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EDITORIAL NOTICE.

The news issues of the Street Railway Journal are devoted primarily to the publication of street railway news and current happenings related to street railway interests. All information regarding changes of officers, new equipments, extensions, financial changes and new enterprises will be greatly appreciated for use in its columns.

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Contents of this Issue

Clubrooms for Chicago Employees

The Chicago Union Traction has begun the work of reconstructing and fitting up its old Lincoln Avenue car house as a clubhouse for its employees. The building is being refitted at a cost of $10,000, and the work is expected to be completed in about three months. The building is 63 ft. x 125 ft. The basement will be fitted up with heaters, etc. An instruction room, fitted with model cars and appliances, will be provided on the first floor, and at the rear of this room will be an auditorium. This will be equipped as a theater, and will be 60 ft. x 70 ft., with a stage 28 ft. wide and 28 ft. deep. A gallery 14 ft. wide will extend around three sides of the room. Two sides of the stage will be smoking and reading rooms, while above these will be the dressing-rooms. On the third floor and to the rear of the gallery will be a dining-room, 50 ft. x 55 ft. Various smaller rooms will also be provided, and every foot of available space in the large building will be put to a use.

Extensions and New Roads in Connecticut

The near approach of the session of the Connecticut Legislature is bringing forth public announcements of the extensions of many of the established street railway lines in the State, and of many projected lines, the plans for which have been secretly worked out during the past few months. The number of extensions proposed and the new lines projected indicate a material increase in mileage, and, if they are all realized, the State will be practically gridironed with electric railway lines. Eleven years ago there were fifteen horse railways in Connecticut, and their total mileage was but little over 100 miles. To-day there are thirty-three separate corporations of the kind in the State, and these have absorbed in ten years some fifty smaller enterprises. There are in the State at the present time 492 miles of road, and the total capital stock of the companies is $12,715,948. Probably the most important new line projected is one to extend along the east side of the Connecticut River, affording a through route from Hartford to Springfield. Among the many other lines projected are two to extend between Meriden and Waterbury.

Decision Against Massachusetts Half-Fare Act

The United States Circuit Court has just handed down a decision in which it says that street railway companies are not compelled to transport school children at half fare, in compliance with the law passed by the last Legislature. The Boston Elevated was the only company exempted from the provision of the law. The decision was rendered in the case of Morris Ahern vs. the Newton & Boston Street Railway, and, although the court does not decide that the statute is unconstitutional, it plainly intimates that its opinion is that it is invalid. The case was brought by the plaintiff, a foreign stockholder, to restrain the company from complying with the statute on the ground that his rights as a stockholder would be infringed upon. The court says: "Upon its face, the statute seems to be open to the objection of unreasonably reducing the rates charged by railway companies, and to the further objection of discriminating in favor of a particular class in the community. An act, open to either of these objections has been held by the Supreme Court of the United States to be in violation of the fourteenth amendment to the Constitution of the United States. Notwithstanding I have grave doubts of the constitutionality of the act, I think, as an important constitutional question is raised, and as the plaintiff has not clearly brought himself within the rules respecting the granting of preliminary injunctions, the case should stand over for full argument upon final hearing."

Electrical Industries in Bangkok

United States Consul-General King, writing from Bangkok, under date of Oct. 15, 1900, to the State Department in regard to electrical industries in Bangkok, points out the rapid development of the electrical industries in the city, and calls the attention of American manufacturers to the opportunities for increasing trade there. There are only two companies of importance engaged in the electric line at Bangkok at present. They are the Bangkok Tramways Company and the Siam Electricity Company. There are, however, several minor concerns, and isolated plants are to be found in the city. It is estimated that there are thirteen of these plants. The Bangkok Tramway Company now operates about 6 miles of line by electricity, and has just secured franchise grants for the construction of about 5 additional miles of road through a most prom

ising section of the city. The company's lines were originally operated by horses. They were placed in operation in 1889 and equipped with electricity in 1892. The Bangkok Tramway Company and the Siam Electricity Company are about to be consolidated under the title of the latter, and it is announced that, as soon as the consolidation is completed, the company will extend the scope of its business. At present the Siam Electricity Company furnishes power only during the night, but it hereafter intends to supply power at all times and for all purposes. The company also contemplates introducing the automobile. The lighting plant was first placed in operation in 1894, and has been owned by several companies. In January, 1899, it passed into the hands of the present owners, the Siam Electricity Company. Orders have already been placed for the material to be used in extending the tramway lines, and it is expected that the new extension will be in operation by the end of next year.

The Chicago Traction Bills

The Chicago Street Railway Commission has completed its labors, and it will make the following recommendations to the Council at an early date, in reference to the transit situation in Chicago:

"Recommends short-term grants at the expiration of franchises in 1903.

"Recommends the unification of street railway systems.

"Recommends the creation of a commission on local transportation for jurisdiction over traction affairs.

"Recommends the referendum of all traction ordinances to the people on petition of 10 per cent of the voters.

"Recommends action to secure authority from the Legislature for municipal operation or ownership of street railways with the consent of four-sevenths of the voters.

"Recommends regulations to prevent over-capitalization, and to enforce annual publication of accounts."

The Street Railway Commission was created by resolution adopted in Council on Dec. 18, 1899, and its purpose was to outline a street railway policy for the city for submission to the Council, in anticipation of the expiration of the franchise of the main street railway lines in 1903. It consisted of seven Aldermen appointed by the Mayor, and $4,000 was appropriated in March last for expenses and the payment of the secretary's salary. The latter devoted his entire time to the work of the commission. The work of the commission has been chronicled, from time to time, in the Street Railway Journal. An act of the commission, which attracted considerable attention, was the submission to the people of a list of questions, on which it asked the public to express their opinion.

Suburban Company to Enter Boston Over Lines of Elevated Company

The Boston Elevated Railway Company has granted the Boston & Worcester Street Railway Company permission to operate over the Boston Elevated tracks between Newton and Boston, by way of Brookline, thus completing the trunk line which has for some time been contemplated between Boston and Worcester. The agreement is the culmination of a long wrangle between these two companies for the right of way over Boylston Street in Brookline. When the Boston & Worcester Street Railway Company announced its intention of establishing a trunk line between Worcester and Boston, it encountered but little opposition in securing franchises along the route until it reached Brookline. There the Boston & Worcester and the Boston Elevated made application for a franchise at about the same time, and, after a stubborn fight in Council, the Boston Elevated was successful. Shortly following this defeat, the Boston & Worcester introduced a bill in the Legislature providing for the operation of the cars of one line over those of another, but this bill was defeated, although it was indorsed by the Massachusetts Street Railway Association. The company was determined, however, to secure entrance to Boston, and had prepared another bill with provisions similar to the first for presentation to the Legislature. Now that an agreement has been reached, the new measure will probably not be presented. The Boston & Worcester Street Railway Company has received franchises in all the towns between the Brookline-Newton line and Worcester. All material for constructing the line has been ordered, and the work of construction will be commenced as soon as the frost is out of the ground. The route from Brookline to Worcester is over the old turnpike, and is a direct line. About 30 miles of track will be laid.

Trying to Explain the Cause of Street Car Sickness

The Union Traction Company, of Philadelphia, recently placed a number of cross-seat cars in operation on its lines, and the public expressed general satisfaction at the innovation. All progressed serenely for a few days. The public was delighted, and the company was about to congratulate itself in that it had endeared itself in the hearts of the people, when suddenly one man discovered, or imagined, he had been made sick by looking out of the window of one of the cross-seat cars. He immediately wrote a letter to the *North American*, describing the symptoms of the new disease which had attacked him, and roundly scored the company. Imagine the effect! More than one-half of the riding public at once succumbed to the new malady, and the *Philadelphia American*, which was by this time making an extended investigation as to the cause of the new illness, received numberless letters on the subject. Various reasons were given as to the cause of the new sickness; the vibration of the automatic air pump and the smell of the varnish were alleged to have caused it. The *North American*, in its efforts to explain the cause of the new illness, says: "In the new cars, with the seats running horizontally, the only place for the passenger to look is out of the window. He picks out an object in advance of the car, follows it with his eye until the optic is almost at right angles with his nose, and then glances hurriedly back again for something new to look at. If the ocular nerve be weak, this exercise will cause intense weariness, which may be accompanied by headache or nausea. In the cars with seats running lengthwise the tendency to look out of the window is not so great, and the eyes are exercised within an easier range." President Parsons, of the Union Traction Company, was convulsed with laughter when interviewed on the subject. This is what he said: "This is the most absurd and ridiculous complaint that has yet come to my attention. It is proof positive of universal insanity. The idea of a man or a woman getting sick because he or she is riding with his or her face frontward instead of sidewise! That is against all the rules of nature. I don't see why one should be more likely to look out of the windows of the new cars than the old ones. Certainly when one is directly facing a long row of windows there is nothing to prevent his looking out. As to the vibration of the air-brake mechanism, that is the funniest claim of all. If the passenger is going to be sick on account of vibration, why shouldn't the vibration of the motor cause nausea?"

The Operation of Compressed Air Cars in New York City

The Metropolitan Street Railway Company took formal control of the cars, charging station, etc., of the Twenty-Eigthth Street and Twenty-Ninth Street line on Dec. 6. The Hardie system has been used on this line since Sept. 26, and the compressed air company which controls this system has been operating the cars. A great amount of data regarding the running expenses, speed, capacity of the reservoirs, etc., have been collected during the three months that the cars have been running, which has been carefully compiled, and much interesting information obtained. From Sept. 26 to Dec. 16 the cars traveled 139,057 miles and carried 1,496,287 passengers, the maximum number of cars operated at any one time being twenty. Careful records were kept of each of the 25,283 trips, and from them the following estimations were made: Repairs, including material, supervision, machinists and workmen, adjusting valves, piping, repairing brakes, rods, brasses, etc., $35 per day, or 2 cents per car mile. Charging expenses, including oil, waste, foremen, charging gang (two shifts), oilers, cleaners, etc., $28 per day, or 1.60 cents per car mile. Power house expenses, including engineers, coal passers, firemen, oilers, pipe fitter, machinist, etc., 16 tons coal per day, oil, waste, etc., $82.50 per day, or 4.71 cents per car mile. These figures are made on a basis of 1750 miles per day, with the present equipment of twenty cars. With the same charging and power plant, however, and but little increase in cost of coal and labor, from sixty cars to eighty cars could be operated. The length of the round trip is 5½ miles, and two trips can be made on one charge. In fact, 15 miles has been covered without recharging, but this is rather too much for ordinary practice with the reservoir capacity installed.

The immense cost of conduit construction on the crosstown lines in New York renders some self-contained method of propulsion a necessity. From the above figures it would appear that the Hardie system may prove a satisfactory solution to the problem.

Electric Tramways in Barcelona and Vicinity

United State Consul-General Lay, writing from Barcelona, Spain, under date of Nov. 16, 1900, regarding the electric tramways in Barcelona and vicinity, says:

"I beg to transmit the following particulars regarding the progress made toward completing roads already in course of construction, and what has been accomplished in organizing companies and obtaining concessions and franchises for projected roads, as well as those to be changed from horse and steam to electric traction. In as many cases as I have been able to obtain them, the names of the chief contractors or persons who are likely to have charge of the purchase of construction material and equipment are given.

"1. Compañia Anonima; owned entirely in England; completed and running through the principal streets of Barcelona with a double track of about 25 miles. The chief contractors were Dick, Kerr & Company, of England. The trolley wire, trucks, electrical machinery, engines and motors all came from the United States.

"2. Ensanche line (not named). This line now runs horse cars, and is owned by another English company, although the directors are those of the Compañia Anonima, in conjunction with which it will be operated and connected. The plans and specifications are now being prepared to change the present system of horse traction to electric, and probably the same firm—Dick, Kerr & Company—will be its chief contractors. This road will be about 4 miles in length, and, although single track, the wirework necessary will be as much as if for a double track.

"3. Barcelona-Horta Extensiones; will run from outskirts of Barcelona to the town of Horta, 8 miles distant; a single track line. This road is about half completed. The contracts are all let.

"4. Barcelona and San Andres. This line, at present steam, is to be changed to electric very soon, as permission for the change has been granted by the Spanish authorities. The same company as the Barcelona-Horta line owns this one, with 5½ miles of double track. No contracts for building this line have yet been let, but information regarding them may be obtained from the Société Anonyme d'Enterprise de Travaux, Liege, Belgium. This company will also build an electric tramway from San Andres to Horta, a distance of 2½ miles.

"5. Barcelona to Badalona via St. Martin; now steam; 10 miles; G. H. Gillis, manager. Nothing has been done toward any change, but the power house now under construction for the Barcelona-Horta Extensiones is being built to furnish power to the three last named lines.

"6. Compañia General de Tranvias. The present German company has purchased franchises and concessions of the former owners, and the change from steam to electricity should soon be made, as the permanent way has been relaid for 5½ miles. Contracts for cars and equipment have not as yet been let. Details of same may be obtained from Mr. Fengercroff, representing the technical interests of the German stockholders here.

"7. Barcelona to Sans; a mule line of 8 miles, running from the center of the city. This line has lately been purchased by German capitalists intending to introduce electric traction, but they are having some difficulty in obtaining a franchise, owing to the narrowness of streets through which they wish to run; and the objection of property holders to span wires and of the authorities to the poles. The company will probably be compelled to put down underground conduits in the city and trolley in the suburbs. No contracts have been let for this line, nor has the chief engineer been appointed.

"The only hindrances to the sale of American electrical goods in Spain, when the prices are the same as those of similar articles from other countries, are the higher duties levied on American imports than on those from nations under the "favored-nation clause," and, of course, there is a prejudice in favor of obtaining machinery and equipment, everything else being equal, from the country of the principal shareholders. A direct line of steamers is now running monthly between New York and Barcelona."

Convention of the Engine Builders' Association of the United States

An account was given last week of the annual meeting of the Engine Builders' Association of the United States, held in New York, Dec. 4. As stated last week, three papers were read before the association; one by H. C. Eberet, of the Westinghouse Electric & Manufacturing Company, on "Inter-relations Between Engine and Generator Builders in Connection with Engine Type Units for Power Purposes"; another by E. T. Armstrong, of the Ball Engine Company, on "Economy Guarantees of High Speed Simple Engines," and a third by H. G. Reist, of the General Electric Company, on "Some of the Requisites of Modern Lighting Generator Sets." These papers are given in abstract below:

SOME OF THE REQUISITES OF MODERN LIGHTING GENERATOR SETS

BY H. G. REIST, OF THE GENERAL ELECTRIC COMPANY

At the Washington meeting of the American Society of Mechanical Engineers, May, 1899, an interesting and stirring paper was read by Mr. Stanwood on "Standards for Direct Connected Generator Sets." So far as I know, this was the first time that the desirability of engine and dynamo builders getting together and trying to make their designs interchangeable as far as practicable, was brought before the public. Its importance was at once realized, and action taken toward improving matters by the appointment of a committee, and by inviting other organizations interested to co-operate. I understand these committees are taking up the standardization of speeds of engines as well as the proportions of certain parts that affect the two pieces of machinery, such as the dimensions of base and the diameters of the engine shafts.

It will not be possible to fix absolute speeds for engines used for directly driving alternating-current machines, because currents of various frequencies are used for different classes of work, and dynamos must be built with an even number of poles, or, better yet, with a number of poles that is divisible by four. The ordinary frequencies used are 25 cycles, 40 cycles and 60 cycles per second in this country, but in Europe the usual frequency is 50 cycles. To illustrate the variation in speed necessary for the various frequencies: For 60 cycles and 40 cycles, a speed of 200 r. p. m. may be used, but for 25 cycles the speed should be 187 r. p. m. or 214 r. p. m. Similarly, we can make 60-cycle and 40-cycle dynamos to operate at 100 r. p. m., but the 25-cycle machines must be driven at 94 r. p. m. or at 107 r. p. m. In working over a list of speeds for the various frequencies it will be found that a mean speed may be selected which in no case need be much departed from, so that it seems perfectly practicable to select a range of speeds for the various sizes of engines at which they may be run without any changes except an adjustment of the governor. Then by a careful selection of sizes, best ranged in geometric progession, it will be feasible to keep down the number of machines very greatly, leading to duplication, thus to the practicability of making special tools for more of the parts, and also to carrying parts in stock and helping toward quick deliveries.

We have given considerable thought to the selection of a range of sizes, and have come to the conclusion that if the units were so spaced that each one has a 50 per cent increase over the one below it, there will be a sufficiently large number of machines to meet all ordinary conditions. This conclusion was also sustained by having had practical application in lines of generators and motors spaced about in this way, so that it is rarely that it becomes necessary to go to the expense of developing anything between. This method of determining sizes necessarily gives some of the machines on the list odd ratings, but this will occur in any case many times with either the engine or the generator, since one is rated in horse-power and the other in kilowatts. A table was submitted giving sizes of generators and speeds that are proposed.

The variation in speed given in the tables allows the same engine to drive generators for the three frequencies standard in this country. It will be noted that with very few exceptions the total variation in speed is less than 10 per cent—in most cases being not more than 2½ per cent from the mean speed. For each capacity given, except the smaller ones, several speeds are proposed to accommodate the different types of engine.

In all reciprocating engines there is an intermittent speed, the speed gradually increasing during the stroke until such time that the power applied is less than the mean power absorbed, after which the speed gradually decreases until steam is again admitted.

It will thus be seen that in every single crank engine there is, during each stroke or each half revolution, a period of increasing speed and one of decreasing. With two cranks at 90 degs. there will be four such periods during each half turn. With cranks set 120 degs. apart there will, of course, be six such periods. The amount of fluctuation in speed is dependent on the number of cranks, the weight of the reciprocating parts, the length of the connecting rod, the proportion and adjustment of the valves and the weight of the fly-wheels. It is desirable to keep this variation within certain limits, on account of the parallel operation of the generators, but more particularly to insure the satisfactory operation of synchronous apparatus, such as synchronous motors and rotary converters from such circuits.

When two generators are running in multiple, their mean speed will be the same, but as the speed is variable, as already explained, there is an instant during which one generator runs a little faster

than the other. It will be seen that its potential wave will then get ahead of the wave produced by the other machine, and, in consequence, current will flow into the second machine and tend to drive it as a motor. A little later, when the engines are further along in the revolution, these conditions will be reversed. This produces cross currents between the machines, which should be avoided. It might be prevented with duplicate sets, if the engines were synchronized, that is, if they were run with the cranks of the machines in the same relative position. The angle of velocity of one engine is then the same as that of the other at all times. But this is not a practical method of operation. This fluctuation is also liable to make synchronously-driven electrical machinery drop out of step. In practice, the allowable variation is usually given in displacement in degrees of any point on the roating mass from what it would have if the motion was perfectly uniform, which gives a value that is independent of the number of cranks of the engine. Steam engines intended for direct-connected dynamos should not have an angular deviation in degrees of more than 2½ degs. or 3 degs. of phase; or, dividing the number of one-half of the number of poles of the generator to be driven, will give the allowable angular deviation in terms of degrees of the rotating mass. Thus, a 40-cycle machine should be driven by an engine whose motion is so uniform that a point on the rotating mass will not vary more than $\frac{2.5}{20}$ or one-eighth of one degree from the position it would have if the motion were perfectly uniform.

In order to obtain this result it is necessary to so proportion the fly-wheel, the weight of which depends upon many things, relative to the proportion of the engine, and cannot be given except in special cases. It is specially desirable in designing the engine to proportion the fly-wheel with this object in view. The proportion of the connecting-rod is also a matter of importance in this connection. Mr. Reist here submitted data covering the fly-wheel effect necessary to meet the above degree of regulation, and submitted a formula representing a safe figure for well proportioned engines. Mr. Reist's formula covered 25-cycle, 40-cycle and 60-cycle machines, and was varied to apply to horizontal engines as well as vertical, to single cylinder engines as well as compound. It would naturally be expected that a three-crank engine, with cranks placed 120 degs. apart, would require a lighter fly-wheel than one with two 90-deg. cranks, but in working out the forces of compound three-cylinder engines, it is found that other conditions so far enter into the problem that no appreciably better result is obtained than from a two-crank cross-compound engine.

Ever since alternating-current machines have been built parallel operation has been discussed and tried, at first with great caution, but it is at present the usual method of operation of installations, and experience has taught us that any two alternators of the same frequency and potentials will operate in multiple satisfactorily, if they are allowed to do so by the prime motors. No trouble is experienced in operating machines in multiple when driven by water-wheels. There are also many installations of steam-driven alternators, ofttimes of different types, both belted and direct connected, operating satisfactorily in multiple. The principal trouble experienced in the parallel operation of alternators is due to the variation of the speeds of the machines with reference to each other, producing oscillations in the relative motions of the two alternators. This produces cross currents in the variations of the cut-offs of the engines.

In some cases the amplitude of these oscillations is limited in extent, while in others the force is liable to accelerate with more or less rapidity, until the machines drop out of step. In some cases the machines may run in parallel for a considerable period, then, by some change of conditions, oscillations will begin, throwing the machines out of step in a few seconds. The power to produce these oscillations comes naturally from the steam, and is caused by the intermittent action of the engine governors, which, in their efforts to adjust themselves to compensate for the speed variation, cause a periodic delivery of steam. This delivery of steam by jerks keeps up the oscillation in the same manner as the pendulum of a clock. The frequency of this variation is affected by many conditions aside from the fly-wheel effect of the rotating mass on the engines; e. g., the period of the engine impulses the synchronizing power of the dynamo, and probably the fly-wheel effect of any synchronous machinery driven by the current from the dynamo.

The degree of retardation of the governor required by proper parallel operation must depend upon the combination of these effects, and is consequently difficult to pre-determine. Mr. Reist submitted one or two illustrations covering this point and the manner in which the difficulty had been satisfactorily overcome.

There are, however, cases where a simple retarding device is not sufficient without seriously affecting the governing of the engine. A special device was suggested to cover a case of this kind. Engines that are directly coupled to alternators that are to be run in parallel should be provided with means by which the speed may be adjusted within a small range without throttling while the engine is running. Such a device is very useful in bringing the machines together without throwing them into parallel when one machine is loaded and the other is idle, otherwise it is necessary to throttle the steam for the engine without load to bring it to the speed of the loaded machine. This device is also very useful to divide the load between the machines, since, however carefully adjusted, high temperatures or some other local condition may throw them slightly out of adjustment.

ECONOMY GUARANTEES OF HIGH-SPEED SIMPLE ENGINES

BY E. J. ARMSTRONG, OF THE BALL ENGINE COMPANY

I have been asked to read a paper upon the general subject of the economy of simple high-speed engines. I esteem this a rare privilege, and the more so because of my belief that the single-valve automatic is not always given a fair chance.

The matter of economy does not always receive consideration. The engine that runs smoothly, noiselessly and punctually will have friends and purchasers whether it uses much or little steam. I have no desire to advocate improvement in economy to the detriment or neglect of other qualities which go to make up successful machines, but I believe that many engine builders have but a very imperfect idea of what their own engines were capable of. If the subject were more amenable to mathematical treatment the case would be different, but in spite of the marvelous advancement in science at the end of the century, I believe that the exact formula for the economical performance of the steam engine has yet to be written. In view of the fact that the steam used by an engine often costs each year as much as the engine itself, it would seem as if the customer might consider steam economy as of first importance and price as a bad second. Yet even a small difference in price or a personal preference will decide a purchase without raising the question of economy at all. A difference of 10 per cent in steam consumption between two engines might easily place the more wasteful one in the position of being too expensive, even as a gift; but there is no doubt that there have been, and still are, even greater differences than this between engines that are sold on equal terms. It is singular that customers who figure so closely on other matters should be so careless and unbusinesslike in this, or that builders should expect to market engines with no economical record, and not even a pedigree. This rather anomalous condition of things will soon be brought to an end; for years there has been an increasing tendency among customers to raise the question of steam consumption, and builders of engines must recognize this and prepare to meet a demand for definite promise and performance in the matter of economy.

This should be welcomed, not as a hardship, but rather as an opportunity. It is essential to obtain more exact data concerning the performance of automatic engines, and in making an effort to improve the quality of work turned out the first step is a systematic effort of finding the defects in that work. The first move in reducing cost is to find out what things are costing, and the way to improve the economy of engines is to test them systematically and to learn their deficiencies.

It is not usually practical to test engines of small size after installations; the expense is disproportionate, and the difficulties in the way of obtaining accurate results are great. The liability to error and the impossibility of running preliminary tests make it unsafe to make close guarantees to be demonstrated in this way. The proper place to test an engine is on the shop testing floor. With properly arranged apparatus tests can be made in a short time, and at little cost.

Apparently a simple thing to make duty tests with apparatus of this kind, the matter is really more complicated than it seems. A detailed description of precautions necessary and the methods of detecting and locating errors, or the causes of irregular and inconsistent results. This method of testing engines cannot fail to impress one with the great difference in accuracy possible when compared with the plan of testing after installation, as must be done with very large engines under any circumstances.

The manner in which different tests check up with each other is to some extent proof of their accuracy, and gives confidence in using the data obtained as a basis for future guarantees. I have here several duty curves, plotted from tests made in the ordinary course of demonstrating economy guarantees. The majority of the series of tests shown in these diagrams have been checked by engineers representing the purchasers. In other cases reliance had been placed on the builder to see that his guarantees were fulfilled. The rate of water consumption was plotted without correction for dry steam, for which, however, a proper allowance was made. These results were not at all exceptional, as is proven by

the fact that they practically duplicate each other. They show what can be readily obtainable in regular practice, with fairly tight valves, moderate clearance and other conditions as he described. There are other details which contributed to the result. These have to be learned by practice, and can be learned at all only by frequent tests.

The single-valve engine is capable of giving results even better than those shown on the diagrams, to the extent of 1 lb., or perhaps 1½ lbs., per hour. At the same time the results are very much better than the average of high-speed work. These tests show that it is possible to approximate very closely the difference in economy which may be expected from a change in steam pressure, from a change in back pressure, from an increase or reduction in speed, etc. It was possible also to speak with considerable accuracy of the difference in economy between a large engine and a small engine of the same general design or of the difference in the same engine when carrying a greater or smaller percentage of its load.

In estimating the steam consumption of an engine of a size or under conditions which have not yet been tested, there are two ways of figuring; one is to determine the losses in the engines separately from the steam accounted for by the card. This method, while quite complicated, is the more accurate of the two, and is sometimes very valuable in working out a close guaranty. The other plan is simply to learn the general effect of the different conditions which affect economy, and to use some previous tests as a basis.

The building up of a better reputation for automatic engines is well worth the attention of its manufacturer. No guarantee of economy should be given unless its fulfilment by actual trial is provided for. Where there is no certainty that a test will be made, there is the temptation to give a lower water rate than would be the case were its fulfilment one of the conditions, especially if accompanied by penalties for failure to meet the terms of contract.

This question of penalties is considered quite onerous by engine builders, but if not provided in the contract, the only penalty is the non-acceptance of the engine; and as this is often impracticable, because of lack of time, there is a good chance that the guarantee is not worth anything. Definite penalties at least have the effect of protecting those who really make their guarantees in good faith and with a knowledge of what they can do. There is nothing wrong about it from the purchaser's standpoint. A deficiency in economical performance means a direct and continuous loss to him. There is one feature of the situation that is manifestly unfair, and calls for remedial action. Better economy costs money. It may not actually cost more to build the high duty engine than a wasteful one, but it costs a good deal more to learn how, and to keep up the standard afterward. It costs money to tune an engine up to meet a close guarantee, and testing engines is an expensive business at the best. There should certainly be an addition to the price when guarantees are required. All duty guarantees should provide for their fulfilment on the shop floor test before shipment, and should always be considered as an extra, it being optional in all cases with the purchaser to accept the proposal with or without the guarantee. If the guarantee does not mean anything, it should not be made. If it does stand for something, it costs a good deal, and is worth to the customer all that he is likely to be asked for it.

INTER-RELATIONS BETWEEN ENGINE AND GENERATOR BUILDERS IN CONNECTION WITH ENGINE TYPE UNITS FOR POWER PURPOSES

BY H. C. EBERT, OF PITTSBURGH

I have thought this occasion particularly favorable to discuss the relations between the engine and generator manufacturers for the purpose of promoting co-operation and harmony, and to prevent causes for disagreement

Purchasers continue to express a strong preference for direct-connected apparatus, and there is now an extremely large demand for this. It is proposed, therefore, in this paper, to deal specifically with the subject of so-called engine-type electric generating sets. The manifold advantages of the engine-type direct-connected generator unit for power, traction and lighting purposes over the old style high-speed belted type are so apparent to all of us that I think they need not receive consideration here. The management of the Westinghouse Electric & Manufacturing Company is glad of the opportunity to place before your association some of the points which, in its opinion, might advantageously be considered jointly by the engine and the generator builders, with the object of establishing, if possible, a uniform practice in treating these same complex conditions which arise in getting the two parts of an engine type unit successfully installed. We have observed that when the consulting mechanical or electrical engineer specifies the size and type of the generator unit to be furnished, he generally designates an engine that in capacity, speed and regulation will closely correspond with the same characteristics of the generator to be provided; but when the selection of an engine to drive a certain size generator is made by the purchaser, or he is coached in his selection by the ordinary generator or engine salesman (and this is oftener the case than one would generally suppose), an engine is invariably secured, which in these three most important features does not match the electrical part of the outfit. It is in these latter cases where eventually the engine builders have their difficulties and we also have ours, for the engine and generator are correctly considered by the purchaser as a single unit, and the failure of one part to meet his requirements constitutes, from the purchaser's standpoint and that of his engineer, sufficient grounds to withhold his acceptance and purchase of any part of the unit. Manifestly, this is a hardship to the manufacturer whose apparatus is, in all respects, what it should be and as represented. Our object and yours should be to minimize the chances of an improper combination of engine and generator, and to this end we will invite correspondence from the engine builders and give close attention in the appropriate departments of our works to any inquiries they may make respecting the electrical or mechanical details of the generator set to be provided, so that perfect calculations may be made for efficiently driving the generator from which ultimate power is to be derived.

The engine and generator specifications must be analogous, in so far as capacity, speed and regulation are concerned. It is the general practice of the dynamo builders to give their machines a normal rating, allowing for 25 per cent, 50 per cent or 75 per cent overload for certain periods, ranging from 10 minutes to 2 hours, and sometimes longer. This overload capacity, upon which the electric companies' salesmen lay considerable stress, avails the purchaser nothing if the steam end of the unit is inadequate to care for it. Will not your interests, the purchasers' and ours be better conserved if we get together on these features to start off with?

There should be uniformity in rating engines with regard to overload capacity of the generator to be driven. Of course, steam pressures, belting, etc., operate to change the engine capacity, but it would seem there could be greater uniformity than has yet been shown.

The engines for direct or continuous current power work should be designed to regulate quickly for sudden changes in the load, and the drop in speed from no load to the maximum load, however, should be as nearly a straight line as possible.

This is absolutely necessary to properly care for the over-compounding of the generator as the load increases. It should be noted that what would be considered an ideal regulation and operation in a direct-current installation would not be satisfactory with alternating-current power generators. There is no difficulty whatever in running two or more direct-current generators together on the same circuit and dividing the loads equally and maintaining them practically constant on the different machines. However, in running alternators together, particularly at slow or medium speeds, the problem is different. In order that each alternating current machine shall deliver its proper share of current for the common circuit, the machines must work harmoniously and simultaneously. The fundamental requisite being that the e. m. f.'s or voltages produced by the two or more machines operating in parallel must be equal at all times. If not, then at any instant when the voltage of one machine is lower than that of the others, a current will be sent through it from the other machines; this, of course, not being desirable.

If the engine governors tend to give different speeds, say, 500 r. p. m. and 525 r. p. m., respectively, then it is evident that when the two alternating-current machines are in parallel, the machine which tends to run at the higher speed will carry all the load until the speed is reduced to 500 r. p. m., when the second machine will begin to carry load.

It is essential that the governing of the speeds of the alternating current machines shall be such that when running at a common speed they shall receive their proper amount of power. As stated heretofore, it is to be observed that engines which govern closely between no load and full load, may not be as well adapted for running alternating-current generators in multiple as other engines in which the regulation is not so close. For example, if one engine runs at no load at 100 r. p. m., and drops off 1 per cent at full load, and a second engine also drops 1 per cent between no load and full load, but happens to run at a slightly higher speed, say, 101 r. p. m. at no load and 100 r. p. m. at full load, then it is evident that one engine would carry its full load before the other engine had begun to carry any load. If, on the other hand, the engine

drops 5 per cent in speed; that is from 100 r. p. m. to 95 r. p. m. and from 101 r. p. m. to 96 r. p. m., respectively, then a comparatively small load will reduce the speed of the latter to 100 r. p. m., so that the engines will begin to work together almost instantly the generators are thrown in parallel, the engine which tends to run faster carrying only a slight excess load.

A member of your association suggested that this paper contain something to bring about a discussion of what the engine builders should do and what not, and the best way to avoid disputes and disagreements, presumably between the purchaser, the engine contractor and themselves. There would seem to be no good reason for dissension or disagreement if the engine company to furnish the engine and the electric company to furnish the generator will acquaint each other with the general terms of their contracts with the purchaser in so far as those terms relate to the integral parts of the generator and engine combination to be supplied. In taking up correspondence with this object in view, we will at once disclose any discrepancy in what we are to furnish conjointly to make a complete unit. Usually the parts which are not clearly covered in either the engine company or the electric company's agreement are of a minor and inexpensive character, but still, if no attention or thought is given to them, we find ourselves on the ground with a shortage that will seriously retard the erection work, and greatly increase its cost. Up to and including 125-kw engine type generator, 200 r. p. m., we furnish simply the bare machine, that is, the fields and armature, without shaft, shaft key, outboard bearings, bed-plate, steel guide strip and holding-down bolts. When we contract for the entire unit our order to the engine company clearly stipulates the parts just enumerated as not being a portion of the generator, and are to be included with the engine. With machines of larger capacity than 125 kw we supply bed-plates, steel guide strip and holding-down bolts, as usually the larger sizes can not have a common sub-base with the engine. These remarks so far, excepting where they relate to parallel running of alternating-current generators, treat specially with continuous current 125, 250 or 550-volt generators. Conditions surrounding the combined alternating-current engine type unit for power purposes are somewhat different, and will be referred to later on.

It is assumed that all the members of the Engine Builders' Association are familiar with the work that the committees on "Standards for Direct-Connected Generating Sets," appointed by the American Society of Mechanical Engineers and the American Institute of Electrical Engineers, have thus far accomplished in the direction of standardization, and it is confidently anticipated that their final reports will lead to some definite and unanimous action along that line. The time has certainly come when such steps should be taken to prevent unreasonable requirements, and this standardizing of sizes, speeds, shaft diameters and general dimensions, if strictly adhered to, will undoubtedly be a strong preventive measure. The report of the committee already published, which was, I believe, but tentative, recommended capacities, speeds and probable shaft sizes for center and side-crank types of engines from 25-kw to 250-kw capacity generators, inclusive. It made no definite comments on the subject of armature-spider bore, press fits and the method of keying to shafts. In connection with these questions, I would like to outline here briefly Westinghouse Electric & Manufacturing Company's standard practice, with which we have invariably had success. Armature spiders are arranged to receive a shaft amply large for extreme rigidity, so as to eliminate crank action, as far as possible, it being absolutely necessary that the armature run perfectly central in the fields to prevent unbalanced magnetic pulls. Shafts are figured for both deflection and fiber stress, taking into account the possible unbalanced magnetic pull. In submitting generator drawings to engine builders, we call attention to this magnetic action if the armature becomes decentralized, and state on the drawings the amount of magnetic pull which may be expected on the generator. As this unbalanced magnetic pull acts at right angles to the shaft, and may be in any direction to the plane of revolution, it should be carefully considered, not only for the shaft diameter, but also for strength of foundation, sub-base and bearing housings. The connection between the out-board bearings and the sub-base should be perfectly rigid. One or two instances wherein this magnetic action was not taken into consideration by the engine contractor finally resulted in almost total destruction of both engines and generators.

We make allowance for press fit in the armature, the amount depending largely on the material, or rather the quality of the material in the spider. This is such that the fiber stress per square inch produced by forcing the hub on the shaft is greater than the fiber stress produced by centrifugal force due to the rotation of the armature at maximum running speed. The engine shaft and gages should be absolute, as a matter of record. It is a simple thing to use pin gages, and they are better for giving close results. We, therefore, supply exact shaft gages to the engine builder as soon as the shaft diameter is settled. Two short press fits are employed, one at each, and of the spider hub. It is our practice to use only a single feather or parallel key, half in the shaft and half in the hub. This key is furnished by the engine builder and fitted tightly to the shaft sidewise. Between the top of the key and the bottom of hub keyway, there is a clearance of about 1-32 in. The feather key admits of easily centering the armature, acts as a guide in pressing it to position, and does not deform the hub as a driving or tapering key tends to do. We supply key gages at the time shaft gages are sent to the engine maker.

The foregoing remarks relative to standardizing apply simply to direct-current generators. With respect to alternating-current engine type machines the case is not so simple. There is not the same demand for uniform standard of alternating-current dynamos, there being fewer builders of this type of apparatus. Usually, also, the generators are of such large size that it is not a requisite requirement to have everything in accordance with a predetermined standard. It would be difficult to even assign standard limiting dimensions, since there are usually two types of construction—one in which the field moves at right angles to the shaft, and the other in which it moves parallel to the shaft; this, of course, requiring different engine arrangements, especially in regard to shaft lengths. Consequently, to properly combine an engine type alternating-current unit, even of the smaller capacities, the drawings should be taken up in each case and the necessary arrangements made for a successful combination.

In general, I would add that the Westinghouse engine-type generators, for both alternating and direct-current power work, can be designed with either of the following characteristics:

1. The generator revolving element may be pressed and keyed on an extension of the engine shaft, the engine builder furnishing the shaft, shaft keys and outboard bearing.

2. The generator may be self-contained and include the shaft, shaft keys, outboard bearing and a half coupling flange for directly connecting to the engine shaft or fly-wheel.

3. The generator revolving parts may be designed with a flanged extension for directly connecting to the fly-wheel. The shaft on which this revolving element is pressed and keyed may or may not be a part of the engine shaft.

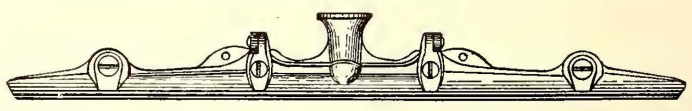
4. The large machines, 850 kw and above, can be built with bosses on the spider arms for directly connecting to an extension on the engine fly-wheel. In either of these cases the Westinghouse Company will provide the necessary gages and templates to enable the engine manufacturer to arrange his parts for connecting to the generator. Mr. Ebert added that there was much more to be said on the subject of the relations between the engine builder and the generator builder, which would be more clearly and successfully brought out by the general discussion which followed. Mr. Ebert also presented a number of drawings illustrating different types of generator construction, on both large and small machines, which were examined with interest by the engine builders present.

Street Railway Patents

[This department is conducted by W. A. Rosenbaum, patent attorney, 177 Times Building, New York.]

UNITED STATES PATENTS ISSUED DEC. 4, 1900

662,921. Apparatus for Electric Traction; H. Dolter, Paris, France. App. filed July 6, 1899. A pendulum circuit closer arranged in a box in the roadbed is lifted and swung to close the circuit by a magnet carried on the car.



PATENT NO. 663,198

663,138. Combined Rail Chair and Joint Block; G. T. Thompson and A. J. Lechler, Philadelphia, Pa. App. filed May 22, 1900. Two castings surrounding the lower portion of the rail and constructed with interlocking parts.

663,198. Clip for Trolley Wires; W. H. Russell, Watertown, Mass. App. filed March 20, 1900. The clip consists of two parts hinged together and provided with an irregular groove, in which the wire is to be seated, and held by clamping the parts together.

663,233. Connection of Strikers to Motor Vehicles for Mechanically Operating Electric Switches; W. Kingsland, London, England. App. filed July 10, 1900. The striker is mounted on the axle, so as to partake of all the movements thereof, and thus maintain a constant relation with the rail.

663,360. Electrical Rail Bond; W. Pervenko, Kiew, Russia.

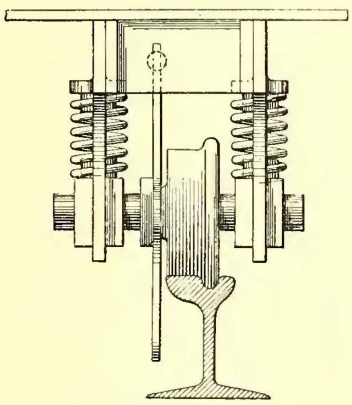
App. filed Dec. 30, 1899. The bond consists of a steel ribbon, extending continuously between the track rail and its support.

663,398. Electric Railway; E. Sussmann-Hellborn and W. Hornauer, Munich, Germany. App. filed Oct. 11, 1900. In an induction system the core of the secondary carried on the car, and that of the primary fixed in the roadbed, are laminated, and the laminations of the one extend into the spaces between the laminations of the other to afford intimate magnetic relation.

UNITED STATES PATENTS ISSUED DEC. 11, 1900

663,499. Car Moving Mechanism; M. Johnson, Milwaukee, Wis. App. filed April 23, 1900. An internal gear is cut on one of the wheels and a crankshaft is mounted in suitable bearings, supported from the axle, and carries a pinion engaging with the internal gear, by which the car can be moved by manual effort.

663,519. Electric Rail Brake; R. W. M. Schiemann, Dresden, Germany. App. filed May 22, 1899. A multipolar electro-magnet having a series of coils connected alternately to be positive and negative is arranged just above the rail, but when energized will be drawn downward against the rail surface, to afford the braking action.



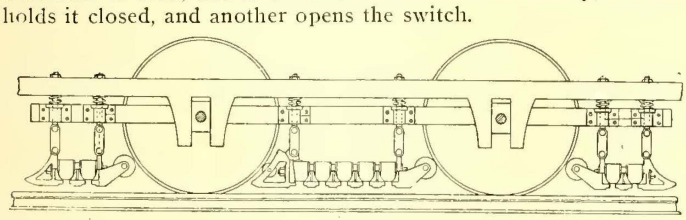
PATENT NO. 663,223

663,525. Elevated Single Rail Railway; A. A. Welsh, Allegany, Pa. App. filed Aug. 20, 1900. The invention consists in the arrangement of the guard wheels to afford equilibrium.

663,600. Electric Railway; T. P. Chandler, Philadelphia, Pa. App. filed Oct. 22, 1900. This is a temperage system, in which the invention relates to the details for supporting the conducting wire and the cable.

663,605. Wire Coupling; W. Frankham, Canton, Ohio. App. filed May 24, 1900. The sleeve into the ends of which the wires project contains an enlarged central cavity wherein the ends of the wires are looped to form enlargement preventing their withdrawal.

663,625. System for Electric Traction; M. T. De Felice, Rome, Italy. App. filed June 9, 1900. The electro-magnetic switch which closes the circuit to the working sections is provided with a number of coils, one of which closes the circuit initially, another holds it closed, and another opens the switch.



PATENT NO. 663,519

663,671. Car Brake Operating Mechanism; H. Blumenberg, Jr., New York, N. Y. App. filed July 20, 1900. The power to set the brake is obtained by bringing two cone pulleys into engagement, one of which is driven from the axle.

663,740. Trolley for Electric Cars; W. H. Earl, Painesville, Ohio. App. filed Aug. 14, 1900. The harp is pivoted to swing laterally, and a frame carrying the wheel is pivoted to swing on a vertical pivot.

663,747. Car Starter; T. Geraghty, Bayonne, N. J. App. filed Oct. 12, 1900. Consists of a bar having a wedge-shaped end, provided with roughening corrugations on the upper and lower side to grip the wheel and the track.

663,788. Trolley Pole; W. Schroeter and A. Kurtzmann, Dallas, Texas. App. filed June 11, 1900. The pole is fitted with a trolley wire finder, consisting of an arm attached to the rope in such a way that it may be thrown into position to conduct the wheel to the wire, and when that is accomplished the slackened rope permits the arm to assume a position where it will not interfere with the running of the wheel.

663,817. Aerial Wire Rope Tramway; J. H. Montgomery, Denver, Col. App. filed May 14, 1900. Means for automatically releasing the gripping lever at the loading station, whereby the carrier is allowed to stop until the bucket is filled, while the endless rope continues its movement.

663,827. Car Brake; P. Boch, New York, N. Y. App. filed March 30, 1900. Details of a brake in which two shoes are used respectively against the wheel and the rail.

PERSONAL MENTION

MR. WARREN H. HAUTSCH has resigned as superintendent of the Staten Island Midland Railroad Company, of Stapleton, S. I., N. Y.

MR. C. W. WOODWARD has been appointed purchasing agent of the Electric Storage Battery Company, of Philadelphia, to succeed the late Mr. John B. Falkner, Jr.

MR. J. S. HAMLIN has resigned as superintendent of construction of the Christensen Engineering Company, of Milwaukee, to accept the position of manager of the Auto-Appliance Company, of Chicago, manufacturers of automatic couplers.

MR. W. CARYL ELY, president of the International Traction Company, has just returned from a ten-week trip to Europe. Mr. Ely was accompanied by his wife, and they spent five weeks in France, a week in Brussels, Antwerp and adjacent places, and one week in England.

MR. JAMES SMITH, formerly superintendent of the Elizabeth division of the North Jersey Traction Company, of Newark, N. J., has just been made general manager of the Elizabeth, Plainfield & Central New Jersey Street Railway Company, which controls the line between Elizabeth and Plainfield. John Adelmann, who has been superintendent of that road and also of the Plainfield Street Railway, will hereafter be superintendent of the Plainfield line. Mr. Smith will make his headquarters in Westfield.

PROF. ALFRED E. BURTON, of the Massachusetts Institute of Technology, has been invited to accompany an expedition, which is to make a careful trial of the method of use in the field and on extended work of a new base measuring apparatus which has been perfected under his supervision by members of his classes. The apparatus has been recently tested by the Coast and Geodetic Survey in Washington, and such satisfactory results have been reported that it is about to be used in the important triangulation measurements in Texas.

MR. DUNCAN McDONALD, the retiring superintendent of the Montreal Street Railway Company, of Montreal, Que., was tendered a reception by the officers and employees of the company, and his numerous friends a few days ago. Every employee of the company who could be excused from duty attended the demonstration in honor of Mr. McDonald, and the officers of the company were present. General regret was expressed at Mr. McDonald's retirement, and a letter from the employees was read, wishing Mr. McDonald every success in his new position. Mr. McDonald was presented with a solid silver casket, suitably engraved, containing a sum in gold, as a token of appreciation, and Mrs. McDonald was presented with a silver toilet set.

MR. CHARLES S. CLARK, secretary of the Massachusetts Street Railway Association, was presented with a handsome solid silver pitcher at the meeting of the association, held Nov. 14. Mr. R. S. Brown, of the Westinghouse Electric & Manufacturing Company, made the presentation, and Mr. Clark responded with an appropriate speech. Speeches commendatory of Mr. Clark were made by Mr. John R. Graham, president of the association; Mr. C. S. Sergeant, of the Boston Elevated Railway Company; Mr. H. B. Parker, of the Newton & Boston Street Railway Company, and E. C. Foster, of the Massachusetts Companies. Mr. Clark has planned and carried out very successfully all the excursions to the street railway conventions, and the pitcher was a tribute of appreciation of his services.

MR. F. L. DAME has resigned as general superintendent of the Tacoma Railway & Power Company, of Tacoma, Wash. Mr. Dame has been connected with the Tacoma street car lines as superintendent for five years. He came to Tacoma in 1892 to take charge of the construction of the Point Defiance line, and three years later became superintendent for the Tacoma Railway & Motor Company. When consolidation of all the city lines was effected Mr. Dame was made general superintendent. He has been

on the Coast for eleven years, coming to Portland in 1889 from Boston to represent the Westinghouse Company. He spent two years in Vancouver, B. C., going there to take charge of the construction of an electrical plant. Later he went to Portland again and came from that city to Tacoma. Mr. Dame will reside at Marshfield, Mass., in the future.

MR. ASA M. MATTICE has been appointed chief engineer of the Westinghouse Electric & Manufacturing Company, and will enter upon his new duties immediately. During the past year Mr. Mattice has been engaged in remodeling the Cocheco Cotton Mills at Dover, N. H., but for the ten years previous he has been actively connected with the design of all the large machinery coming from the office of E. D. Levitt, of Cambridgeport, Mass., Mr. Mattice having been principal assistant to Mr. Levitt for the entire period. Mr. Mattice was a classmate of Mr. B. H. Warren, vice-president of the Westinghouse Electric & Manufacturing Company, having graduated as an engineer from the Naval Academy in 1874. He was assistant to Admiral Melville at the beginning of the new navy, and had an important part in the design of the machinery of the "Maine," "San Francisco" and others of the important early ships. The Westinghouse Company is to be congratulated on the additional strength which he will give to its already strong engineering staff.

ENGINEERING SOCIETIES

FRANKLIN INSTITUTE.—A stated meeting of the institute committee on science and the arts will be held Jan. 2.

NEW YORK RAILROAD CLUB.—The next meeting of the club will be held at the rooms of the American Society of Mechanical Engineers, New York City, Dec. 20. The address of the evening will be given by J. V. Davies, C. E., on "Railroad Tunnels: Their Construction, Maintenance and Operation."

ILLINOIS ELECTRIC ASSOCIATION.—The first annual meeting of the Illinois Electric Association was held at the University of Illinois, Nov. 27. The members of the association comprise the Illinois electric companies or individual owners of electric light plants doing a general commercial lighting business from a central station. There were fifty-two delegates present, and several visitors interested in the development of electrical engineering. Several technical papers were read and discussed at the meeting, including the following: "Meters vs. Flat Rates," by M. C. E. Hay; "Enclosed Long Burning Arc Lamps," by W. J. Ferris; "Desirability of Moderate Sized Cities Operating Day Power Circuits," by H. J. Pepper; "Minimum Monthly Charges and Meter Rent," by S. S. Davis.

NEWS NOTES

SAN FRANCISCO, CAL.—The Market Street Railway Company has applied to the Council for a twenty-five year franchise for the construction of a single or double-track electric railway from Third Street along Townsend to Second Street, and along Second Street to Brannan.

LOS ANGELES, CAL.—A boiler exploded in the power house of the Los Angeles & Pacific Electric Railway Company at Sherman a few days ago, injuring several persons. The plant is said to have been damaged to the extent of $25,000 by the explosion.

BRIDGEPORT, CONN.—The Bridgeport Traction Company is rebonding a large portion of its tracks. It is estimated that the new work will cost $20,000.

PUTNAM, CONN.—In the report of the street railway taxation in Connecticut on page 1206 of last week's issue the People's Tramway Company is given as paying $2,840. The treasurer of the company states that this should read $4,574.

NEW HAVEN, CONN.—The Fairhaven & Westville Railroad Company will present several petitions to the General Assembly for the extension of its lines over routes parallel to the steam railways to surrounding towns, and will petition for franchises to build lines running in every direction out of New Haven and over every route that it is possible to run parallel to the steam roads. Among the surrounding towns which the company wants to reach are Milford, Derby, Wallingford and Cheshire, to all of which the steam road is the only means of rapid transit at present.

ATLANTA, GA.—An ordinance has just been introduced in Council providing that no franchise grants be made in the future without suitable compensation to the city for the grants.

ATLANTA, GA.—The Council has passed an ordinance granting the Atlanta Rapid Transit Company the right to construct lines on Randolph Street, State Street, Mangum Street, Grant Park and Cherokee Avenues, Windsor Street and Forest Avenue.

CHICAGO, ILL.—A car of the Calumet Electric Street Railway Company jumped the track a few days ago. Four persons were injured.

LEBANON, ILL.—The Lebanon Commercial Club has developed a new project for an electric railway from Lebanon to East St. Louis. A proposition has been made them by E. L. Thomas, of Belleville, under whose management the East St. Louis & O'Fallon coal road has been completed to within a mile or two of O'Fallon, 6 miles west of Lebanon. Mr. Thomas proposes that the projects be linked, and that his coal road be extended to Lebanon over the right of way already secured by the Lebanon Commercial Club. The probability is strong that this proposition will be acted upon, inasmuch as Mayor Stephens, of East St. Louis, who has been chiefly interested with the Commercial Club in the proposed electric road to Lebanon, is interested in the completion of the Thomas road.

CHICAGO, ILL.—The Chicago, Evanston & Northern Street Railway Company has made application to the Council of Evanston for a fifty-year street railway franchise. The purpose of the company is to construct an electric railway from Lake View through Evanston to Grosse Point. The company agrees to pave all of the streets used for its purposes with compressed brick and to keep them in repair at all times. The brick is to be of the best and the privilege is given the city of superintending the work. The company also offers to pay the city 2 per cent of the gross receipts after and during the second ten years that the franchise has been in operation. After and during the fourth ten years that the franchise has been granted the city is to receive 3 per cent of the gross receipts of the company, and after the fifth ten years, should the franchise be renewed, 8 per cent. The names of those interested in the company are not set forth.

INDIANAPOLIS, IND.—The Indianapolis Street Railway Company has put a number of new combination cross and side-seat cars in use. In the forward half of the car the seats are arranged crosswise, while in the other half of the car side seats are used.

INDIANAPOLIS, IND.—On Dec. 12 the County Commissioners granted the Indianapolis & Northwestern Railway Company a franchise for the construction of an electric railway over the Crawfordsville road. The franchise is granted for fifty years. The company is to pay $25 into the County Treasury the first of each year for each mile of track in the county. Construction is to begin not later than May 1, 1901, and the road is to be completed by June 30, 1902. If the company fails to comply with the contract the franchise will be forfeited.

MARTINSVILLE, IND.—The County Commissioners have decided to extend the franchise of the Indianapolis & Martinsville Traction Company to Sept. 1, 1901, provided the company files a bond of $20,000 by March 1, 1901, that it will have the road completed in due time. The former franchise would have expired Jan. 1.

GREEN CASTLE, IND.—The County Commissioners have granted W. B Vestal and others a franchise to construct and operate electric lines on all of the principal thoroughfares in Putnam County.

INDIANAPOLIS, IND.—William C. Jamison, Charles L. Davis, James R. Riggs, A. A. Homes and W. H. Hawkins have filed a petition with the County Commissioners of Sullivan County, asking the grant of a franchise for the construction of 20 miles of electric road in Sullivan County.

TERRE HAUTE, IND.—The Board of Public Works has made known the terms on which it will give the Wabash Valley Electric Company a franchise. It provides for a deposit of $24,000 in cash by the company. Four roads are to be built. As fast as a line is completed, the company is to have $3,000 refunded, and the city is to retain $12,000 as remuneration.

INDIANAPOLIS, IND.—The Board of Public Works has signed a contract with the Greenwood and Greenfield companies by which they are to sell Indianapolis Street Railway Company's tickets at prices now charged by the latter, and are to pay an annual fee to the city for each car used on the city's streets. This contract must be ratified by the Council. The board has receded from its original position to permit the interurban companies to charge a straight 5-cent fare in order to discourage city traffic.

MIDDLESBORO, KY.—The Straight Creek Coal Company contemplates constructing an electric railway up Straight Creek for a distance of several miles. The road will extend to the new mines which the company is about to open, and will be used for transporting both passengers and freight.

BANGOR, MAINE.—The first snow storm of the season in New England started here Dec. 4 and continued through the night and the next day. No attempt was made to operate electric cars until Dec. 5.

WESTBROOK, MAINE.—The Westbrook, Windham & Naples Electric Railway Company has petitioned the Legislature for permission to extend its lines to Gorham and Cumberland Mills.

YORK, MAINE.—The York County Electric Railroad Company has been incorporated, with a capital stock of $44,000, to construct an electric railway from York to Waterboro and Limerick, a distance of 11 miles. The incorporators of the company are: William W. Mason, William R. Anthone, Charles G. Moulton and Samuel F. Clark.

NORTHBRIDGE, MASS.—The Worcester & Blackstone Valley Street Railway Company is now operating its line through to Whitinsville, making hourly trips.

PALMER, MASS.—The stockholders of the Palmer & Monson Street Railway Company held their annual meeting Dec. 10. The following directors were elected: Charles E. Fiske, Charles B. Fiske, Edward Fairbanks, W. H. Fairbanks, C. A. Granis, W. G. Bushnell, A. W. Paige, George C. Flynt, G. D. Fuller.

LINCOLN, MASS.—The Railroad Commissioners have denied the applications of the Lexington & Boston Street Railway Company and the Concord & Boston Street Railway Company for locations here.

MILLBURY, MASS.—There was a spirited hearing before the Railroad Commissioners Dec. 11 in the contest over the proposed location of the Worcester & Suburban Street Railway Company's tracks on Main Street, as ordered by the Aldermen to allow the Worcester & Blackstone Valley Street Railway to enter the city. The Railroad Commissioners will announce their decision in the matter in a few days.