

Governor James P. Goodrich of Indiana in his message to the General Assembly urges the repeal of the 2-cent law. He says:

> The status of the railroads of the country will be determined by Congress in the near future. If the roads go back to private ownership immediately, or in the near future, there is an urgent necessity for action on the part of the states to remove existing statutory rate restrictions. The railroads in Indiana, as in all other states, are now operating under a rate of 3 cents per mile which was authorized by the federal railroad administration. If federal control should end, and unless prior action is taken, the roads will immediately pass back under the rate restrictions of the several states. Such an action would surely prove fatal to transportation, and to the economic conditions of the country.
>
> Therefore, I recommend the repeal of the present statutory railroad rate restriction in Indiana, and urge that the power of determining such rates be vested in the Public Service Commission of Indiana until the permanent status of the railroad companies is fixed.

Des Moines Fare Unchanged

Citizens, However, Will Get Only Such Service as the Fare Will Support

Judge Martin J. Wade of the Federal Court has denied the application of the receivers for the Des Moines City Railway for an increased rate of fare. While Judge Wade's ruling is regarded by attorneys for the city of Des Moines as a victory, the ruling sets out that if the company's earnings are not sufficient to meet the fixed charges provided for in the franchise and pay for the present service the service must be adjusted to the income.

Immediately upon receipt of the ruling officials of the. Des Moines City Railway announced that a general curtailment of service would go into effect within the next two weeks. Owl cars are to be abandoned, lines now on a seven-minute service are to be reduced to ten-minute service and non-productive lines are to be further reduced as to service. There is to be no curtailment of rush-hour service according to the announcement.

Judge Wade holds that the franchise is a contract and that the fares fixed therein are definite and binding and that they cannot be increased. In this connection Judge Wade rules that the terms of the franchise as regards service are as binding upon the people as upon the company. The court said in part:

> The only question involved before the court is whether or not section 17 of the franchise, fixing the fares at six for a quarter, is to be construed with section 7, which provides for the payment from the fares of all costs of operation, including taxes and interest, at not to exceed 5 per cent on the company's indebtedness represented by bond, and not to exceed 6 per cent on the remainder of such indebtedness and the setting aside of a depreciation fund.
>
> It is the contention of the receivers, and for the purpose of this hearing only the contention is assumed to be true, that the income from fares will not pay the cost of operation, taxes, interest and depreciation and continue the present service.
>
> It is here apparent, of course, that if this contention is true, fares will have to be increased or service reduced.
>
> The court cannot close its eyes to the fact that in controversies over franchises for street railway companies, the thing most important in the minds of the people is the rates of fares. Fares touch the people most directly and I have no doubt from all the evidence before the court that so far as the people of Des Moines are concerned they assumed that the fare was definitely and finally determined by this franchise.
>
> Of course the people of Des Moines cannot have service which will not be paid for out of the fares. The receivers are claiming that the service demanded by the city of Des Moines cannot under present changed conditions be rendered from the present income. If this claim is true, of course, it is most unfortunate; and yet these parties have made a contract and the court cannot modify its provisions.
>
> That the contract did not contemplate a change of fares is further emphasized by the omission from the contract of any method of fixing higher fares.
>
> New conditions may render it absolutely impossible for the people to get, under the contract, what they expect in the way of service, but the people are bound by the contract as well as the company, and when they get that service which can be paid for under the provisions of the contract, they must be content.

Emil G. Schmidt, president of the Des Moines City Railway, announces that there will be no appeal from Judge Wade's ruling.

A Small Road's Problem

Three-Cent-a-Mile Charge Under Government Replaced by Seven Five-Cent Zones

As the result of several conferences between the Public Service Commission of Massachusetts and the Grafton & Upton Railroad, the latter has agreed to try out for an experimental period a new fare plan under which the road is to be divided into seven zones, with a 5-cent fare in each. Under this plan the through fare will be the same as suggested by the petitioners, but the 5-cent unit of fare for zones of approximately 2 miles each should prove more convenient both to the company and to the public.

Joint Operation Provided

As the portion of the line between Milford and Hopedale is now operated by the Milford & Uxbridge Company on its own line and under its own tariff, the passenger rates from Milford to Hopedale and other points on the Grafton & Upton Railroad are not included in the local passenger tariffs to be filed by the Grafton & Upton Company. With this exception, all the present workingmen's tickets are to be retained at a rate 40 per cent in excess of that prevailing prior to June 10, 1918, which corresponds with the proposed increase in the cash rates as compared with those in effect prior to the same date.

System Has 18.10 Miles of Line

The Grafton & Upton Railroad runs from North Grafton through the towns of Grafton, Upton and Hopedale to Milford. It has a total mileage of 18.10 miles, including a loop 2.73 miles long in the town of Upton which was acquired through purchase of the railway of the Upton Street Railway. This loop line retains the status of a street railway, as the Grafton & Upton Company did not acquire the right to operate a railroad upon that location.

Under the authority of the same statute the Grafton & Upton Company, on Oct. 1, 1902, entered into a contract, which still remains in effect, with the Milford & Uxbridge Street Railway, under which the latter company supplies the cars, car employees, and the power, and maintains the overhead system, for the operation of the passenger service and the transportation of baggage, express and mail matter of the Grafton & Upton Company between North Grafton and Hopedale. The portion of the line between Hopedale and Milford is now used for freight traffic only, the passenger service between these points being performed by the Milford & Uxbridge Company on its own line and under its own tariff. By virtue of this arrangement the Grafton & Upton Company furnishes passenger service through the medium of the Milford & Uxbridge Street Railway between North Grafton and Hopedale by way of the Upton loop, a total distance of 13.60 miles, and directly operates the freight service between North Grafton and Milford by way of the main line, a distance of 15.37 miles. By the terms of the contract between the two companies the Grafton & Upton company receives a stated sum of $9,500 a year plus one-fourth of the gross passenger receipts in excess of $25,000, and the remainder of the passenger receipts go to the Milford & Uxbridge Company.

Government Took Over Road

On Jan. 1, 1918, the federal government took over the possession, use, control and operation of the Grafton & Upton Company. At that time, the road was divided into five zones, with a 5-cent fare in each. On June 10, 1918, the United States Railroad Administration established a uniform one-way rate for passenger transportation of 3 cents a mile, with a minimum charge of 10 cents, upon all railroads under federal control. On June 24, 1913, the company was discharged from federal control, but the rates meantime established have remained in effect except as modified by a tariff supplement effective on Aug. 1, 1918, which provided for a reduction of the minimum fare for a ride of 2 miles or less from 10 cents to 6 cents.

The petitioners claimed that the passenger service of the Grafton & Upton Company is essentially a street railway service rather than a railroad service, that the rates should be established according to railway rather than railroad standards, and that upon this basis the existing rates are excessive.

The company contended that its status as a railroad had been established, but suggested that, if the present system of mileage zones is inconvenient to the public, it might be willing to provide for a division of the road into 6 fare zones, with a 7-cent unit of fare. This plan would make no change in the through rate for the entire line, but would result in certain readjustments of fares between intermediate points.

New York's Accident Record

In the second serious accident within ten days on the Third Avenue Elevated Railroad of the Interborough Rapid Transit Company, six persons were hurt, at 8.15 a.m., on Feb. 8, at 120th Street and Third Avenue when a northbound seven-passenger-car local train of wooden cars ran into an empty train, made up of composite cars, standing idle on the tracks.

In the accident on Jan. 30, a rear-end collision on the Third Avenue Elevated at 175th Street, one woman was killed and thirty persons injured.

The number of deaths in accidents on subway and elevated lines in 1918 was greater than in any other year on record. The total of killed was 177. The largest in any preceding year since 1910 was eighty-three in 1914. Of the 177 deaths last year, ninety-nine were due to the Malbone Street accident in Brooklyn in which a train of cars left the track. Aside from this there were seventy-eight deaths, seven more than in 1917 and eight more than in 1916. The number of persons killed in surface car accidents in 1918 showed a marked decrease, dropping from 157 in 1917 to 119 last year, accounted for in part by the decrease in surface line traffic.

An official table showing accidents of all kinds, whether to equipment or to human beings, of casualties of all kinds, and of deaths on the subway and elevated lines in New York City follows:

Year	Accidents	Casualties	Killed
1913	12,435	11,009	71
1914	12,358	11,598	83
1915	11,610	11,336	74
1916	13,572	13,478	70
1917	15,372	15,092	71
1918	12,455	12,692	177

The table of accidents for the same period on the surface lines is as follows:

Year	Accidents	Casualties	Killed
1913	54,854	30,342	155
1914	54,128	29,416	134
1915	48,176	27,142	94
1916	51,535	28,585	116
1917	52,195	28,526	157
1918	41,086	21,643	119

Defines Public's Interest

J. F. Porter, president of the Kansas City Light & Power Company, Kansas City, Mo., was invited to address the Kansas City Chamber of Commerce on Jan. 8 on the subject of the attitude of cities toward their public utilities. Unusual interest attached to the address because of the recent strike of the employees of the Kansas City Railways and the recent fare increase. Mr. Porter said in part:

The Public Service Commission looks after the interests of the public, the customers, but it also looks after the interests of the investors. If it raises rates it is criticised, but there have been cases where the rate was too low to render a just return to the investor. The company must have a fair return or go broke and the customers suffer. If the situation were understood the commission would be encouraged to fix rates for adequate returns on investment when costs are high so that prices might be reduced when costs decline. If the people who complain were sincere they would say in such times as these; "Those securities are low, I'll make an honest dollar by buying them." If they cannot trust the commission which says the company should have 6½ per cent return for its investors these people should get behind the utilities and make their securities more valuable.

The fundamental basis of utility operation is service. You want service. What do you say to sitting in and helping dictate the company's policies so far as the commission will allow? You who pay for service pay what the commission, after examining our books, says is a fair price.

You are interested in costs, because when anything happens to costs it also affects the rates. A lower rate for yourself may increase your costs of service in another direction. You are interested in every judgment against the company, for every judgment affects rates.

When some one says, "That company or corporation should be stopped from doing such and such a thing," think of your own interest in such an estoppel. Be sure that the thing opposed is not some step necessary for economical and efficient service; the better the service the lower the rates. The less friction there is in the working of the company the easier and cheaper it is for the company to give good service at low rates. Public officials are realizing this and are assisting rather than hampering corporations in improvements required for better operations.

Rome (N. Y.) Hearing Closed

The application of the New York State Railways, to the Public Service Commission for the Second District of New York for a 6-cent fare in Rome, was submitted to the commission on Jan. 15 for determination. Mayor H. C. Midlam and Corporation Counsel M. J. Larkin represented the city. Walter N. Kernan and B. E. Tilton, vice-president and general manager of the Utica and Syracuse lines, appeared for the railroad company. Patrons of the railroad company in Rome protested against present service there and considerable evidence was submitted.

The railroad company, through Mr. Tilton, put in proof as to the financial operations of the Rome road for the first eleven months in 1918. Mr. Tilton said the receipts of the Rome line for the eleven months were $57,490, showing a decrease of 14.2 per cent over the same months in 1917. The expenses for the eleven months were $69,583, or a deficit of $12,092. The fare receipts included all fares in Rome and to Stanwix. The expenses do not include legal expenses, salaries of general officers and fixed charges, including interest on bonds and return on capital invested. Wages of conductors and motormen were increased from 31 cents an hour early in the year to 35 cents and then to 45 cents, the latter rate the result of the War Labor Board's award. Mr. Tilton said the earnings per car-mile in Rome were the lowest of any city he knew.

Mr. Tilton figured that the company, under the proposed increased fare, would receive about a 13 per cent increase in revenue or about $8,317. He estimated a falling off in traffic of 1½ per cent over 1918.

Mr. Tilton told Mr. Larkin that the reduced revenues were not due to the reduced service. He acknowledged that there had been demands for better service. To this Mr. Larkin replied that the company was not entitled to increased fare because of the service given. He was informed by Mr. Tilton that the base schedule in Rome had not been reduced, only the tripper service.

The hearing was declared closed unless either party desires to submit additional evidence after the company's figures are checked up.

Trenton Service Still Unsatisfactory

The Board of Public Utility Commissioners of New Jersey has rebuked the Trenton & Mercer County Traction Corporation for failing to carry out all the recommendations of the commission's order of Nov. 27. The inspectors' report shows that poor service is due mainly to lack of discipline among the crews, inability to maintain proper schedules, inadequate maintenance of rolling stock and an insufficient number of cars. Suggestions made by the inspectors follow:

The company should insist on the obedience of its operating rules by the employees, particularly the car crews.

Greater alertness and general activity on the part of the traffic inspectors on the streets.

Improvement in the repair and maintenance of rolling stock and installation of additional facilities for carrying out this work.

The operation of additional cars during rush hours or the substitution for the present small cars operated during this period of larger cars.

The separation of the system into three divisions, each under the supervision of one or more inspectors of supervisors, each of whom shall be held directly responsible for the operation of his particular division.

At the suggestion of Peter Witt the railway placed an order for twenty one-man cars, each to carry thirty-two persons. The company recently received six of these cars and will experiment with them under an agreement, whereby they may be returned to the manufacturers for large cars if the small ones are deemed to be unsuitable.

Jitneys Reappear in Des Moines

Jitneys made their first appearance in a number of years on the streets of Des Moines, Iowa, during the week ended Jan. 18. City officials state they will arrest all drivers who have not compiled with the city ordinances, which require an indemnity bond and compel the jitneys to follow established routes. The autos in service formerly plied between Camp Dodge and Des Moines.

Denver Retrenching

The Denver (Col.) Tramway is retrenching in every direction in an effort to reduce expenses to a point that can be met with the revenue from the 6-cent fare during the time that the company is waiting for the result of the investigation of the committee of fifty appointed by the city's consumers, labor and commercial organizations. In December the company secured a fare of 7 cents plus 1 cent for transfers from the Public Utilities Commission, but as a result of the ruling by the Supreme Court on Jan. 15 in the telephone case, to which reference was made in the ELECTRIC RAILWAY JOURNAL for Jan. 25, page 206, the company put the fare back to 6 cents. The court held that the Utilities Commission had no jurisdiction over rates in home-rule cities in Colorado. The 6-cent rate had been authorized by both the City Council and the Utilities Commission, whereas the 7-cent rate was authorized only by the Utilities Commission. The 6-cent fare being inadequate to pay the company's bills it reduced service, laid off about 150 employees, stopped all construction and street improvement work and abandoned two lines. These abandonments and the changes in operating schedules were discussed in *Tramograms* for Feb. 1.

Transportation News Notes

One-Man Cars Suggested.—The introduction of one-man cars on the Country Club, Brooklyn, Ingalls Park and Fourth Avenue lines of the Chicago & Joliet Electric Railway has been proposed to the City Council of Joliet, Ill.

Denied Excess Fare Charge.—The Public Utilities Commission of Illinois has denied the petition of the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., for permission to charge an excess fare to passengers who fail to purchase tickets before boarding cars.

Another Increase Denied.—The Public Service Commission of Indiana has denied a petition of the Cincinnati, Lawrenceburg & Aurora Railroad, Cincinnati, Ohio, for an increase in intrastate passenger rates. The commission ascertained that the company is losing money, but found that most of this was loss on the Ohio end of the line.

200 Coupon Book for $2.—The New York State Railways, Rochester Lines, on Feb. 17 will put into effect a new tariff regulation providing for the sale by conductors and agents of a 200 coupon book for $2 entitling the holder to $2 worth of transportation on the Rochester lines except in Rochester. The minimum detachment will be five coupons.

Talks to Trainmen in Dallas.—Motormen and conductors of the Dallas (Tex.) Railways are holding regular meetings for the exchange of ideas on how to improve the railway service and to hear addresses from heads of the operating departments. At recent meetings, the men were addressed by the general manager, and by the assistant to the president.

Fare Increase Suspended.—The Public Utilities Commission of Illinois has suspended until Aug. 14 the application of the East St. Louis & Suburban Railway, East St. Louis, Ill., for a proposed increase in passenger fares. The company wanted to advance rates 10 cents between Belleville, Ill., and St. Louis, Mo. Two new collection zones, one additional in Belleville and one additional in East St. Louis, were proposed.

Maintaining Schedules in Dallas.—The Dallas (Tex.) Railway, as a means of improving schedules and making for faster time, has installed markers exery six or seven blocks along its lines. These consist of easily discernible signs suspended from the span wires. Each motorman is supplied with schedule cards showing the time due at each of these markers. This system has been put into effect by Dan Fisher, assistant to the president and also in charge of publicity.

Co-operating in Freight Campaign.—Electric railways operating out of Indianapolis united in a full-page advertisement in the Indianapolis papers relative to the annual Indiana Poultry Show. Express service from all parts of the State to Indianapolis, the "Hub of Hoosierdom" is made a prominent feature of the publicity matter. The Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis & Cincinnati Traction Company, Interstate Public Service Company, and the Union Traction Company of Indiana all joined in the advertising.

Short Strike in Wichita Falls.—Conductors and motormen of the Wichita Falls (Tex.) Traction Company went out on a strike recently because the company refused their demands for recognition of the union and for a wage increase from 30 cents to 40 cents an hour, and for a shorter work day. The men have been working twelve hours a day for 30 cents an hour. They now want an eight-hour day with extra pay for overtime. The company was unable to move cars for several days, but finally employed other men and has resumed service.

Two-Mile Line Feels Pinch.—The receipts under the present fare of the St. Louis & Jennings Railway, St. Louis, Mo., are insufficient, according to statements made by officers of the company at a recent hearing before the Public Service Commission of Missouri on the company's petition for an increase of fares. The city of St. Louis has ten days in which to file an answer to the petition. The company operates about 2½ miles of track from the northern terminus of the Bellefontaine Street line of the United Railways, St. Louis, to the town of Jennings, St. Louis County.

Fare Reductions Ordered.—The Public Service Commission for the Second District of New York at its regular session on Feb. 4 ordered George Bullock as the receiver of the Buffalo & Lake Erie Traction Company, beginning on Feb. 6 to charge only 5 cents, with transfers, in the city of Buffalo on all cars where he is now charging 13 cents without a transfer, to reduce to 10 cents, the fare between the city of Lackawanna and the city of Buffalo on such cars as he is now charging passengers 14 cents, and to restore the sale in the city of Lackawanna of strips of seven tickets for 25 cents which he discontinued in January last and charged 5 cents fare.

Relief in Sight in Richmond.—Final vote in the Common Council of Richmond, Va., the city's lower legislative body, on the measure increasing fares on the lines of the Virginia Railway & Power Company in Richmond resulted on Feb. 3 in the passage of the ordinance by a vote of twelve to eight. The ordinance now goes to the Aldermen. The increases are as follows: A straight 5-cent fare to the general public, instead of the six tickets for 25 cents. Labor tickets, now sold at the rate of two for 5 cents, and good from 6 a. m. to 7 a. m., will be sold at the rate of six for 25 cents, and will be good from 6 a. m. until 8 a. m. School tickets will remain as at present.

Seven-Cent Minimum Charge.—The New York, Westchester & Boston Railway, New York, N. Y., on Feb. 1, by special permission of the Public Service Commission for the Second District, changed its tariff schedules affecting local passenger traffic as follows: Local one-way fare between any two points in any one zone, except between points in New York zone, Harlem River to Dyre Avenue, Bronx, inclusive, 7 cents, an increase of 2 cents. Increases varying in amounts from 2 to 5 cents in all interzone fares except between Wykagyl and Quaker Ridge. Commutation ticket fares, sixty and forty-six-trip, increased approximately 10 per cent. Baggage rates canceled and provision made for free transportation of baggage, not exceeding 150 lb. in weight per passenger, between points where the company has baggage facilities.

Service Ordered to Be Restored.—The Public Service Commission for the Second District of New York at its regular session on Feb. 6 ordered the New York State Railways, on or before Feb. 10, to restore service upon its lines in Rochester during non-rush hours so that operation shall conform to recommendations and requirements in the report of Charles R. Barnes, chief of the division of electric railroads, to the commission and to continue the service until further order. In its order the commission decided to enlarge the scope of its proceeding under the "show-cause" order directed to the company so as to include generally the company's service in Rochester. It was also decided to hold further hearing on Feb. 19 on the reports of Mr. Barnes to the commission and upon all questions concerning service on the company's lines in Rochester.

In a Spirit of Mutual Helpfulness.—Receiver Garrison of the Brooklyn (N. Y.) Rapid Transit Company called at the offices of the Public Service Commission on Jan. 21 and conferred for an hour with Commissioners Whitney, Hervey and Kracke; the commission's chief counsel, Godfrey Goldmark, and its special counsel, William L. Ransom, on the subject of increasing the efficiency of the Brooklyn Rapid Transit Company. The commission promised to do what it could to complete the rapid transit system so that trains could begin running, and to assist Mr. Garrison with schedules that would yield the maximum of service with the present equipment. It was also practically agreed that 250 new surface cars should be bought. There is no money available for these cars, but it was suggested that the surface companies could issue certificates of indebtedness, which could be accepted by the Brooklyn Rapid Transit Company and money furnished on them out of sums to be raised on receiver's certificates. There will be other conferences between the commission and Mr. Garrison.

New Publications

Electrical Blue Book

Eighth edition, 1918. Published by the International Trade Press, Chicago. Cloth, 274 pages. Price, $2.

This book contains the national electrical code, as recommended by the National Fire Protection Association, with illustrations and explanatory notes, and with the changes introduced in the latest revision of the rules made conspicuous by being printed in larger type. It also contains a list of inspected and approved electrical appliances and other information of value to the electrical contractor and installer of lighting and power equipment.

What is Fair?

By William G. Raymond. John Wiley & Sons, Inc., New York, N. Y. 172 pages. Cloth, $1 postpaid.

This little book is the attractive presentation of the author's ideas in regard to what is fair in the relationship between the public and utility owners. Mr. Raymond believes that no corporation serving the public should be made to feel that its property is of uncertain value because of intermittent regulation of rates according to no fixed rule. He has developed an equation to express the fair return for a utility under continuous regulation. The book as a whole represents an earnest effort to consider all the equities involved in one of the most complicated questions of the day.

The Financing of Public Service Corporations

By Milton B. Ignatius. The Ronald Press Company, 20 Vesey Street, New York, N. Y. 508 pages. Cloth. $5 postpaid.

The purpose of this work, according to the author, is the presentation of a comprehensive discussion of the important aspects of utility financing, from the inception of the enterprise and the issuance of securities to the expenditure of the proceeds and the recording of the facts. This purpose has been well carried out.

The book is an admirable survey of a field which is no longer of purely private concern, since the advent of the regulatory commissions. The part of the book most striking, because of its newness, is the discussion of the supervisory powers of the commissions over utility securities. Mr. Ignatius hits the nail on the head when he says that the future usefulness of such bodies depends upon the spirit with which they approach the task of outlining, without legal responsibility for results, the financial policies of utilities.

The book is written not only for that part of the general public which is interested in utility financing but also for those directly connected with utility operation. It therefore should be in the libraries of all utility men.

Personal Mention

W. J. Hodgkins has been appointed general superintendent of the Ironwood & Bessemer Railway & Light Company, Ashland, Wis., to succeed F. R. Winders.

Gust Johnson has been appointed engineer of maintenance of way of the St. Paul Southern Electric Railway, Hastings, Minn., to succeed Carl Erickson.

Allen Blanchard has been appointed master mechanic of the Trenton & Mercer County Traction Company, Trenton, N. J., to succeed Benjamin C. Bowers.

F. R. Burns has been appointed superintendent of the Blackstone division of the Worcester Consolidated Street Railway, Worcester, Mass., to succeed C. H. Sanborn.

W. I. Dill has been appointed secretary of the Burlington County Transit Company, Hainesport, N. J., to succeed Armitt H. Coate, who retains his position as treasurer of the company.

James Smith has been appointed master mechanic of the Atlantic Coast Electric Railway, Asbury, Park, N. J., to succeed J. H. Moor, who retains his position as chief engineer.

I. C. Elston, formerly secretary and treasurer of the Vicksburg Light & Traction Company, Vicksburg, Miss., has been elected president of the company to succeed William B. Walter.

Joseph N. McCallum, vice-president of the Vicksburg Light & Traction Company, Vicksburg, Miss., has also been appointed treasurer of the company to succeed I. C. Elston, who has been elected president.

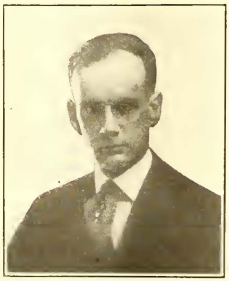
A. G. McMasters has been appointed purchasing agent of the Lincoln (Neb.) Traction Company to succeed C. F. Greenberg, who, as noted in the ELECTRIC RAILWAY JOURNAL, resigned from the company, effective on Oct. 3.

E. Driscoll has been appointed assistant chief engineer of power station of the Tampa (Fla.) Electric Company to succeed L. P. Chaney, who was recently appointed chief engineer of the Pensacola (Fla.) Electric Company.

G. H. Kuhrts, formerly assistant general manager of the Los Angeles (Cal.) Railway Corporation, has been appointed general manager of the company to succeed Howard Huntington, who remains as vice-president.

R. M. Harding, who has been general superintendent and director of transportation of the Columbus (Ga.) Railroad for several years, has been made acting general manager of the company to succeed John S. Bleecker, who, as noted previously in the ELECTRIC RAILWAY JOURNAL, has become connected with the New Orleans Railway & Light Company.

Hartley Le H. Smith, who has been chief of the testing bureau of the Brooklyn (N. Y.) Rapid Transit System, has resigned to take charge of the steam engineering department of the New England Power Company, Worcester, Mass. He will have supervision of the steam-driven power stations of this company which are auxiliary to its hydroelectric power supply. He has been connected with the engineering staff of the Brooklyn Rapid Transit Company for more than sixteen years, having joined it for the purpose of looking after meter, coal, boiler and other testing work. The testing bureau was organized soon after he joined the staff and under his direction has grown to be a large department, with mechanical, electrical and chemical subdivisions each with its staff under competent supervision. The nature of the work done by this department is reflected in the series of articles contributed by Mr. Smith to the monthly mechanical and engineering issues of the ELECTRIC RAILWAY JOURNAL during the past year. Mr. Smith is thirty-nine years of age. He secured his elementary education in Camden, N. J. After leaving high school he attended Drexel Institute in Philadelphia and completed a three-year mechanic arts course and a two-year electrical engineering course. Immediately thereafter he spent one and a half years with the Camden & Suburban Railway as assistant to the electrical engineer who at that time had charge of power stations, rolling stock and lines. He left this company to join the B. R. T. staff as already mentioned. Aside from his direct work for his employers Mr. Smith has taken an active interest in the national engineering societies. He is a member of the American Institute of Electrical Engineers and the American Society for Testing Materials.



H. LE H. SMITH

B. E. Parker, Evansville, Ind., has been appointed general superintendent of railways of the Northern Ohio Traction & Light Company, with headquarters at Akron, Ohio. Mr. Parker occupied a similar position with the Evansville Public Utilities Company, and was superintendent of transportation of the Rockford, Ill., system before that time. He entered electric railway work in April, 1890, as a conductor at Muskegon, Mich. Going to Marion, Ind., some years later, he soon became local superintendent of the Union Traction Company, in which position he remained until 1911, when he went to Rockford.

Clifton W. Wilder, electrical engineer of the Public Service Commission for the First District of New York, and connected with that organization practically since its establishment in 1907, has resigned to join the staff of the New York Edison Company. Mr. Wilder was graduated from the Massachusetts Institute of Technology in 1896. He engaged in general engineering work pertaining to lighting, industrial and railroad properties in Boston and New York until 1907, when he entered the service of the commission as an assistant electrical engineer. In 1909 he was appointed electrical engineer and placed in charge of the equipment inspection bureau. Just previous to the signing of the dual subway contracts in 1913, Mr. Wilder's duties were extended so as to include the engineering matters coming before the commission pertaining to the equipment of the rapid transit lines constructed under the dual contracts and the related elevated railroad certificates. In the past seven years the staff of the bureau under Mr. Wilder's direction has passed upon the plans for and purchase of equipment by the two companies amounting to nearly $100,000,000. Mr. Wilder has also had charge of appraisals of the property of several of the large public utility corporations under the jurisdiction of the commission.

Obituary

Randolph S. Reynolds, secretary of the Curtain Supply Company, Chicago, Ill., died of pneumonia on Jan. 20. Mr. Reynolds became connected with the Curtain Supply Company in 1912. Prior to that time he was with the Western Steel Car & Foundry Company, at Anniston, Ala., and the Pressed Steel Car Company at Pittsburgh, Pa., having been connected with the purchasing departments of these companies from 1905 to 1912. He left the Pressed Steel Car Company in 1912 to accept a position with the Curtain Supply Company and later was made assistant to the general manager. On April 30, 1918, he was elected secretary of the company, to succeed Holmes Forsyth, who on that date became president.

Manufactures and the Markets

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

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Large Swiss and Swedish Electrification Projects

German Methods Retard Work, But United States Aid Is Sought—Many Millions Involved

Electrification of railroads in Europe, particularly in those countries where quantities of cheap water power are available, did not get far during the war although last fall the subject apparently was revived. In Switzerland and Sweden especially were large projects contemplated, involving the expenditure of millions of dollars for equipment.

Switzerland has been working under extreme hardships in the last four years with reference to the proposed change-over of her railroads from steam to electricity, and for new electric lines. With only one workable iron-ore deposit in the country and little coal she has been dependent for her supplies of these commodities on the Central Powers, as the Allies were unable to provide sufficient for her use. *Commerce Reports* of Nov. 29, 1918, issues a report submitted under date of Oct. 11, 1918, by Commercial Attaché Pierce C. Williams, wherein is shown Germany's control over Swiss supplies of iron and steel for the electrification of Swiss railroads, in its endeavor to keep a grip over its Swiss competitors in the electrical industry.

Switzerland was then engaged in the electrification of a portion of the railway connecting the country with Italy through the St. Gotthard tunnel, and to complete this work there were required great hydroelectric stations, miles of transmission lines, steel poles and locomotives. Swiss workshops were ample to handle all of this work, but with the inability of the Allies to furnish the materials, Switzerland felt the necessity of accepting the German steel. Although Germany at this time was unable to make deliveries, that country succeeded in keeping the Swiss works from receiving as much work as they could handle thereby retarding the work of electrification. It was enabled to hold Switzerland to the bargain made years ago at the opening of the St. Gotthard convention, whereby the right to participate in the tenders with Swiss firms for electrical apparatus was received by Germany.

That the Swiss really desired to import steel and other railway supplies from the United States was shown in a letter which the Attaché had just received from a steel importer in Geneva. Herein it was stated that in his dealings with the Swiss railroads for the importation of steel poles, American licenses, unfortunately, were not being granted at that time and freight conditions were such that the buying of American poles had to be abandoned, thus obligating them to the Germans for poles. He pointed out the importance of the growing Swiss railroads and the large American field for all electrification material.

In a previous *Commerce Reports*, page 524, Vice-Consul R. E. Schoenfeld, writing on Sept. 20, 1918, shows that Switzerland is making every effort to utilize her great sources of water power to provide for the electrification of her railways. The General Director of Swiss Federal Railways has submitted a detailed plan of electrification to the Council of Administration of these railways for approval. On the basis of expenditures outlined, it would be necessary to count during a series of years, possibly up to thirty, on the following expenses of construction: installation of electric traction $5,000,000, construction of new lines $300,000, works of completion $7,200,000, rolling stock $5,400,000. This totals $17,900,000 per year for the first ten years, after which the amount would decrease to approximately $16,000,000 a year for possibly twenty years.

The Federal Direction foresees great difficulty in financing these construction operations with Swiss capital, and looks to the United States for financing part of the construction and supplying the raw material.

200,000 Hp. of Water Power Needed in Switzerland

The amount of water power necessary has been estimated at an average of 200,000 hp. at the axis of the turbines. Sufficient water power concessions have already been obtained to supply three-quarters of the system.

As to the electrification of the Swedish railways, translation of an article in the "Social-Demokraten" of September 20, 1918 states:

The Swedish railway committee was instructed by the King of Sweden in the end of 1915 to investigate the practicability of electrifying the railways of the Kingdom.

The potential water power of Sweden is immense, of which 4,000,000 turbine horsepower is now being developed. The great reduction in the supply of coal and the increase in the cost has accentuated the importance of developing Sweden's water power. This development has naturally been hampered during the war by the absence of metals necessary for the manufacture of turbines, dynamos, and other machinery and wires for power transmission.

Current Price Changes for Supplies

Wire, Galvanized Pole Line Hardware and Cotton Tapes Show Decreases

Prices generally remain unchanged. There have been some decreases however.

Rubber-covered wire-base averages 25 cents, a drop of about 3½ cents from last week. One manufacturer quotes on a 28-cent base, one on 27 cents, six on 25 cents, two on 24 cents, one on 22-cent base and two on cost. Those quoting on the high bases apparently figured that business could not be stimulated merely by a change in prices and therefore saw no reason to reduce. Bare wire was reported on a 21-cent base, weatherproof on 22½ to 24-cent base and annunciation on 30-cent and 37-cent bases.

Galvanized pole line hardware has declined approximately 10 per cent.

White cotton tape has been reported by one jobber as off 10 to 15 per cent. Friction tape has been reported as lower in only one instance, and that was about 8 per cent. The drop in cotton brings that commodity to a level which some believe is close to bottom.

Inquiries failed to disclose any drop in the price of rail bonds following the drop in copper last week by the big copper producers.

Pneumatic Door and Step Control Gaining

Further Installations Show Popularity of This Safety Equipment Applied to Both New and Old Cars

While reports show that but few traction companies have ordered large numbers of new cars equipped with pneumatic door and step control, manufacturers report that a large number of roads have either ordered a small number of new cars so equipped or are having some of their old cars remodeled to incorporate this safety feature. The manufacturers are also working on many inquiries for these devices from roads which have not yet entered this field but which are watching carefully the results of cars so equipped on other lines.

Depending upon the class of service to be rendered under different conditions, the safety features are being applied to heavy as well as to light cars. For instance, the inquiries coming from Toronto indicate that the safety control would be incorporated in the new pay-as-you-enter cars of the heavy type, rear end entrance. The

majority of the applications, however, appear to be for light cars.

Of the more recent cases which have come to notice, where safety equipments either are under contemplation or have already been ordered, inquiries are under way for 50 cars for Brooklyn, while six new cars of a previous order are already on their way, some of which have been delivered. Boston has the matter up, Erie contemplates fifteen cars, and Milwaukee is remodeling some of its cars to incorporate this feature. Bridgeport has twenty safety cars, Trenton has recently received four new ones and the Richmond Light & Railway Company has received one out of the twenty new safety cars ordered last year. The Third Avenue Railway Company is using twenty-five cars on its Mount Vernon and New Rochelle lines, embracing safety features of its own design.

New Advertising Literature

Unit Railway Car Company, Newton, Mass.: Pamphlet on a kerosene or fuel oil burner, steam operated railway car for railroad, interurban and city use.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.: Six-page reprint of an article in the *Magazine of Wall Street* for September, 1918, by W. H. Easton, entitled "The Advantages of Railroad Electrification."

Heine Safety Boiler Company, St. Louis, Mo.: An eighty-six-page treatise on steam boilers, entitled "Boiler Logic." The topics treated include: (1) Some fundamental considerations in boiler design; (2) practical baffling of water-tube boilers; (3) boilers for different fuels, firing and services; (4) overloads; (5) boilers as pressure vessels, and (6) details of construction of Heine boilers. The pamphlet contains much practical information which should be of use to power station operators and an aid in producing economies in station arrangement and operation.

Rolling Stock

Kitchener & Waterloo Street Railway, Kitchener, Ont., expects within the next six weeks to purchase two 45-ft. pay-as-you-enter four-motor passenger cars.

Nipissing Central Railway has two motor passenger cars on order with the Preston Car & Coach Company and will shortly be in the market for two more cars of similar type.

Decatur Railway & Light Company, Decatur, Ill., is considering the purchase of ten new city cars, to cost approximately $65,000. General Superintendent M. L. Harry has secured the approval of Vice-President Executive H. E. Chubbuck of the Illinois Traction System for the purchase of the cars.

Trade Notes

Edison Storage Battery Company, Orange, N. J., has moved its New York sales office to 247 West Thirty-fifth Street.

Huntly H. Gilbert, who left the service of the Pressed Steel Car Company and Western Steel Car & Foundry Company at the start of the war, to enter the Army as captain in the Ordnance Department at Washington, and later was commissioned major and transferred to the Rock Island Arsenal, has re-entered the service of these companies as assistant manager of sales, Western district, at 425 Peoples Gas Building, Chicago, Ill.

International Register Company, Chicago, Ill., has recently received from the Boston Elevated Railway an order for 275 motor-driven coin registers to take money and metal tokens. These registers will be installed on the new surface cars ordered by the Boston Elevated Railway. The machines to be used are similar to the coin registers previously supplied to the railway by the same manufacturer but have an extra totalizer for registering metal tokens.

Arthur F. Braid has been appointed sales manager of the metal and alloy department of the Metal & Thermit Corporation. Mr. Braid joined the company seven years ago as a traveling salesman, but after a few years of most successful service in this capacity he was appointed assistant superintendent of the Jersey City plant, in charge of the manufacture of carbon-free metals and alloys. When the United States entered the war, he assumed active charge of the metal sales at the New York office of the company. Mr. Braid is a member of the American Iron & Steel Institute, the British Institute of Metals and many other societies and scientific organizations.

NEW YORK METAL MARKET PRICES

	Jan. 30	Feb. 13
Copper, ingots, cents per lb.	19	17.50
Copper wire base, cents per lb.	28.75	20.75
Lead, cents per lb.	5.50	5.00
Nickel, cents per lb.	40	40.00
Spelter, cents per lb.	7.00	6.80
Tin, cents per lb.	†72.50	†72.50
Aluminum, 98 to 99 per cent., cents per lb.	†33.10	†33.10

† Government price in 50-ton lots or more' f. o. b. plant.

OLD METAL PRICES—NEW YORK

	Jan. 30	Feb. 13
Heavy copper, cents per lb.	15.50 to 16.00	14.50 to 15.00
Light copper, cents per lb.	12.00 to 12.25	11.50 to 12.00
Heavy brass, cents per lb.	9.00 to 9.50	8.00 to 8.25
Zinc, cents per lb.	5.00 to 5.25	5.25 to 5.50
Yellow brass, cents per lb.	7.00 to 7.50	6.50 to 6.75
Lead, heavy, cents per lb.	4.50 to 4.75	4.75 to 4.25
Steel car axles, Chicago, per net ton.	$28.00 to $30.00	$28.00 to $30.00
Old carwheels, Chicago, per gross ton.	$24.00 to $25.00	$22.00 to $23.00
Steel rails (scrap), Chicago, per gross ton	$22.00 to $23.00	$16.50 to $17.50
Steel rails (relaying), Chicago, gross ton.	$50.00 to $55.00	$50.00 to $55.00
Machine shop turnings, Chicago, net ton	$6.50 to $7.50	$6.00 to $6.50

ELECTRIC RAILWAY MATERIAL PRICES

	Jan. 30	Feb. 13
Rubber-covered wire base, New York, cents per lb.	27	25
Weatherproof wire (100 lb. lots), cents per lb., New York	30.75	31.25 to 33.75
Weatherproof wire (100 lb. lots), cents per lb., Chicago	32.76 to 36.75	30.75 to 35.75
T rails (A. S. C. E. standard), per gross ton	$60.00 to $65.00	$60.00 to $65.00
T rails (A. S. C. E. standard), 100 to 500 ton lots, per gross ton	$57.00 to $60.00	$57.00 to $60.00
T rails (A. S. C. E. standard), 500 ton lots, per gross ton	$55.00 to $60.00	$55.00 to $60.00
T rail, high (Shanghai), cents per lb.	...	3½
Rails, girder (grooved), cents per lb.	...	4½
Wire nails, Pittsburgh, cents per lb.	3½	3½
Railroad spikes, drive, Pittsburgh base, cents per lb.	4½	3.90
Railroad spikes, screw, Pittsburgh base, cents per lb.	3.90	
Tie plates (flat type), cents per lb.	8	8
Tie plates (brace type), cents per lb.	3	3
Tie rods, Pittsburgh base, cents per lb.	3	3
Fish plates, cents per lb	7	7
Angle plates, cents per lb	3	3
Angle bars, cents per lb	3	3
Rail bolts and nuts, Pittsburgh base, cents per lb.	4.90	4.90
Steel bars, Pittsburgh, cents per lb.	2.70	2.70
Sheet iron, black (24 gage), Pittsburgh, cents per lb	4.55	4.55
Sheet iron, galvanized (24 gage), Pittsburgh, cents per lb	5.60	5.60
Galvanized barbed wire, Pittsburgh, cents per lb.	4.35	4.35
Galvanized wire, ordinary, Pittsburgh, cents per lb.	3.95	3.95
Car window glass (single strength), first three brackets, A quality, New York, discount †	77%	77%
Car window glass (single strength, first three brackets, B quality), New York, discount	77%	77%
Car window glass (double strength, all sizes AA quality), New York discount	79%	79%
Waste, wool (according to grade), cents per lb.	15	13 to 20
Waste cotton (100 lb. bale) cents per lb.	12	12
Asphalt, hot (150 tons minimum) per ton delivered	.....	.....
Asphalt, cold (150 tons minimum, pkgs. weighed in, F. O. B. plant, Maurer, N. J.), per ton	$43.00	$43.00
Asphalt filler, per ton	$45.00	$45.00
Cement (carload lots), New York, per bbl.	$3.20	$3.20
Cement (carload lots), Chicago, per bbl.	$3.34	$3.34
Cement (carload lots), Seattle, per bbl.	$3.68	$3.68
Linseed oil (raw, 5 bbl. lots), New York, per gal.	$1.48	$1.48
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	$1.55	$1.55
White lead (100 lb. keg), New York, cents per lb	13	13
Turpentine (bbl. lots), New York, cents per gal.	75	71½ to 72

* Government price. † These prices are f. o. b. works, with boxing charges extra.

Recent Incorporations

La Jolla Electric Line, San Diego, Cal.—Incorporated to construct an electric line from San Diego to LaJolla. Capital stock $250,000. Directors: Frank A. Riehle, Lemon Grove; Alice G. Ford, Ed. Twelker, Howard Hopkins and Lila McConnell, all of San Diego.

Franchises

Torrington, Conn. — The Torrington Traction Company has received an extension of time until the next session of the Legislature within which to begin construction on its proposed line between Torrington and Thomaston. [Oct. 9, '15.]

South Weymouth, Mass.—The Massachusetts Highway Service Company has received a franchise from the City Council of South Weymouth to operate a trackless trolley in South Weymouth.

Track and Roadway

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—Work has been begun by the Indianapolis Traction & Terminal Company on the extension of the company's tracks in South Street from Virginia Avenue to Delaware Street.

Frankfort & Shelbyville Traction Company, Shelbyville, Ky.—It is reported that plans are being made to begin construction early in the spring on the proposed line of the Frankfort & Shelbyville Traction Company, between Frankfort and Shelbyville. F. H. Frankland of the engineering firm of Waddell & Son, Inc., New York, N. Y., and Kansas City, Mo., has been elected president of the Frankfort & Shelbyville Traction Company to succeed L. G. Smith of Shelbyville, who now becomes vice-president. F. W. Henkel, Chicago, is secretary and treasurer. [April 13, '18.]

Somers (Mass.) Electric Company.—A bill has been introduced into the House at Hartford, Conn., providing for the Somers Electric Company to purchase all the property and franchises of the Hartford & Springfield Street Railway and property and franchises of any other electric railway company operating in the towns of South Windsor, East Windsor, Windsor Locks, Suffield, Somers and any place in Massachusetts. The Somers Electric Company would be authorized to issue stock to an amount not exceeding $1,000,000 more than the amount under the authority of its charter. The bill was referred to the railways committee.

Worcester (Mass.) Consolidated Street Railway.—Officials of the Worcester Consolidated Street Railway have under consideration plans for improvements this spring and summer which will call for an expenditure of approximately $250,000. The work which the company would like to complete consists chiefly in laying new rails on some of the most important lines of the city. The work planned includes the laying of new rails on Green Street from Temple Street to Vernon Square, at an estimated cost of $40,000. The company also wants to put in new rails on Millbury Street from Cambridge Street to the South Works of the American Steel & Wire Company. A big West Side job is planned on the Tatnuck line and provides for new rails on Pleasant Street between Moreland Street and Mill Street. The company would like to put in new rails on Salisbury Street from Park Avenue to the end of the line. The relocation of the tracks on Belmont Street from Shrewsbury Street to the Lake is also under consideration.

St. Louis, Mo.—The city of St. Louis has decided to operate the passenger car line over the Free Bridge, beginning about March 1. The city will operate cars from Seventh and Gratiot Streets to the east end of the bridge only.

Pennsylvania & Ohio Railway, Ashtabula, Ohio.—A report from the Pennsylvania & Ohio Railway states that it will regrade and reballast 12 miles of track during 1919.

Toledo Railways & Light Company, Toledo, Ohio.—Discussing the requests of the people of West Toledo for a crosstown line and better car service. Frank R. Coates, president of the Toledo Railways & Light Company, said it is impossible for the company to make an expenditure such as this would necessitate without a franchise that would insure operation in the city for a sufficiently long period to warrant it. Mr. Coates has asked permission to extend the Cherry Street line to Stop 4 on Sylvania Avenue.

Brantford (Ont.) Municipal Railway.—The rate-payers of Brantford recently approved a bylaw authorizing the extension of the Brantford Municipal Railway into the Terrace Hill district and the provision of extra rolling stock at a total estimated cost of $125,000.

Fort Erie, Ont.—Announcement has been made by Sir Adam Beck of the Ontario Hydro-Electric Commission of Canada that work will be begun within the next few months on the proposed hydro-radial electric railway to connect Fort Erie with Niagara Falls and Port Colborne as one of the Canadian government's reconstruction plans. Another project which will be undertaken soon by the Dominion Government is the construction of an electric railway between Fort Erie and Hamilton, Ont. The road between Hamilton and Fort Erie is one link in the proposed line to connect Toronto and Buffalo. The Niagara, St. Catharines & Toronto railway line from St. Catharines to Niagara Falls, Ont., and St. Catharines to Welland and from Port Colborne to St. Catharines are parts of the Canadian Northern system which has been taken over by the Dominion Government. By taking over the Burlington radial line, the Hydro-Electric Commission is well started on its line between Toronto and Hamilton. The Hamilton, Beamsville & Grimsby electric line operates from Hamilton to Beamsville and it is only necessary to connect up the 12.4 miles between St. Catharines and Beamsville to have the completed line between Hamilton and Niagara Falls, Ont.

Canadian Northern Railway, Montreal, Que.—The Toronto Suburban Railway which operates 69.53 miles of city and interurban track is being acquired by the Canadian Northern Railway and will be operated as part of the Canadian National Railways. The Canadian Northern Railway is also acquiring the Toronto Eastern Railway Company's charter. This line is projected to run from Toronto to Cobourg, Ont. A contract was let and construction begun in 1914, grading being done from Bowmanville west to Pickering Village, 19.5 miles, and track was laid and ballasting done from Bowmanville to Whitby, 14.5 miles. No overhead or other electrical work was done, and, owing to the war, all construction was stopped.

Power Houses, Shops and Buildings

Athens Railway & Electric Company, Athens, Ga.—The Athens Railway & Electric Company is considering the installation of an additional boiler.

New Orleans Railway & Light Company, New Orleans, La.—The building of the New Orleans Railway & Light Company on Napoleon Avenue was recently destroyed by fire.

United Railways & Electric Company, Baltimore, Md.—Plans are being made by the United Railways & Electric Company for the construction of a steel and concrete passenger terminal and carhouse at Easton Avenue and Fifteenth Street, East Baltimore, to cost about $150,000.

Kansas City, Mo.—The excavation and grading of the site for the interurban station to be built at Tenth and McGee Streets will be begun soon. Contracts for the excavating are to be advertised within the next few weeks. It will take three months to complete the grading of the site and by the latter part of the summer the actual work on the eight-story building will be begun.

Sand Springs Railway, Tulsa, Okla.—Work will be begun in April by the Sand Springs Railway on the construction of a reinforced concrete and brick station and office building, 100 ft. x 40 ft., three stories.

Charleston Consolidated Railway, Gas & Electric Company, Charleston, S. C.—Rapid progress is being made by the Charleston Consolidated Railway, Gas & Electric Company on the construction of a new transmission system to Port Terminal, North Charleston. The company is also increasing the capacity of its power plant at Charleston.