

BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,

New York, January 15, 1895.

Dear Sir:

The Board of Rapid Transit Railroad Commissioners will meet on Wednesday, January 16th, and on Friday, January 18th, 1895, at two o'clock P. M. for the purpose of hearing such persons as may desire to be heard concerning the method of construction of a rapid transit railway.

Yours respectfully,

Lewis L. Delafield,
Secretary.

BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,

New York, January 23, 1895

Dear Sir:

An informal meeting of the Rapid Transit Commissioners will be held at the offices of the Board on Saturday, January 26th, at half past one o'clock for the purpose of conferring with the committee of engineering experts.

Yours respectfully,

Lewis L. Delafield,

Secretary.

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VOL. XV.—No. 402.

NEW YORK, JANUARY 26, 1895.

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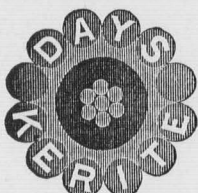
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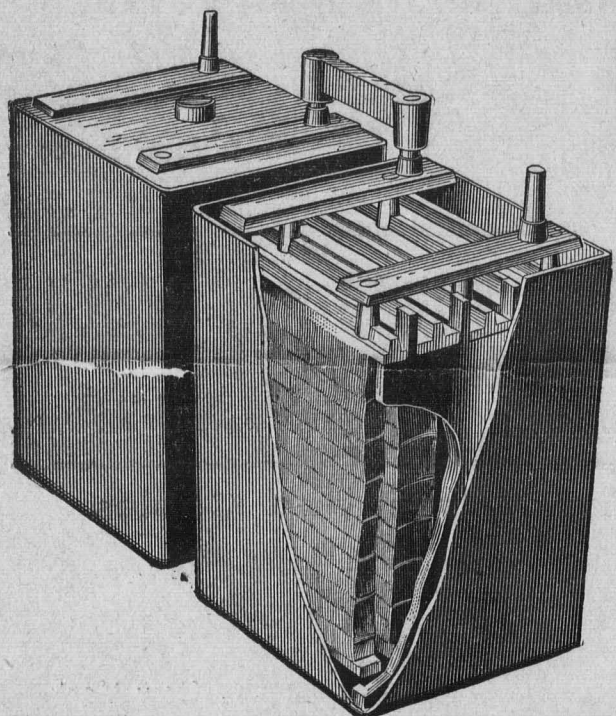
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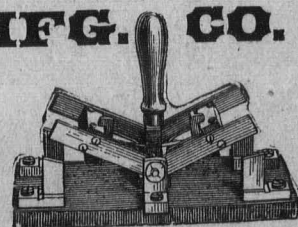
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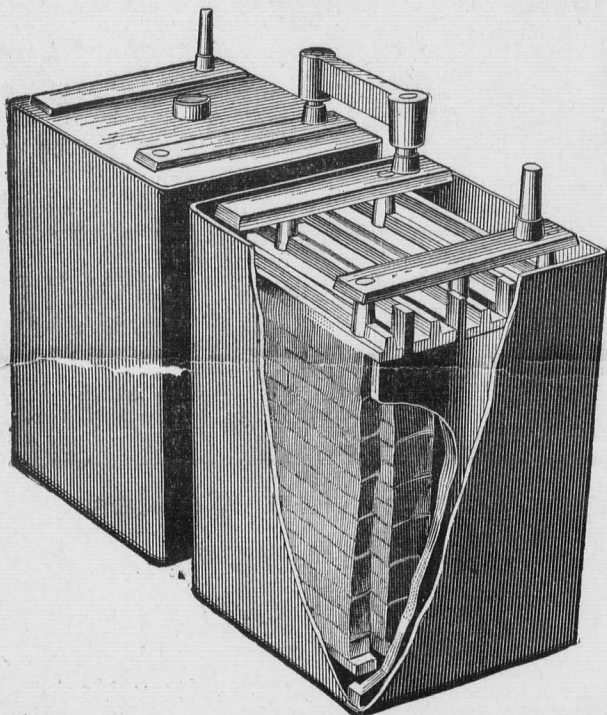
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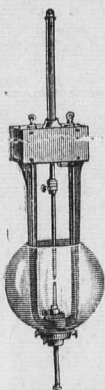
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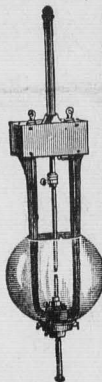
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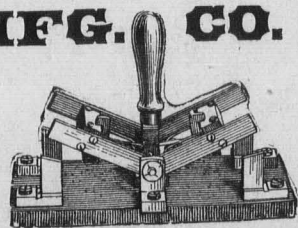
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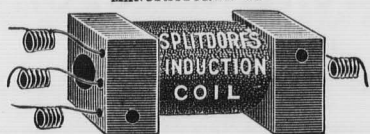
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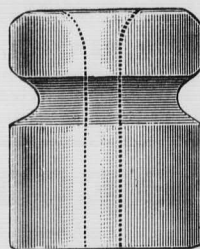


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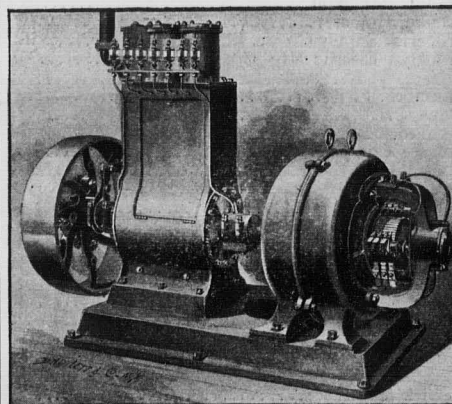
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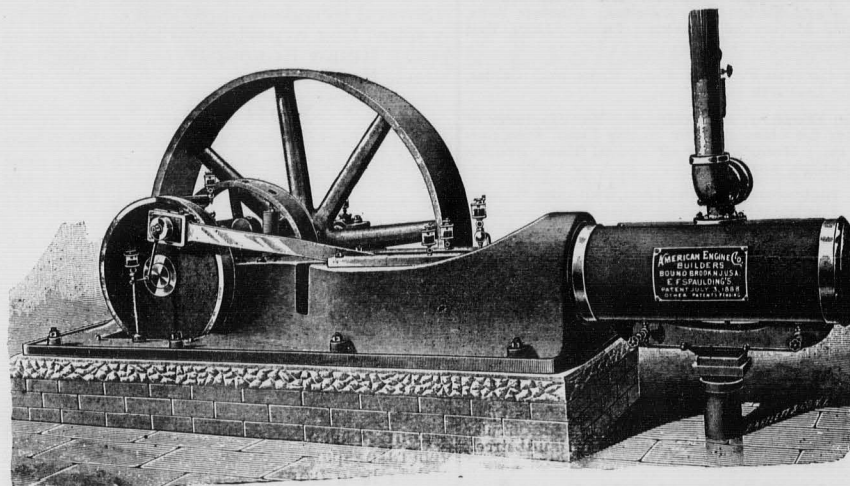


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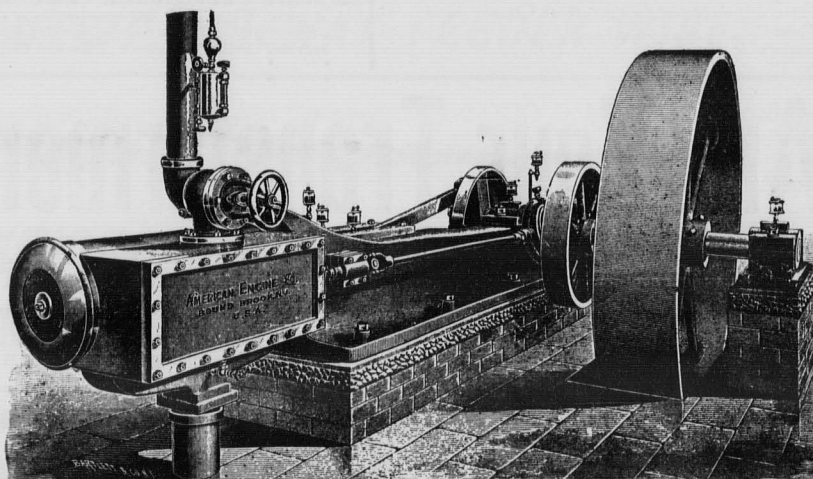
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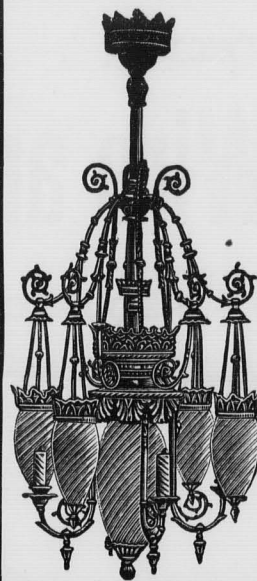
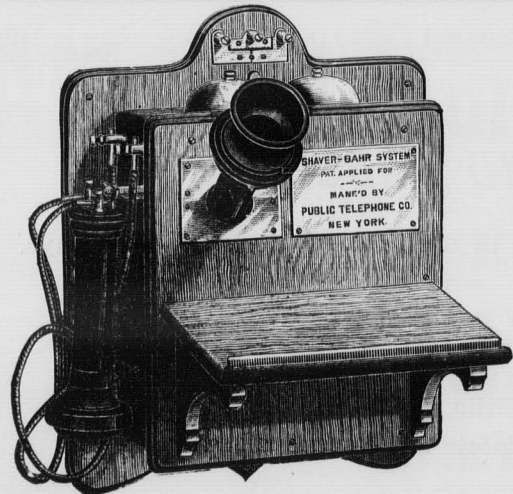
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ELECTRICAL AGE

VOL. XV., No. 4.

NEW YORK, JANUARY 26, 1895.

WHOLE No. 402

ESTABLISHED 1883.

Entered at New York P. O. as second-class matter, January 18, 1891.

THE ELECTRICAL AGE PUBLISHING CO., PUBLISHER

TERMS OF SUBSCRIPTION:

One Copy, one year,	\$3.00
One Copy, six months,	1.50
Great Britain and other Countries,	4.00

Cable Address (all Cables,) "Electage," New York.

W. T. HUNT, President F. N. BASSETT, Vice-President.
T. R. TALTAVAL, Secretary and Editor.
NEWTON HARRISON, E. E., Scientific Editor.

ADDRESS ALL COMMUNICATIONS TO
THE ELECTRICAL AGE PUBLISHING COMPANY,
FIRST FLOOR, WORLD BUILDING.
NEW YORK.

NEW YORK, JANUARY 26, 1895.

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THE RAPID TRANSIT PROBLEM.

The plan of rapid transit for New York city, described on another page of this issue, seems to be one of the most feasible of all so far proposed. It involves the least construction work of any, and at the same time avoids the necessity of going underground, in the ordinary sense of the word. There are serious doubts about the proposed tunnel plans. The people would prefer to be on or nearer the surface, and Mr. Leschziner's plan seems to more

nearly approach this desirable condition than any other that the rapid transit commission has so far considered. The simplicity of the plan commends itself, and the rapid transit commission should give it their careful consideration. Mr. Leschziner has some very practical ideas on the subject.

THE SITUATION IN BROOKLYN.

At this writing the strike of the employees of the Brooklyn trolley lines continues, attended with considerable violence. The circumstances outlined by us in our last issue have all occurred, and the state troops have been called out to guard the railroad companies' property and those of their employees engaged in operating the cars. Brooklyn's police force proved inadequate in the extreme emergency, and the troops were called on to afford the companies the necessary protection in order to reopen their lines. The presidents of the companies claimed that they had plenty of men to fill the places vacated by the strikers, but it was proved on Monday that they could not get enough men to resume the regular schedule. The result is that with the combined protection of the city and state the companies are unable to fulfil their promise to resume regular service when sufficient protection was afforded. This places the companies in a rather serious predicament, and there is already talk of beginning proceedings to annul their charters because of their inability to render the service necessary, and which they promised to render when their franchises were obtained. To admit, as they have done, that they cannot get enough men to run their cars, is an acknowledgment that they are unable to carry on their business. This being the case there is only one of two courses for them to pursue—either surrender their charter to some one who can run the business, or grant the men the increase of wages they ask. The people of Brooklyn through their representatives in authority should now take prompt and positive measures to bring the existing state of affairs to a head. If they do not they will, by their neglect to act, simply give and acknowledge the right of the street car companies to do just what they please. The strikers are evidently getting the better of the companies by winning over to their cause the new men as they are placed in charge of the cars. As we pointed out last week, they can accomplish more by moral suasion than by any other means, and by their adoption of such measures they have succeeded in seriously crippling the companies. A good many acts of violence have occurred during the week, and these are greatly deprecated; but it would be hardly fair to charge the strikers themselves with being responsible for such acts. It is well known that, as a rule, such unlawful demonstrations are chargeable to the sympathizers and mob element and not to the strikers. Nobody can prevent a striker from buttonholing a new man the first chance he gets and cause him, by argument, to desert the company's service. The effects of such methods are apparent in this case. The companies are now seriously embarrassed, to say the least, and the strikers seem to have the best of the situation. It would be a bitter pill for the companies to yield now to the men, but they may have to come to it, or go out of business.

NEW PLAN FOR RAPID TRANSIT.

Mr. Siegfried Leschziner, of 191 Schermerhorn street, Brooklyn, has a plan for rapid transit in this city that has some meritorious features. As this question is an all-important one in New York at the present time, a general description of Mr. Leschziner's plans will be of particular interest.

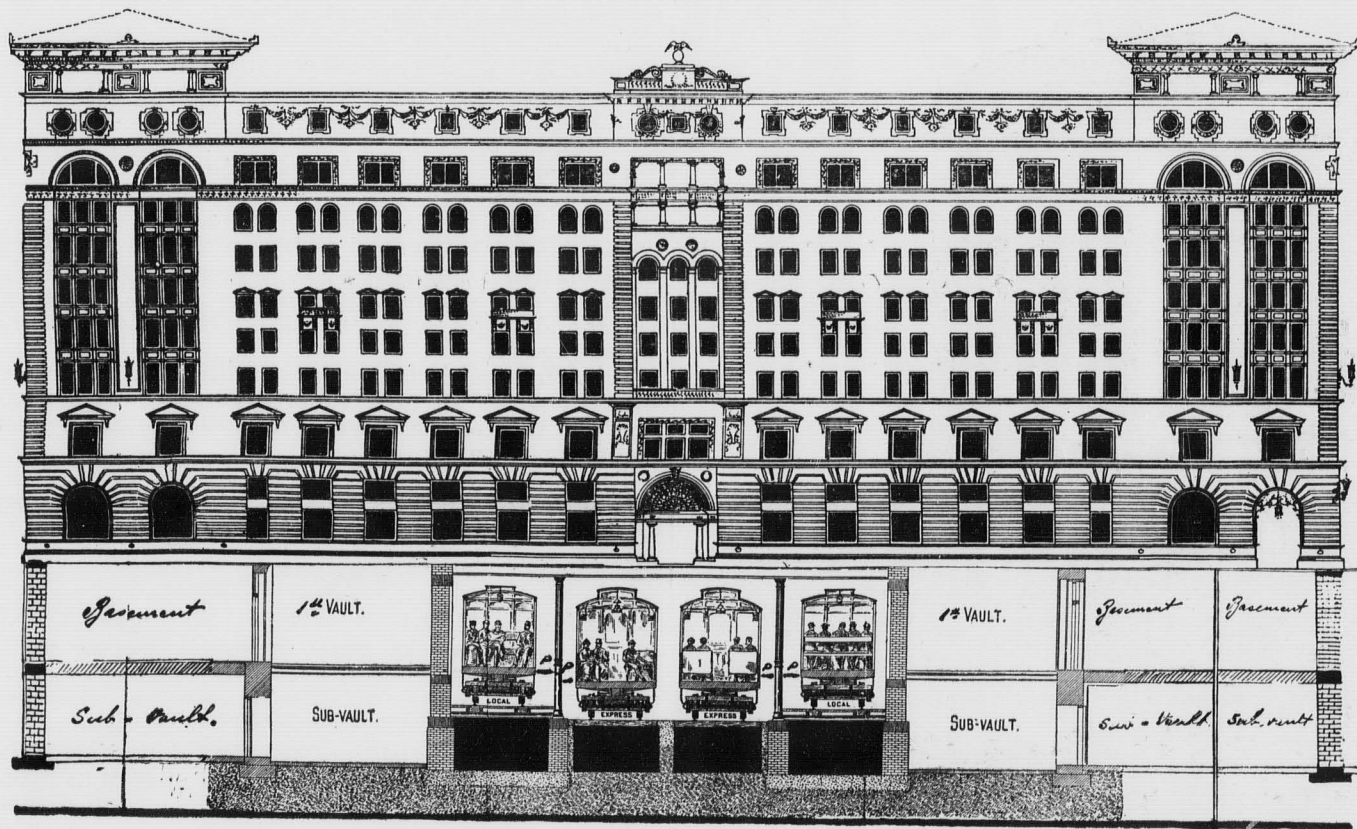
Mr. Leschziner believes that the tunnel idea for a railroad is all wrong. People don't want to go underground, he says, while they are alive, and there is no excuse for building an underground road when a much superior construction can be had in the open air, where there is daylight, and at less cost.

His plan, in brief, is to construct a three-deck elevated road through the middle of the blocks. Twenty-five or thirty feet of ground through each block will give sufficient space for the road, and on the land is to be erected a mas-

The disposition of traffic on ten tracks would be an easy matter, and seats would be provided for all. Passengers could be distributed at more rapid speed along the route and with less loss of time than is possible with any other system yet suggested.

Mr. Leschziner claims that his system provides ample means for rapid service, not only for 25 years to come, but for all time. Such a construction, of course, would cost considerable money, but it will meet every demand and be satisfactory to the public. The same cannot be said of any underground system.

This plan certainly has some excellent features. In crossing streets the road would be carried over arched structures, and between streets, or through the blocks, little of it would be seen. Therefore the objection heretofore raised against elevated structures in general does not seem to have any standing in this case. The right of way through the blocks would have to be acquired of course.



VIEW OF LESCHZINER'S PLAN II, FOR RAPID TRANSIT IN NEW YORK CITY.

sive structure of brick up to the second story line. The substructure is to be arched so as to provide free passage-way beneath. Upon this substructure the railroad company could build as many levels of track as it pleased.

Mr. Leschziner has a plan of a road to be constructed after his idea providing for a three-story structure with ten separate tracks. Upon the arched substructure are laid four tracks, and above these, on the super-structure are four more tracks immediately above those on the first level, and then, on the third level there are two tracks, with space for two more. The plan also provides for depressing the first tier of tracks below the surface of the ground where necessary so as to avoid grade crossings, and to continue the line any distance beyond the city limits. The depressed sections of the road of course would only be required up to the city limits and then the road could be continued on the arched substructure.

This method of construction provides almost unlimited possibilities for future enlargement, and Mr. Leschziner proposes, by his plans, to continue the road from New York to Niagara Falls, the State assuming the ownership. In this way not only would the city itself be provided with rapid transit, but passengers could be transported long distances beyond the city, almost from the very doors of their houses, without change of cars.

This would be the greatest item of expense, but set against this is a road that cannot be approached for completeness, provision for future enlargement, and the absence of objectionable features.

It is Mr. Leschziner's idea to operate the road by electric power.

Mr. Leschziner has a modified plan of his system, which he calls Plan II, an illustration of which is given herewith. It shows a depressed road running through private property in the middle of the block, said property to be acquired by the city whenever the route is decided upon. The plan is to build such a road on the east and west sides of the city, the two divisions converging at City Hall Park and continuing down Broadway to Battery Park, around which the road forms a loop, and returning up Broadway to the City Hall, where the east and west side tracks divide. Cross roads are to be constructed to connect the two main divisions on such streets as may be desirable.

Our illustration of Plan II shows the road to be of four tracks, two for express service and two for local, with platforms marked at P. The necessary property for the erection of the road is to be acquired by purchase or by condemnation proceedings. At street crossings the street would be built over. A depth of 13 or 14 feet would be all that would be necessary for the building of a road on

this system, hence very little excavating would be necessary. Mr. Leschziner estimates that the cost for the construction of such a road would not be half of that estimated for proposed roads, and he thinks that the cost of the road complete, including payments on account of property acquired, would not amount to as much as would the excavation of the tunnel roads so far proposed. The routes and extension features are practically the same in both plans. When the road reaches the city limits the idea is to continue it as far as necessary.

Mr. Leschziner is of the opinion that a road constructed on the lines laid down in his Plan II, would cost a great deal less than the \$50,000,000 voted to be expended in the construction of a rapid transit system, and be more practical, besides, than any of the tunnel systems.

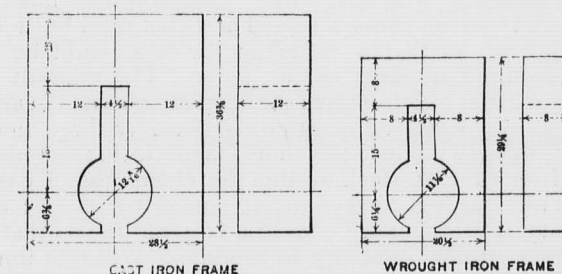
The plans provide for suitable stations, etc., and Mr. Leschziner will be glad to give all information desired respecting his plans to interested parties.

THE BEST METAL FOR FIELD MAGNET FRAMES.*

BY ALTON D. ADAMS.

Cast-iron, cast-steel and wrought iron being the materials at our command for field magnet construction, it is an important question to the engineer and manufacturer which will produce a dynamo of given capacity, speed, efficiency and working qualities at the least cost.

I am not aware that any of the works on dynamo construction attempt a definite answer to this question, and



FIELD MAGNET FRAMES.

the practice of builders is by no means uniform. Economical points of saturation requiring about the same magnetizing force per unit of length in each metal, are for cast-iron a little under 40,000, cast-steel 70,000 to 80,000 and wrought-iron about 90,000 lines per square inch.

The cost of cast-steel is fully equal to that of forgings in simple shapes, and as it lies between cast and wrought-iron in magnetic qualities, the cost of machines made with it will be between those of cast and wrought-iron. A comparison will, therefore, be made between the cost of the latter two.

To be fairly compared, machines of different materials must be equal as to magnetic flux in field and armature cores, ampere-turns on armatures, field ampere-turns required in air gaps and as nearly as possible in magnet frames, watts used in windings and be of the same capacities and speeds.

Taking wrought-iron at a saturation of 90,000 and cast at 40,000 lines per square inch, the section of an equivalent cast will be two and one-quarter times that of a wrought frame and as the length of the cast-iron frame must be a little greater to give enough winding length, its weight will be about two and one-half times the wrought. A saving is thus at once made in favor of the wrought magnet, as forgings can be had per pound for much less than two and one-half times the cost of cast-iron.

The same number of ampere-turns and watts being required for the coils of the cast as the wrought-iron magnet, and the weight of wire varying as the square of its length, the coils for the cast-iron frame will be much

heavier. The armature core may have the same diameter in each frame, but must be longer in the cast frame so as to come under the pole-pieces, thus materially increasing its weight.

As for the same resistance, the weight of armature winding increases as the square of its length, considerable more wire is required for the armature core of the cast-iron machine. In addition, the purely mechanical parts, shaft and base must be larger and more costly in the cast-iron machine, because of the greater weights they have to carry.

To illustrate the difference in cost of construction, the following data of two machines is presented, each having capacity of 25 k. w. of 1,275 revolutions per minute, the same winding losses, the same ampere-turns on armatures and field ampere-turns in air-gaps equal to about twice the armature ampere-turns active at the pole corners.

The air-gaps and armature cores of each machine are crossed by 4,320,000 magnetic lines and allowing a leakage of 25 per cent. the field core must furnish 5,760,000 lines.

A wrought-iron field to carry 5,760,000 lines, at 90,000 per inch saturation, requires a section of 64 square inches, which is provided by a core of eight inches square and a cast-iron field at 40,000 lines per square inch requires a section of 144 square inches provided by a core 12 inches square.

Allowing sufficient length for magnet windings, the same air-gap resistance and an armature core of 11 inches diameter for each of these frames, their dimensions will correspond to the following drawings:

The weights of these frames are—

Wrought-iron frame 1020 lbs.
Cast-iron frame 2730 "

For work as shunt motors the wrought-iron machine requires 11,000 ampere-turns in the air gaps and 2,000 in iron, the cast machine 11,000 ampere-turns in air-gaps and 3,800 in iron.

With 440 watts expended in field coils of each machine, an average length per turn of 38 inches in the coils for wrought iron and 54 inches in the coils for cast iron, the weights of these coils are

Wrought-iron machines 100 lbs. copper.
Cast-iron machine 280 "

The drum armature for the wrought frame is 11 inches diameter and eight inches long, that for the cast frame 11 inches diameter and 12 inches long, without allowance for shaft hole.

The weights for armatures are

Wrought-iron machine 133 lbs. disks.
Cast-iron machine 340 "

With a loss at full load of 490 watts in the armature winding for wrought-iron machine and 464 watts in the armature winding for cast-iron machine these windings require in

Wrought-iron machine 49 lbs. copper.
Cast-iron machine 71 "

The above indicates plainly the great saving of wrought over cast-iron in dynamo construction.

From the users' standpoint the wrought-iron machine seems preferable on account of its lesser weight and bulk, this difference being especially marked in machines for direct connection to engines and other purposes where slow speed is necessary.

An electric railway is to be established between Montiers and Brides-les-Bains, Savoy, the power to be obtained from two water-falls in the neighborhood.

Postal long distance telephone lines have been opened between Leeds and South Wales, and Merthyr Tydfil and Newcastle-on-Tyne, England.

* A paper presented at the ninety-third meeting of the American Institute of Electrical Engineers, New York and Chicago, January 16, 1895.

PRINCIPLES OF DYNAMO DESIGN.

BY



(Continued from Page 37.)

The Choice of Metals.—Although the proper consideration of leakage will greatly determine the shape or type of a frame, another factor of equal importance presents itself to our immediate notice.

There are many grades of magnetizable metal on the market whose use has given rise to much discussion as to which is cheapest and best for dynamo frames.

The use of cast iron was a general practice, and is to a limited extent today, because of its apparent cheapness and ease with which it could be moulded to any shape. But it has been superseded of late by a metal which we can cast and handle with the same facility, and whose magnetic qualities are so greatly superior in every respect that experience would immediately demand its use.

This metal, called cast steel, possesses the most desirable qualities; high permeability, and practically the same ease in casting as cast iron itself.

The metal which for many years was considered the most economical for smaller types, but which was occasionally used for cores of larger machines, was wrought iron. It was generally forged into shape, if used for both core and pole-piece. This in itself was necessarily a great expense; the use of dies to produce the drop-forgings limited the size of the forging and implied an additional cost for wear and tear of dies to be considered in the price of the metal per pound.

The practice was quite prevalent to have wrought iron cores but cast iron in every other part of the frame.

The Edison Company use in their bipolar types of machines, wrought-iron cores and keepers, but cast-iron pole-pieces. There is a great objection to the butting together of cast and wrought iron unless proper provision be made for such an arrangement. The magnetic flux issuing from a wrought-iron core and passing into a body of metal of greater magnetic resistance at the surface in contact would tend to throttle the lines of force and reduce them in number. It therefore becomes necessary to use a large wrought-iron washer between the two, if the case of a wrought core and cast pole-piece be considered. The area of cross-section of this washer should be sufficient to allow the lines of force to pass into the cast iron at a normal specific induction, otherwise a junction without the above precautions will mean an interposed resistance in the magnetic circuit.

The great objection to cast iron has always been due to the fact that its permeability is very low in comparison with wrought iron or cast steel. It has invited the attention of engineers because of the ease with which it could be manipulated to any shape. But this objection of low permeability and at saturation of only approaching an induction of eight to twelve thousand lines of force per square centimeter, which again necessitates a longer ampere turn than would be required for the same magnetic output in wrought iron, has for reasons of economy almost entirely excluded it from general practice for entire frames. As an illustration:

A square inch of wrought iron will have a magnetic flux at saturation of a hundred thousand lines of force, while the same cross-section of cast iron will give only sixty thousand lines of force with a number of ampere turns greatly exceeding those required for the wrought iron; this fact is of considerable importance to the practical engineer. Space and weight are factors which at times must be brought to a minimum value, and a metal of high permeability will effect this often desirable end. The relative values of cast iron and wrought iron are in the ratio of one to two, as regards their magnetic qualities.

At the present time cast steel is a metal whose high

permeability has caused its general adoption in place of either wrought or cast iron. In its chemical composition it does not differ considerably from wrought iron and is in reality that metal itself.

The purity of iron or the absence of carbon changes its quality, so that we pass according to the respective quantities they contain from cast iron to steel and from steel to wrought iron. Steel, or more properly mild steel, therefore belongs to the family of wrought irons, not only in this respect but in the possession of a very high permeability, such that many makers have denied its inferiority to wrought iron. As it can be cast into any shape all objections to its use fall away and machines of today can be made without a single joint and possessing the average permeability of wrought iron in all parts.

Mr. Alton Adams has made some calculations on this subject and produced the following figures, showing the relative weights of cast and wrought-iron frames producing the same number of lines of force:

Wrought-iron frames	1020 pounds.
Cast-iron frames	2730 "

Although steel has been left out of this calculation, the figures for wrought iron in all probability would not vary ten per cent. from those for cast steel. Mr. Adams has stated that the relative points of saturation in the three metals are: for cast iron, 40,000; cast steel, 80,000, and wrought iron, 90,000 lines per square inch, but the experience of other manufacturers brings these figures up to a greater value. It being granted for the sake of argument that wrought iron was 20 per cent. superior to cast steel, the cost of handling it would not be an incentive to its use in comparison with cast steel. Drop-forgings have a value of six to seven cents a pound and cast steel but four cents a pound, so that a choice of the two would be at once determined in favor of the latter. The amount of copper used in each of the above-mentioned cases would also vary. Cast iron would require two and possibly three times as much copper to produce the same magnetic flux as either wrought iron or cast steel, so that the cheapness of cast-iron does not imply a corresponding saving by its use; on the contrary, it means more copper, a larger frame, a greater weight and a greater difficulty in handling. Wrought iron, while greatly superior, cannot be handled with the same ease. We are limited in the size of forgings because of the great expense, and we cannot produce a machine as solid, mechanically, as one whose structure is complete in every part. Cast steel, whose only possible inferiority to wrought iron may be caused by blow-holes, covers the objections to both these metals by possessing all their good qualities and none of their bad ones. It may be well understood from the start that the severe conditions of practice may utterly remove the question of a few per cent. gain by the use of either wrought iron or cast steel. The question lies more with the builder, to whom the saving of any amount which does not involve the expenditure of an equal sum, is from the standpoint of economic design a most desirable object.

(To be Continued.)

BUFFALO'S NEW ENGINEERING SOCIETY.

The Engineering Society of Western New York has been organized in Buffalo and is now looking for suitable quarters. In order that the society may be put on as high a plane as possible, the charter members will be confined to members of various engineering societies of the United States, including the American Institute of Electrical Engineers. The objects of the society are similar to those of engineering bodies in general. Meetings will be held on the first Monday in each month. The officers are: President, George E. Mann; Vice-President, E. B. Guthrie; Junior Vice-President, Walter McCulloh; Secretary and Treasurer, Geo. R. Sikes; Directors: Geo. B. Burbank and C. M. Morse.

ON THE UNITS OF LIGHT AND RADIATION.*

BY A. MACFARLANE, D. SC., LL. D.

One of the recommendations made by the sub-committee of the Institute in the programme for the International Electrical Congress at Chicago, was that the practical unit of illumination should be defined as the illumination produced by the bougie-decimale at the distance of one metre, and that this unit should be denominated the bougie-metre. To this definition little objection was made, excepting that Professor Nichols pointed out that it involved an arbitrary standard of light which had no relation to the c. g. s. system of units. More general objection was taken to the notation for the unit.

The London *Electrician* for February 3, 1893, objected to the "bougie-metre," that all other such compound names imply a product of the components, while in this case the former component is divided by the latter, or, more correctly, multiplied by the square of its reciprocal; and suggested, half seriously, that instead of "candle-foot" we ought on the "mho" principle to speak of "candle-toof-toof."

M. Hospitalier made the same objection, that "bougie-metre" according to existing usage means a product, and suggested "bougie-at-a-metre," or, if that were inadmissible the use of a new term such as "lux." M. Blondel favored the single term "lux," and Mr. Lockwood, the single term "davy."

Consider the philosophy of the substitute suggested by the *Electrician*. If we attempt to formulate the "mho" principle, we find that it may be expressed as follows: The reciprocal of a given unit may be denoted by writing the name for the direct unit backwards. It supposes that the given unit can be expressed as the ratio of two other units; thus, ohm is the single name for the ratio, volt per ampere. The reciprocal idea is ampere per volt, and there is a convenience in not introducing a new and independent word, but in denoting it instead by the direct term written backwards.

It appears to the writer that here we have a principle which might well be adopted in mathematical analysis, for we have all felt the want of a suitable notation for a function, which is the reciprocal of a given function; for example, the reciprocal of \tan or \sin . English and American writers use \tan^{-1} and \sin^{-1} , a notation which is half word, half symbol; which cannot be pronounced; and which suggests the reciprocal quantity instead of the reciprocal function. Continental writers use "arc tan" and "arc sin," which are too long and periphrastic. On the "mho" principle, the reciprocal of "tan" is "nat" and that of "sin" is "nis." Let $x = \tan y$, then $y = \text{nat } x$; let $a = \sin b$, then $b = \text{nis } a$. According to Lord Kelvin, who, I believe, introduced the "mho" notation, the expression for a function should consist of three letters; and it may be added, the middle letter ought to be a vowel, the other two consonants. Such a syllable notation when inverted remains a syllable. This notation would have the advantages of being short, unambiguous, articulate and logically connected.

But in the case of a fundamental unit, such as the foot, is there any reciprocal idea? It is true that there are physical quantities which have the dimension L^{-1} ; but on examination they will be found to express a physical ratio of some kind. For example the unit of curvature has the dimension L^{-1} ; it is expressed by radian per foot. The reciprocal unit is foot per radian, having the dimension L ; it is not a measure of length, but of flatness.

The difficulty experienced in expressing the intensity of a candle or other spherical source arises from the want of a name for the unit of solid angle. Just as the natural unit for plane angle is metre of arc per metre of radius, so the natural unit for solid angle is square metre of spherical surface per metre of radius squared. The name "radian" given to the former unit (Everett's "Units and Physical

Constants," 1879), has been very useful in expressing exact ideas; a recognized name for the latter unit would also be highly useful. For this purpose the word "steradian" was introduced by Dr. Halsted in his *Metrical Geometry* in 1880, and I have used it in my work on *Physical Arithmetic*. Though not faultless from the point of view of the etymologist, it is sufficiently expressive to the physicist.

How then is the unit of illumination properly expressed? Suppose that by "bougie" is meant the current of light which streams from a uniform standard candle through one "steradian," then the illumination anywhere may be expressed in terms of bougie per square metre, where the former component refers to the current, and the latter to the cross-section. But in the case of light streaming from a point source, the illumination may be expressed in terms of (bougie per steradian)-(steradian per square metre), where the former component refers to the intensity of the source, and the latter to the solid angle subtended at the source by one square metre of cross-section. If "lux" is the single term for this unit, we have lux = bougie per square metre.

= (bougie per steradian)-(steradian per square metre). Hence, candle per square foot or (candle per steradian)-(steradian per square foot) is the proper expression for the candle-toof-toof of the *Electrician*.

According to the above definition of "bougie," the total current from the candle would be 4π "bougies." But if "bougie" is defined to mean the total current from the candle, and by "lux" is meant the same quantity as before, we should have

$$\text{lux} = \frac{1}{4\pi} \text{ bougie per square metre.}$$

We cannot logically avoid the 4π ; exclude it from the source it appears in the intensity, and *vice-versa*. This point is overlooked in the established system of magnetic units and forms the basis of Heaviside's rational system.

The use of the hyphen to denote a product unit is not very appropriate, for it suggests the sign minus rather than the sign of a product. It would be better if it were omitted altogether and the two component units amalgamated as in footpound and kilogrammetre for then the nomenclature would correspond to the algebraic convention which leaves the sign \times to be understood, and in addition the hyphen would be set free to denote any compound unit other than the product or quotient.

If we consider the general subject of radiation we shall be led to distinguish the following ideas with their corresponding units:

Quantity of radiant energy of whatever kind can be expressed in ergs, and a *flow* in ergs per second. By *strength of source* is meant the whole quantity of radiant energy which leaves the source in a given time divided by the time; the appropriate unit is erg per second. The *intensity of a source* is differently expressed, according as the radiation is spherical, cylindrical, or plane. In the first place it is the ratio of a current through a solid angle to the solid angle, and hence it is appropriately measured by the erg per second per steradian. In the second case it is the ratio of a current through a wedge-angle to the wedge-angle. There is no recognized unit of wedge-angle; as it involves the radian in one plane and a length along the perpendicular to that plane, it may be expressed by cm.-radian. Hence the intensity will be expressed in erg per second per (cm.-radian). If the radiation proceed from an infinite plane, its intensity is measured in terms of erg per second per cm^2 .

By the *density* of the radiation at any point of a source is meant the ratio of the flow normal to a small surface to the small surface, and is expressed in terms of erg per second per cm^2 . By *intensity of current* anywhere, is meant the ratio of the flow through a small cross-section to the cross-section, and is also expressed in terms of erg per second per cm^2 . By *time flow* is meant the ratio of the energy which has passed through a cross-section to the cross-section; it is expressed in terms of erg per cm^2 .

The above is the appropriate system of c. g. s. units for

* Abstract of paper presented at the ninety-third meeting of the American Institute of Electrical Engineers, New York and Chicago, January 16, 1895.

any kind of radiation measured simply as energy. But in the case of light the eye exercises a selective power, not only singling out a certain range of wave-lengths, but discriminating among them as to amount. If one of the units is defined with reference to this discrimination exercised by the eye, then the other units of the light system can be defined in terms of it, and the units of length and time.

THE ANIMAL AS A PRIME MOVER.*

BY R. H. THURSTON.

The Vital Engine, the body of every vertebrate animal—from the human ruler of all, down to the lowest organism having a cartilaginous frame—is today well recognized, as, in the engineer's classification, a "prime motor," in which the latent forces and energies of a combustible "food," of a fuel, as many suppose it, are evolved, transferred and transformed to perform the work of the organism itself, to supply heat to keep it at the temperature necessary for the efficient operation of the machine, and for the performance of external work. The value of the machine as a prime mover is dependent upon the relation between this external work, so far as it can be applied to useful purposes as labor, and the costs of its production in fuel or energy supply, and in wear and tear and replacement, precisely as with any other machine of the class, whether the source of power be chemical, thermal, electrical or vital.

The work of the machine is, however, a very different quality and is vastly different in quantity, useful work being compared with supplied energy and incidental expenditures from that of any other known motor. In the water-wheels and windmills the office of the motor is simply that of transfer of energy of flowing currents of fluid, of water or of air, and, without transformation, to mechanism suitable for giving it useful application. The heat engines develop energy previously "latent," potential, as the modern nomenclature would call it, into the kinetic form of thermal motion, and by transformation, so far as may be practicable, into the dynamic form, make it available for work. Electro-dynamic machinery similarly makes available by transformation the energy of the electric current; and none of these machines has any other function than that of making useful some one energy previously stored by the operations of Nature in such form as to be readily applied to his purposes by the hand of man.

The vital machine, on the other hand, has purposes and performs offices of essentially different kinds. It must not only transform the latent energies of the supplies received by it into useful external work, but all its work being directed toward the sustenance and preservation of the contained soul, as its principal and always essential purpose, all its operations being automatic or self directed, all its powers of transformation of energy are demanded for the production, by transformation, presumably, of (1) the vital forces and energies; (2) the physical energies demanded in constructing, rebuilding and operating the animal frame; (3) the external work required to furnish the body supplies, to protect it from decay or injury and to minister to the physical wants and ethical requirements of the personality of which it is at once the home and the vehicle.

This curious prime mover is thus an apparatus which, from familiar sources of energy, transfers and transforms, for its own purposes and applications, a variety of energies, performing a variety of work in various realms. The nature and composition of the sources of latent energy, always chemical compounds capable of oxidation, are well known; the character and method of many of the internal, as well as of the external expenditures of energy, are equally well understood; but there are a variety and considerable number of internal operations, involving transformations of energy, the nature and method of

which are entirely beyond observation by any process of experimentation yet devised.

"Food" is taken into the body, enters into solution with the peptic fluids, elaborated from previously supplied nutriment, is absorbed into the circulation and disappears from our sight and reach; heat, carbon-dioxide, vapor of water, various salts and a considerable proportion of unutilized nutriment are rejected from the system and work is performed as the product of transformed energies and in large amount, both within the machine and upon external bodies. A chain of energy transformations is in continuous operation, of which we see the two ends, so far as the vital machine is concerned, but of which we only get occasional glimpses between the extremities, and some of the links of which are, as yet, undiscovered and unknown. It is certain that the series of changes, material and kinetic, involves familiar methods of transformation, and it is hardly less certain that singular and probably wonderful and unknown processes of energy, development and transformation are concealed within this miracle among machines.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.

The ninety-third meeting of the Institute was held at 12 West 31st street, Wednesday evening, January 16, President Houston in the chair.

Prof. McFarlane, of Ithaca, N. Y., read his paper "On the Units of Light and Radiation," which was discussed by Messrs. Kennelly, Wolcott and Burnett.

It was voted subsequently that the paper be referred to the Committee on Units and Standards for consideration.

The paper by Mr. Alton D. Adams, of Boston, was read by the author and discussed by Messrs. Crocker, Richard Fleming, Sheldon, Ashley, Burke, Waldo, W. L. Bliss and Gano S. Dunn.

At the council meeting in the afternoon the following associate members were elected:

Anderson, Henry S., General Manager and Electrician, United Electric Light Co., Springfield, Mass.

Buck, H. W., Student in Electrical Engineering, Columbia College; residence, 14 E. 45th street, New York City.

Cox, Edmund V., Student in Electrical Engineering, Columbia College; residence, 50 E. 31st street, New York City.

Denison, Sylvester P., 143 Centre street, New York City; residence, Belleville, New Jersey.

Farnsworth, Arthur J., Chief Engineer, Larchmont Electric Co., Mamaroneck, N. Y.

Fisher, Henry W., Electrician and Director of Elec. and Chem. Laboratories, The Standard Underground Cable Co., Pittsburgh, Pa.

Fridenberg, Henry Leslie, M. E., Student in Electrical Engineering, Columbia College; residence, 60 E. 61st street, New York City.

Gallaher, Edward B., Electrical Engineer, 253 Broadway, room 910; residence, 1190 Madison avenue, New York City.

Klinck, J. Henry, Graduate Student, Cornell University, Ithaca, N. Y.

Lanphear, Burton S., Fellow and Graduate Student in Electrical Engineering, Cornell University; residence, 106 Union avenue, Ithaca, N. Y.

Leslie, Edward A., Vice-President and Manager, Manhattan Electric Light Co., Ltd., New York City; residence, 343 Hancock street, Brooklyn, N. Y.

Lester, William B., Western Union Telegraph Co., 195 Broadway; residence, 346 Lenox avenue, New York City.

Rennard, John Clifford, A. B. E. E., Assistant to Electrical Engineer, Met. Telephone and Telegraph Co.; residence, 302 W. 73d street, New York City.

Wright, Peter, Inspector of Electrical Works, United Gas Improvement Co., Philadelphia, Pa.

The following associate members were transferred to membership:

Abbott, Arthur V., Chief Engineer, Chicago Telephone Co., Chicago, Ill.

Marks, Louis B., Electrician, Marks-Ayer Electric Co., 73 Watt street, New York City.

Baillard, Edward V., Manufacturer of Electrical Instruments, etc., 108 Liberty street, New York City.

Broadnax, Francis, Engineer, Safety Insulated Wire and Cable Co., New York City.

ON THE DEGREE OF INCANDESCENCE OF LAMPS.

BY M. A. CROVA.

This is a note submitted by the author to the meeting of the Académie des Sciences, Paris, on October 15, 1894.

The degree of incandescence of lamps can be determined accurately by means of a spectro-photometer, but, for practical purposes, it can be obtained with sufficient precision by the method which I have proposed, and which was recommended by the Congress of Electricians in 1889.* The luminous intensity, as compared with the carcel, is determined by interposing before the eye a trough containing the mixture of chloride of nickel and perchloride of iron, in proportions allowing of the passage of part of the radiations comprised between the wave lengths, 630 and 534, with a well-defined maximum of 582; a second determination is made by placing before the eye a red glass, which transmits the radiations comprised between the red extremity of the spectrum and the vicinity of the spectral line, D: the first determination gives the value in carcels of the source studied; the ratio of the first to the second gives the degree of incandescence. I have shown† that if we compare two lights of different tints, the total intensities are in the same ratio as the intensities measured within the limits of the spectrum, the wave length of which is 582; thus it is very convenient and very correct to make photometric determinations by means of the trough 582; in fact, the two sources to be compared have not, as a rule, the same tints, and the solution 582 rendering them identical, the determination is more exact; the field of a carcel at 1 metre is too intense, and the interposition of the trough weakens it, so as to bring out very clearly in relief the slightest differences of the two luminous surfaces of the photometric screen.‡

As the employment of electric lamps and intense gas jets is becoming more and more general, the application of the method that I have proposed enables us to ascertain, without difficulty, the conditions of working of the lamps that give the best results.

A few examples will show the utility of these determinations:

For an arc lamp, the degree of incandescence varied from 1.5 to 1.7, the electric work§ absorbed being respectively 1,509 and 1,660 watts.

For a 16-candle incandescence lamp, this degree varied from 1.05 to 1.33, according as the lamp is more or less over-run.

For a Bourbouze lamp with a platinum hood, the degree of incandescence, which is less than unity for low outputs, increases with the consumption of gas and compressed air, and, at a sufficiently high regime, the degree of incandescence equals 1, which is that of the carcel.

The study of the Auer burner furnishes interesting results. The photometric power, the degree of incandescence and the consumption of gas in the lighting of the Auer burner that I used, gave the following results, which were taken from a considerable number of determinations:—

Luminous intensities in carcels	4.42	5.23	5.35
Degree of incandescence	1.30	1.41	1.47
Consumption of gas, in litres per hour	93	105	102
Consumption in litres per carcel-hour	21	20	19

We see that the photometric power increases with the degree of incandescence, which is in accordance with the principles of the emission of radiations by incandescent bodies.

The consumption of gas per hour increasing, the degree of incandescence, low at starting, increases continually as well as the photometric power up to a certain limit, beyond which a part of the gas, which becomes more and more considerable, burns uselessly without contributing to the heating of the tissue of refractory earths that constitutes the hood of this burner; it is, therefore, advantageous to push the Auer burner to the degree of incandescence that it cannot exceed, whatever may be the consumption of gas for the lighting. The other intensifying burners may be studied in a similar manner and accurate data arrived at as to the best régime at which they should burn. The case is very different with gas burning in an ordinary Bengel burner.

In fact, in the Auer burner and other similar burners, the quantity of refractory material contained in the lamp is constant, and the maximum efficiency corresponds to the highest temperature that it can attain in a Bunsen burner. In the Bengel burner, on the contrary, part of the gas is burned outside and inside the cylindrical mass of gas which escapes through the crown of holes, without any deposit of carbon, with the production of a bluish flame, which may be disregarded from a photometric point of view; the high temperature which is produced by this combustion without effective light brings to incandescence the molecules of carbon given off from the carburets of hydrogen contained in the mass of gas comprised between the two surfaces of combustion, and which are the real source of light, as shown in my paper of photometry.*

The quantity of incandescent carbon that furnishes the light is a fraction of the total quantity of carbon that is contained in the gas in combustion, and is smaller in proportion as the flame is lower; if the latter is sufficiently low, the whole of the gas burns blue, without producing any effective light.

As the output of the burner increases the relative quantity of carbon liberated increases; the degree of incandescence slightly decreases and the luminous efficiency increases rapidly up to a maximum which corresponds to the moment when the flame becomes smoky. A similar result is obtained with the standard Carcel, the output of which is varied by raising or lowering the wick.

With the Bengel burner I employed I obtained the following results:—

Luminous intensities in carcels.	Consumption of gas.	
	In litres per hour.	In litres per carcel-hour.
.2	56	280
.4	78	195
.6	95	158
.8	108	135
1.0	120	120
1.2	131	100

Above 131 litres per hour the flame becomes smoky. From the above considerations, it follows:—

1. That, if we increase in a hydrocarbure burner the quantity of fuel burnt per hour, the luminous efficiency increases, but the degree of incandescence slightly diminishes up to a maximum efficiency, which must not be exceeded.

2. That for lamps in which the refractory material brought to incandescence has a fixed value independent of the consumption of combustible material, the maximum efficiency corresponds to the minimum quantity of combustible material that has to be burnt in order to obtain the maximum degree of incandescence.

* From the Journal of the Franklin Institute, Philadelphia, January, 1895.

* "Compte Rendu des Travaux du Congrès International des Electriciens en 1889," p. 210, in which will be found the explanation of solution 582.

† "Comparaisons Photométriques des Sources Lumineuses de Teintes Différentes." (Comptes Rendus, Vol. xciii., p. 512.)

‡ M. Pellin has constructed, according to my instructions, a sliding scale that can be adapted to any photometer, by means of which the indications can very conveniently be made.

§ The term power should be used instead of work, work being measured by joules and not by watts.

ELECTRICITY AT THE CYCLE SHOW.

The first national exhibition of cycles, cycle accessories and sundries is being held at Madison Square Garden all through this week. The exhibition was under the auspices of the National Board of Trade of Cycle Manufacturers.

Electricity plays a very important part in this interesting exhibition. The words "Bicycle Exhibition," made of incandescent lamps, appears on the outside of the building on the tower, to let the people know what is going on inside.

Inside, suspended from the centre of the large space is a beautiful chandelier composed of several hundred 16-c. p. lamps, the effect of which is to shed a remarkably brilliant light upon the floor below. At the extreme end of the garden over the Fourth avenue entrance are the words, in incandescent lamps, "First National Bicycle Exhibition, Under the Auspices of the National Board of Trade," surrounding a blazing figure of a bicycle also made of incandescent lamps of various colors. The wheels of this novel bicycle revolve and give a beautiful effect. The ceiling of the Garden is festooned with strings of lamps diverging from the centre.

A large number of the exhibitors have very effective electrical displays, one of the most prominent of which is that of the Monarch Cycle Company (No. 283-284), of which The C. F. Guyon Company, Ltd., 97 and 99 Reade street, New York, are the managers. They have at the back of their exhibit two large gold frames, showing two of their latest cycles fitted up with colored incandescent lamps. The lamps are distributed around the rims, under the frames and handles, and even the pedals have two incandescent lamps placed in front. The wheels of both cycles are kept revolving by electric motors placed under the frame. Two "monarchs of the jungles" had blazing lamps for eyes and a tongue rendered brilliant red by means of incandescent lights inside. Mr. C. F. Guyon is in attendance at the exhibit and is kept busy with a constant stream of visitors. He is assisted by a number of his salesmen, among them being Mr. L. F. Schnitzpahn. The company's sign in incandescent lamps, "Monarch Cycles," surmounts the two frames containing the living pictures of cycles.

The New York Standard Watch Company, of 11 John street, New York, is represented by exhibit No. 48. Among other things they have a large wheel, six feet in diameter, constructed of colored incandescent lamps. The wheel is made up mainly of their cyclometers and when it revolves it can be seen from every point of the Garden. One of their cycles is kept in motion by means of an electric motor, showing the operation of their celebrated cyclometer. Mr. F. Lutz is in charge of the exhibit.

The Gormully & Jeffery Manufacturing Company's exhibit, Nos. 120 to 125, is one of the main attractions of the show. It occupies the main space at one end of the Garden. Over the exhibit is the word "Rambler" in brilliant incandescent lamps. Mr. Gormully with his assistants are untiring in their efforts to entertain their many visitors.

The Hill Cycle Company, of Chicago, occupies space Nos. 14 and 15, and their exhibit is shown to the best advantage by the aid of incandescent lamps. At the back of the space is most artistically arranged drapery, studded with colored electric lamps. Mr. Frank F. Fowler represents the company and is full of enthusiasm in favor of the Fowler cycles.

The Tilman Magneto Dynamo and Lamp Company showed their little three-pound dynamo lamp and projector combination for bicycles. This combination can be attached to the front frame of the wheel. Connected with the dynamo is an arm holding a rubber pulley, which comes in contact with the inside rim of the front wheel. By this arrangement the dynamo is made operative. In riding the wheel, the light is projected 100 feet or more ahead. The company's trolley car projector lamp is also exhibited. It is claimed to be the best article of the kind in the market.

Dr. W. P. Freeman, the well known electrician, is

found at the exhibit of the Newton Rubber Company, of Newton Upper Falls, Mass. He has on exhibition several of his improved primary-battery lamps and reflector combinations. This combination is designed for bicycles and weighs only one pound. The Newton Company has on exhibition their improved rubber tires. Dr. Freeman has lately completed machinery for making steels guard for use in protecting pneumatic tires.

The M. M. Electric Company, of 140 Washington street, New York, shows their new and improved primary battery lamp and reflector for bicycles, miners' and firemen's use. Dr. Johnson of the company is kept busy at all times explaining the valuable and desirable features of this outfit.

J. C. Perriez, of the Columbia Rubber Co., 65 Reade street, New York, is present in the interests of the Palmer pneumatic tire. He shows how easy it was to repair this tire when it became punctured, and is evidently scoring several points for the Palmer.

The Hitchcock Manufacturing Co., of Cleveland, Ohio, attracts a great deal of attention to their exhibit in the basement, where they ran their motor cycles every hour. These cycles are run by two motors attached behind the rear wheel by means of an extra frame. Oil vapor is used for generating the power for driving these wheels. The oil is carried in a tank on the frame, the vapor being forced in the cylinders, compressed and ignited by electricity. The battery used for igniting is also attached to the frame. Mr. Francis C. McMillin looks after this exhibit.

Mr. Samuel K. Dingle, an old-time electrician, has a brilliant electrically-lighted exhibit of the Boston Woven Hose and Rubber Co., of 275 Devonshire street, Boston, Mass.

Mr. Alfred J. Thompson, well known in the electrical trade, looks after the interests of Louis Rosenfeld & Co., 20 Warren street, New York. This concern makes Hy-lo instantaneous changeable gears for wheels.

Mr. Hawkins, 136 Liberty street, New York agent of the Electrical Construction and Supply Co., Syracuse, N. Y., furnished the sockets and receptacles for all the 16-c. p. lamps used in the various exhibits. Over 3,000 of these lamps are in use.

Mr. Frank Martin is the electrician of Madison Square Garden, and prides himself on the illuminating effects produced.

THE CLEVELAND CONVENTION.

C. O. Baker, Jr., master of transportation of the National Electric Light Association, informs us that the Trunk Line Association has granted a rate of a fare and a third for round trip, on the certificate plan, for members and delegates attending the eighteenth convention of the National Electric Light Association, to be held in Cleveland, O., February 19, 20 and 21. Negotiations are now pending for a special train from New York to Cleveland, notice of which will be given as soon as route is selected and schedule arranged.

CORNELL IN THE LEAD.

An eminent European scholar, Professor Ritter, of Germany, who spent several months in this country, first at the Chicago Exposition and later studying American technical schools, has come to the conclusion that the Americans have outdone Europeans in the field of technological education, at least as regards its practical bearings. The technical branches are believed by Professor Ritter to be less complete and solid on the theoretical side in the United States than in Germany, but he sets opposite this inferiority the "truly grand achievements in engineering and machine construction in the United States. The Americans have not only mastered the technical sciences, mathematics and jurisprudence, but have given form to

distinct faculties of the sciences of engineering. So far as regards instruction in mechanical engineering, Cornell University, of Ithaca, N. Y., stands at the head of American institutes."—A. F. WEBER'S CORNELL NEWSLETTER.

NOLL & MACLEAN.

Augustus Noll and Howard A. MacLean have entered into partnership under the firm-name of Noll & MacLean, contracting electrical engineers, and have opened offices at 8 East 17th street, New York. Both Messrs. Noll & MacLean were connected with the New York Electric Equipment Company since its organization. Prior to this time Mr. Noll was the principal member of the firm of Noll Brothers, who had quite a reputation in the installation of lighting and power plants, and Mr. MacLean represented the Edison Illuminating Company of New York. He was one of the best known representatives of that company under the old Edison regime, when Mr. E. H. Johnson was at the head of the concern. Many of the largest isolated plants in this section were installed through the active agency of Mr. MacLean. Mr. Noll is widely known to the electrical trade as one of the most scientific wire men in the country. He is the author of the best book ever published on wiring, and his work during the past thirteen years stands as a monument his skill. The two named gentlemen form a strong team, both having had large experience. They each have an excellent reputation as a basis for their new enterprise, and we wish them every success.

THE FRANKLIN ELECTRICAL SOCIETY'S BANQUET.

The Franklin Electrical Society, New York, on the night of January 19, held its annual banquet in honor of the 189th anniversary of the birth of Benjamin Franklin. The banquet was held at Leon's, on West 31st street, and there was a large attendance.

President M. M. Mayer occupied the chair and the Hon. Franklin Grady acted as toastmaster.

Prof. W. W. Ker spoke of the society's achievements and recalled the earnestness of Franklin. The speaker referred to Franklin's patriotism and determination, and suggested that Franklin's spirit be embodied in the society's history.

Mr. Newton Harrison spoke on the career of the society, dwelling upon the difficulties of securing a foothold, and referred to the present system of lecturing from notes and the assured success it could claim.

Hon. F. Grady made the closing remarks in a happy and characteristic vein and the party then disbanded, after a most enjoyable feast of gastronomy and intellect.

Several prominent persons were the invited guests of the society.

ELECTRICAL STANDARDS.

Following is a copy of the order just issued in England specifying and describing the new standards of electrical measurements for use in trade:

Whereas by the Weights and Measures Act, 1889, it is among other things enacted that the Board of Trade shall from time to time cause such new denominations of standards for the measurement of electricity as appear to them to be required for use in trade to be made and duly verified.

And whereas it has been made to appear to the Board of Trade that new denominations of standards are required for use in trade based upon the following units of electrical measurement—viz.:

1. The ohm, which has the value 10^9 in terms of the centimetre and the second of time, and is represented by the resistance offered to an unvarying electric current by a column of mercury at the temperature of melting ice 14.4521 grammes in mass of a constant cross-sectional area and of a length of 106.3 centimetres.

2. The ampere, which has the value $\frac{1}{10}$ in terms of the centimetre, the gramme, and the second of time, and

which is represented by the unvarying electric current which when passed through a solution of nitrate of silver in water in accordance with the specification appended hereto, and marked A, deposits silver at the rate of 0.001118 of a gramme per second.

3. The volt, which has the value 10^8 in terms of the centimetre, the gramme, and the second of time, being the electrical pressure that if steadily applied to a conductor whose resistance is one ohm will produce a current of one ampere, and which is represented by .6974 ($\frac{1}{1433}$) of the electrical pressure at a temperature of 15 deg. C between the poles of the voltaic cell known as Clark's cell set up in accordance with the specification appended hereto, and marked B.

And whereas they have caused the said new denominations of standards to be made and duly verified.

Now, therefore, her Majesty, by virtue of the power vested in her by the said Act, by and with the advice of her Privy Council, is pleased to approve the several denominations of standards set forth in the schedule hereto as new denominations of standards for electrical measurement.

C. L. PEEL.

SCHEDULE.

I. *Standard of Electrical Resistance.*—A standard of electrical resistance denominated one ohm being the resistance between the copper terminals of the instrument marked "Board of Trade Ohm Standard Verified 1894" to the passage of an unvarying electrical current, when the coil of insulated wire forming part of the aforesaid instrument and connected to the aforesaid terminals is in all parts at a temperature of 15.4 C.

II. *Standard of Electrical Current.*—A standard of electrical current denominated one ampere being the current which is passing in and through the coils of wire forming part of the instrument marked "Board of Trade Ampere Standard Verified 1894," when, on reverse ing the current in the fixed coils, the change in the forces acting upon the suspended coil in its sighted position is exactly balanced by the force exerted by gravity in Westminster upon the iridio-platinum weight marked A, and forming part of the said instrument.

III. *Standard of Electrical Pressure.*—A standard of electrical pressure denominated one volt being one-hundredth part of the pressure which, when applied between the terminals forming part of the instrument marked "Board of Trade Volt Standard Verified 1894," causes that rotation of the suspended portion of the instrument which is exactly measured by the coincidence of the sighting wire with the image of the fiducial mark A before and after application of the pressure, and with that of the fiducial mark B during the application of the pressure, these images being produced by the suspended mirror and observed by means of the eyepiece.

(To be Continued.)

Notes of General Interest.

It is reported that the Cataract General Electric Company is endeavoring to secure the repeal of the law which authorizes the Superintendent of Public Works to grant franchises. It is stated that if this law is repealed that the Cataract Company would have an absolute monopoly in the transmission and distribution of electric power along the Erie Canal.

Russell B. Harrison, president of the Citizens' Light and Power Co., Terre Haute, Ind., has begun suit in the Circuit Court against Edward S. Ellis and Charles Hilton to enjoin them from cutting down the electric light poles now being erected by the plaintiff. Messrs. Ellis and Hilton are officers of the Terre Haute Electric Light and Power Co., which held the contract for lighting the city for a number of years. The Citizens' Light and Power Co. recently got the contract and trouble between the two concerns has since existed.

WEST END COMPANY'S LOSS BY FIRE.

The West End Railroad Company's car house on Columbus avenue and Northampton street, Boston, Mass., together with about 50 cars, were destroyed by fire on the night of January 16. The fire started shortly after midnight and for a time the large car house on Tremont street was threatened. The burned car house was a wooden building encased in corrugated iron and was 50x200 feet in size. The cars of the Columbus and Huntington street lines were kept here and they were all destroyed. The loss is about \$100,000.

Telephone Notes.

The Tri-Village Telephone Company has been organized in Fort Edwards, N. Y., with a capital stock of \$2,500.

A telephone line is to be built between Lumberton and McComb City, Miss.

Purvis and Columbia, Miss., are to be connected by telephone.

TELEPHONE PATENTS ISSUED JANUARY 15, 1895.

ANNUNCIATOR FOR TELEPHONIC CIRCUITS. Theodore Spencer, Cambridge, Mass. (No. 532,605.)

Street Railway Notes.

The Connecticut House of Representatives has passed a bill providing that no steam railroad in the state shall be crossed by any electric, cable or horse railway at grade. It is stated that the object of the bill is to prevent the Bridgeport Traction Company from laying its tracks across those of the New York, New Haven and Hartford Railroad at the Fairfield avenue crossing.

The Gettysburg Electric Railway, Gettysburg, Pa., together with the electric light plant operated by the same company, has been sold to J. Luttrell Murphy, of Chicago and Walter B. Kendall and John S. Connelly, of Philadelphia, for \$250,000. It is stated that the new owners will build and operate four miles of electric railway over the first day's battlefield, also twelve miles of road along the Baltimore turnpike.

J. Luttrell Murphy, of Chicago, and Walter B. Kendall and John S. Connelly, of Philadelphia, have purchased the Gettysburg Electric Railway, Gettysburg, Pa., and will extend the road's lines.

Possible Contracts.

W. J. Davidson, formerly superintendent of Starin's ship yard, New York, is building a large machine shop at Port Richmond, Staten Island.

The Bridgeport Traction Co., Bridgeport, Conn., has applied for permission to extend its lines to West Haven and Westport, and the Windsor Locks & Suffolk Railroad Company has applied for permission to extend its lines.

Final surveys are being made for the Queen Anne's Electric Railroad between Denton and Queenstown, Md. W. H. Bosley, of Baltimore, is president of the company.

The Rome Electric Street Railroad Co., Rome, Ga., contemplates making several improvements and additions. Mr. J. B. Marvin is manager of the road.

It is proposed to extend the lines of the Wilmington

Street Railway Co., Wilmington, N. C., to Oakdale and Bellevue cemeteries. M. F. Heiskell is superintendent.

Geo. W. Pearce, Mississippi City, Miss., has received permission to build a car line in that place.

It is reported that a \$200,000 electric light plant will be built in Birmingham, Ala.

The electric light and water-works in Troy, Ala., which is operated by the city, are to be overhauled and enlarged. The mayor of that place can give further information.

Mr. Robinson, of Orlando, Fla., is making an effort to secure an electric light franchise in that place. He can be reached in care of the Young Men's Business League.

The plant of the Newnan Electric Light and Power Company, Newnan, Ga., will likely be sold to the city, and negotiations with that object in view have been opened. The mayor of Newnan can give further information.

The Mount Washington Electric Light and Power Company, Baltimore, Md., has purchased a site for its new plant.

A company has been organized in Lumberton, Miss., to construct a telephone line from that place to McComb City.

A company has been organized in Purvis, Miss., to construct a telephone line from that place to Columbia.

An electric light plant is being constructed in Lewiston, Mo. Address the mayor for further particulars.

C. L. Warfield and others are seeking a franchise for an electric light plant in Dallas, Tex., to cost from \$40,000 to \$60,000.

The Lenoir City Car Works, Lenoir City, Tenn., has let the contract for an electric light plant.

An election is to be held in Cleveland, Tenn., on the question of issuing bonds for water-works and an electric light plant. Address the mayor for further information.

New buildings which may need electric plants are to be constructed in the following-named places: a brick depot for the Western Maryland Railroad Company, Baltimore, Md., to cost \$25,000; school building, Baltimore, Md., address Geo. Worthington of that city for particulars; a Masonic temple, Columbia, Ga., address the secretary of the Masons for further information; building in Gainesville, Tex., for the South-Western Telephone Company, Galveston, Tex.; King Opera House, by T. H. King, Greenville, Tex., to cost from \$35,000 to \$40,000; warehouse, to cost \$150,000, by the Cupples Real Estate Co., St. Louis, Mo.

The Annapolis, Md., City Council has granted the Annapolis & Bay Ridge Electric Railroad Co. the right to lay tracks on several of the streets of that city. Henry Y. Bready is engineer.

New Corporations.

W. J. Davis Electric Co., Pittsfield, Mass., by Jacob Gimlich, president, Wm. P. Wood, treasurer and W. J. David.

The Tri-Village Telephone Co., Fort Edwards, N. Y. Capital stock, \$2,500.

The Tillmook Electric Railway Power and Lighting Co., Salem, Ore., by W. H. Cary, David Hess and William Squires. Capital stock, \$500,000.

La Salle Construction Co., Chicago, Ill., by W. E. McClurg, Bumstead and F. S. Donnell. Capital stock, \$100,000.

The Westport and Southport Electric Railroad Company has been organized in Bridgeport, Conn., to operate lines in Weston, Southport and Fairfield.

The Dravosburg & Elizabeth Electric Street Railway Co., Dravosburg, Ohio, by H. W. Juergen and others. Capital stock, \$40,000.

The Economy Street Railway Co., Baden, Pa., by Hartford P. Brown and others. Capital stock, \$3,000.

York Haven Water & Power Co., York Haven, Pa., by Henry L. Carter and others. Capital stock, \$2,000.

The Cartersville Light & Power Co., Cartersville, Ga., by P. W. French, F. P. Sydmonds, W. F. Merrill and others. Capital stock, \$100,000.

The Nantucket Electric Co., Nantucket, Mass., by Fred. H. Potter, president, John R. Bacon, treasurer and W. A. Clark, Jr. Capital stock, \$20,000.

A company is being formed in New London, Conn., with a capital stock of \$200,000, to construct an electric road between that city and Norwich.

Milwaukee Dynamo Company, Milwaukee, Wis., by W. A. Ehlman, John Keorts and Theodore Egelhoff. Capital stock, \$15,000.

Staten Island Terminal Electric Railroad Co., New Brighton, Richmond County, N. Y., by Herman Bergholtz and others. Capital stock, \$50,000.

The Associated Water, Gas & Electric Light Co., Nevada, Mo., by F. J. Tygard, of Butler, as President, and C. F. Stratum, secretary and treasurer.

Bourdreaux Dynamo Brush Co., Chicago, Ill., by Hugo Benedix, Arthur Nollan and James J. Hoch. Capital stock, \$25,000.

State Harrison Telephone Construction Co., Chicago, Ill., by James H. Talbot, Harry L. Talbot, William R. McLaren and John F. Talbot. Capital stock, \$150,000.

Newman, Canning & Electric Light Co., Newman, Ill., by R. Thomas, Joseph Vandine, L. E. Root, W. J. G. Pound and J. H. Scotten. Capital stock, \$14,000.

The County Electric Light and Power Co., Clayton, Mo., by M. B. Greensfelder, E. W. Warfield, E. H. Benoist, C. K. Ramsey and others. Capital stock, \$5,000.

The St. Louis County Telephone Company, Clayton, Mo., by M. B. Greensfelder, E. W. Warfield, O. H. Benoist and others. Capital stock, \$5,000.

New York Notes.

OFFICE OF THE ELECTRICAL AGE,
WORLD BUILDING, NEW YORK,
JANUARY 21, 1895.

The Board of Electrical Control has authorized the issue of temporary permits for placing overhead wires in streets where there are no subways.

Mayor Strong has issued an order to the effect that street railroad companies in the future must sign a written application for permission to use snow plows or sweeping machines in removing the snow from their tracks. The railroad companies must also, in their application, agree to remove from the streets all snow swept from the tracks and to clean the streets of snow for three feet on each side of the tracks. It is stated that the Mayor will revoke the permit of any company failing to comply with the conditions imposed by this order. There are several applications from street railroad companies for permission to use snow plows and sweepers, but the Mayor will not issue them till the companies agree to the conditions of the order above referred to. So far two companies have signed the applications under the new conditions.

The New York Electric Equipment Company is moving its offices from Duane and Elm streets to the factory of the General Incandescent Arc Lamp Company, 572 First avenue, city.

The Third Avenue Railroad Company has just received a large spool containing a new cable, which will be laid down in the conduit. The cable is 19,500 feet in length and 1½ inches in diameter. It will run from the Post-Office to Sixth street and back. The cable and spool together weigh nearly forty tons, the spool being ten feet in length and ten feet in diameter.

Mr. J. H. Waterman, formerly of the export department of the International Thomson-Houston Electric Co., has taken the management of the export department of the Fort Wayne Electric Corporation, at 115 Broadway, city. Mr. Waterman lately returned from Caracas, Venezuela, where he installed a large T. H. plant for the Compania del Gas y Luz. He is very popular in the foreign trade and a pleasant gentleman to know. The Fort Wayne Corporation is fortunate in securing his services.

The annual meeting of the Edison Electric Illuminating Company, of New York, was held at the company's offices on Duane street on January 15. The annual report shows earnings of \$1,369,066; other sources of income, net, \$124,443; operating expenses, \$550,426; net earnings, \$789,466. During the year \$476,196 were paid in dividends. The following named directors were elected for the ensuing year: A. H. Boissevain, R. R. Bowker, C. H. Coster, C. E. Crowell, Thomas A. Edison, W. E. Glyn, D. O. Mills, George F. Peabody, W. A. Read, F. S. Smithers, and Spencer Trask. W. T. H.

Trade Notes.

The LaRoche Electrical Works, of Philadelphia, have gone into liquidation, Mr. F. A. LaRoche succeeding to the business. We understand that the concern was in a solvent condition and went into liquidation in order to dissolve the business.

Mr. H. C. Willis, of the Washburn & Moen Mfg. Company, 16 Cliff street, New York City, is doing a large business in insulated and bare copper wires for all electrical purposes. He recently closed an order for 2,000 feet of 2,000,000 c. m. cable, composed of 127 No. 10 Stubbs gauge wires. The copper cable alone is 1½ inches in diameter. It is covered with pure rubber, on top of which is laid black rubber and it is then braided to a size 2¼ inches over all. Orders like this are common with Mr. Willis. He recently filled one for 80 miles of weather-proof wire.

F. R. Chinnock, Havemeyer Building, New York City, the well-known electric light and railway contractor, has secured the contract to install an electric light plant in the new building of the Curtis Estate, Buffalo, N. Y. The plant will include two 30 K. W. Fort Wayne Electric Corporation dynamos and one 250 H. P. vertical engines made by the Lake Erie Engineering Company. The switchboard for this plant will be a handsome one, of marble, and will be fitted with one Keystone voltmeter, two Keystone ammeters, ten knife switches, one break-down switch and two iron-clad rheostats. Mr. Chinnock will have as his assistants a corps of well-known electricians, including Mr. J. F. Hadley, late of the New York Electric Equipment Company; W. S. Lawton, late of the Edison Illuminating Company, of Brooklyn, N. Y., and D. F. Merrill. Mr. Chinnock, himself, will supervise the work. He does electric light work as well as electric railway. Mr. Chinnock will finish the electric railway plant in Hackensack, N. J., when spring opens.

WOVEN WIRE BRUSHES.

The Belknap Motor Co., of Portland, Maine, are the patentees and manufacturers of the best woven wire commutator brush on the market.

Oratavo, in the Canary Islands, is lighted by electricity generated by water-power. The plant was supplied by a Swiss firm.

UNDERGROUND FEED WIRES.—The West End Street Railway Co., of Boston, Mass., is laying its feed wires underground. This work involves a cost of about \$400,000.

Electrical and Street Railway Patents.

Issued January 15, 1894.

- 532,441. System of Power Transmission. Charles S. Bradley, Avon, N. Y. Filed Sept. 12, 1893.
- 532,448. Conduit Railway-Trolley. William T. Dulany, Jr., New York, assignor of one-half to Oscar F. Shaw, Brooklyn, N. Y. Filed Mar. 30, 1894.
- 532,449. Conduit Electric Railway. William T. Dulany, Jr., New York, assignor of one-half to Oscar F. Shaw, Brooklyn, N. Y. Filed Aug. 16, 1894.
- 532,475. Brake for Electric Motors. William H. Morgan, Alliance, Ohio, assignor of three-fourths to Thomas R. Morgan, Sr., Thomas R. Morgan, Jr., and John R. Morgan, same place. Filed Mar. 19, 1894.
- 532,477. Trolley-Catcher. Martin V. B. Nichols and James A. Fraser, Port Arthur, Canada. Filed May 26, 1894.
- 532,514. Electric Elevator and Motor Controller. Robert Wilson, Louisville, Ky., assignor to the Sulzervogt Machine Company, same place. Filed June 23, 1894.
- 532,531. Electric-Arc Lamp. Arthur Chester and John J. Rathbone, London, England. Filed Mar. 26, 1894.
- 532,538. Controller for Electric Cars. Harry P. Davis, Pittsburgh, Pa., assignor to the Westinghouse Electric and Manufacturing Company, same place. Filed Apr. 14, 1894.
- 532,549. Alternating-Current Motor. Ludwig Gutmann, Pittsburgh, Pa. Filed Aug. 27, 1890.
- 532,559. Galvanometer. Adrian H. Hoyt, Penacook, N. H., assignor to the Whitney Electrical Instrument Company, Saco, Me., and Manchester, N. H. Filed Apr. 25, 1894.
- 532,560. Galvanometer. Adrian H. Hoyt, Penacook, N. H., assignor to the Whitney Electrical Instrument Company, Saco, Me., and Manchester, N. H. Filed Apr. 25, 1894.
- 532,561. Galvanometer. Adrian H. Hoyt, Penacook, N. H., assignor to the Whitney Electrical Instrument Company, Saco, Me., and Manchester, N. H. Filed Apr. 25, 1894.
- 532,566. Car Fender. Joseph J. De Kinder, Philadelphia, Pa. Filed Nov. 27, 1893.
- 532,576. Closed Conduit Electric Railway. George W. McClintock, Wollaston, and Daniel J. McLane, Quincy, Mass. Filed July 2, 1894.
- 532,588. Contact Device for Electrical Appliances. Friedrich W. Schindler-Jenny, Kennelbach, Austria-Hungary. Filed Feb. 19, 1894. Patented in Austria-Hungary Nov. 2, 1893, No. 66,076 and No. 9,799; in France Nov. 10, 1893, No. 233,957; in Belgium Nov. 11, 1893, No. 107,135; and in Italy Nov. 30, 1893, No. 35,280/173.
- 532,590. Closed-Conduit Electric Railway. John Schnepf, New York, N. Y., assignor of one-half to William H. Bellamy and William C. Doscher, same place. Filed Sept. 9, 1893.
- 532,593. Converter System for Electric Railways. Chas. F. Scott, Pittsburgh, Pa., assignor to the Westinghouse Electric and Manufacturing Company, same place. Filed July 31, 1893.
- 532,594. Non-Arcing Switch. Charles F. Scott and Harry P. Davis, Pittsburgh, Pa., assignors to the Westinghouse Electric and Manufacturing Company, same place. Filed Mar. 29, 1894.
- 532,605. Annunciator for Telephonic Circuits. Theodore Spencer, Cambridge, assignor to the American Bell Telephone Company, Boston, Mass. Filed Sept. 10, 1894.
- 532,610. Car-Fender. Edward K. Thoden, Brooklyn, N. Y. Filed May 23, 1894.
- 532,621. Brake for Railway Cars. David L. Winters, Pueblo, Colo. Filed May 19, 1894.
- 532,662. Electric Switch. William P. Hancock, Everett, Mass. Filed Nov. 27, 1894.
- 532,683. Car-Fender. Andrew Mohn and August J. Bothur, Hoboken, N. J. Filed Aug. 30, 1894.
- 532,701. Mechanism for Forming Battery-Plates. Chas. J. Reed, Philadelphia, Pa., assignor to the Reed Electric Company, same place. Filed Sept. 12, 1894.

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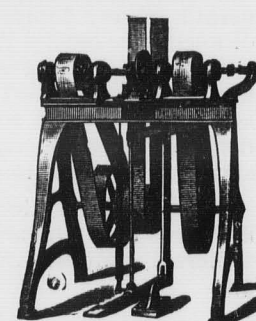
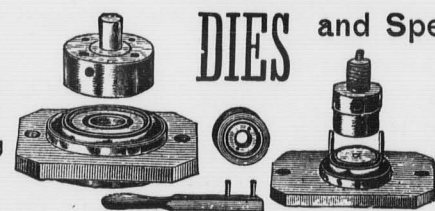
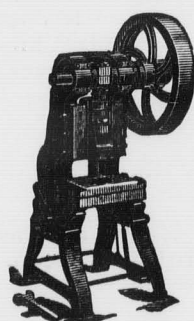
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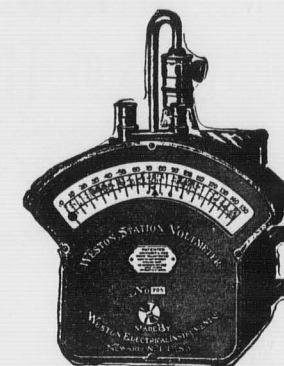
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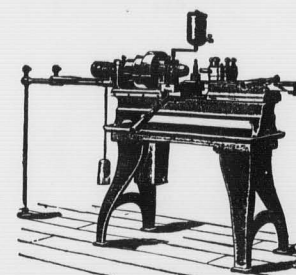
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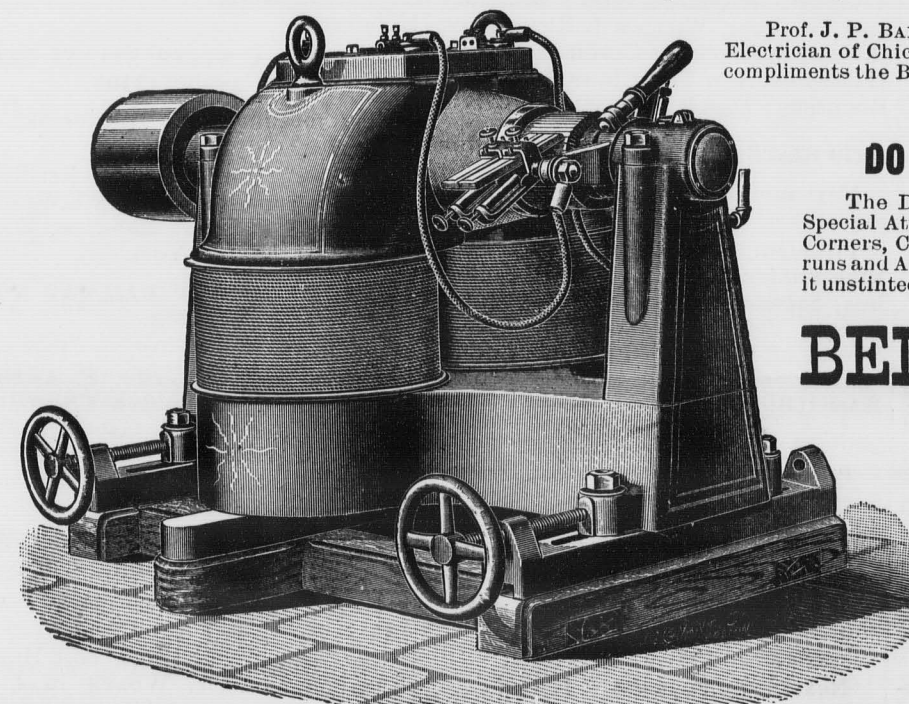
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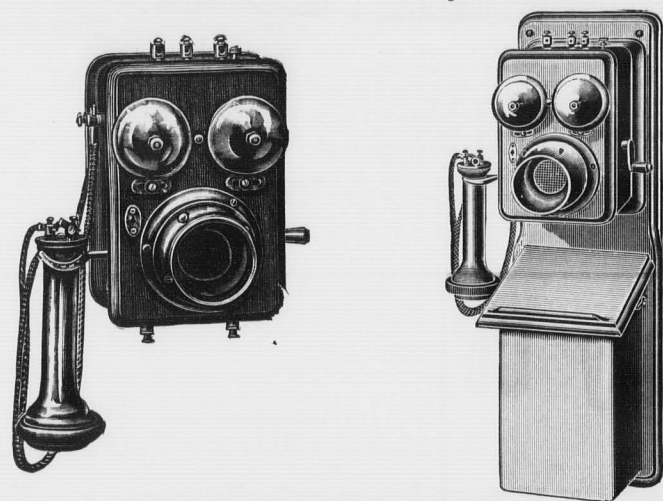
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Next meeting, Cleveland, Ohio, February 19, 20 and 21, 1895.

NEW YORK STATE STREET RAILWAY ASSOCIATION.

Next meeting, Albany, N. Y., third Tuesday in September, 1895.

President, G. TRACY ROGERS, Binghamton; First Vice-President, JOHN H. MOFFITT, Syracuse; Second Vice-President, W. W. COLE, Elmira; Secretary and Treasurer, WILLIAM J. RICHARDSON, Brooklyn; Executive Committee, D. B. HASBROUCK, New York; JOHN N. BECKLEY, Rochester; DANIEL F. LEWIS, Brooklyn.

OHIO STATE TRAMWAY ASSOCIATION.

Next meeting, fourth Wednesday in September, 1895.

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Next meeting, January 7, 1895.

THE STREET RAILWAY ASSOCIATION OF THE STATE OF NEW JERSEY.

President, THOS. C. BARR, Newark; Vice-President, W. S. SCULL, Camden;

Secretary and Treasurer, CHARLES Y. BAMFORD, Trenton; Executive Committee, OFFICERS and C. B. THURSTON, Jersey City; H. ROMAINE, Paterson; S. B. DOD, Hoboken.

PENNSYLVANIA STATE STREET RAILWAY ASSOCIATION.

Next meeting, first Wednesday in September, 1895.

President, JOHN A. RIGG, Reading; First Vice-President, ROBERT E. WRIGHT; Secretary, S. P. LIGHT, Lebanon; Treasurer, W. H. LANIUS, York.

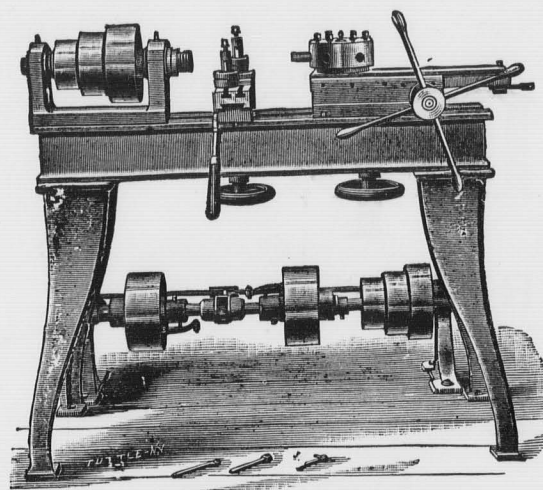
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MICHIGAN STATE STREET RAILWAY ASSOCIATION.

Next meeting, Grand Rapids, December, 1894.

President, W. L. JENKS, Port Huron; Vice-President, W. WORTH BEAN, St. Joseph; Secretary and Treasurer, B. S. HANCHETT, JR., Grand Rapids; Executive Committee, the OFFICERS and DAVID H. JEROME, Saginaw, and STRATHERN HENDRIE, Detroit.



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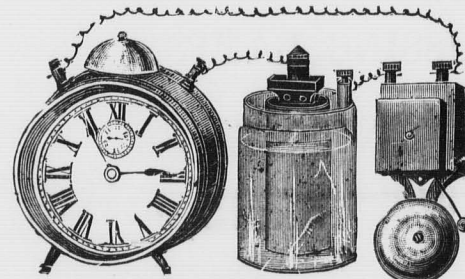
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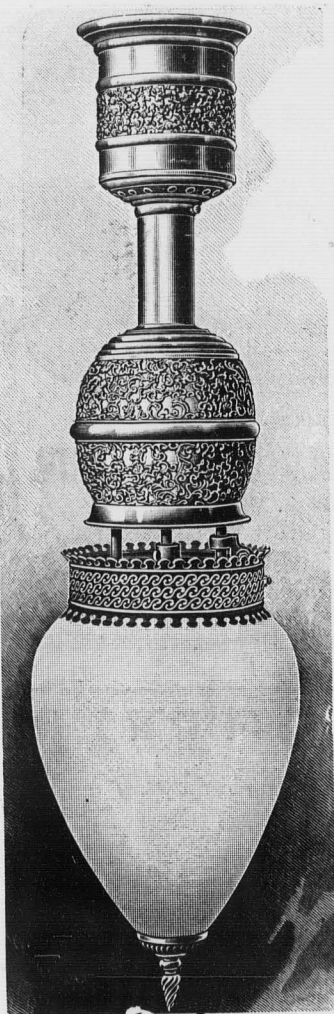
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2. Patent No. 290,122, Electrical Conductor or Cable for Lighting and other Systems. A conductor or cable for supplying electric lamps, motors, and similar apparatus, designed to obviate or lessen the danger to life and property, liable to occur with ordinary conductors.
3. Patent No. 281,223, Electric Conductor. A conductor or cable having the insulating material between the several layers of wires, strips, or the like, electroplated (when desired) so as to secure strength with economy of material and space, a valuable invention, new and novel.
4. Patent No. 292,694, Insulated Conductor of Electricity. A fireproof compound for bare or insulated wires.
5. Patent No. 139,690, Printing and Dial Telegraph and Circuits therefor. A combination of a dial or printing instrument in one main line circuit upon one base; a unique and valuable device.
6. Patent No. 305,022, Self-Sustaining Electric-Battery. A battery of large and constant electromotive force, and to obviate polarization.
7. Patent No. 310,724, Secondary Battery and Means for Transporting the Same. The object of this invention is to accumulate electric energy in suitable storage-chambers at natural sources, and convey the same to desirable points, by land or water, in apartments adapted to the vehicles conveying the same; also for a device for running trains, etc., by dispensing with the third rail.



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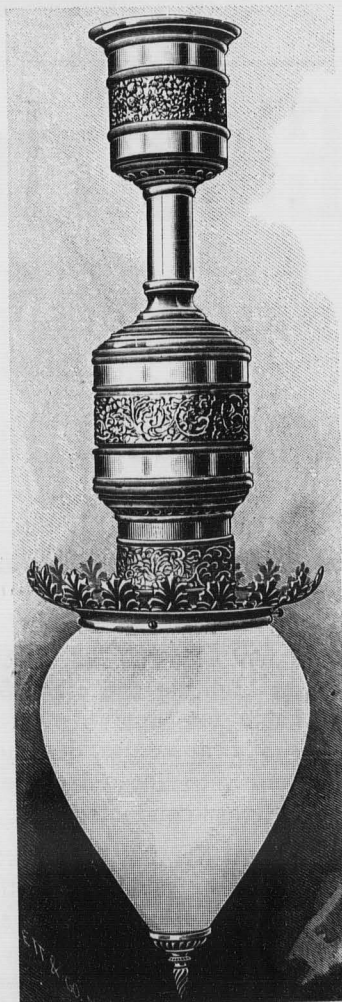
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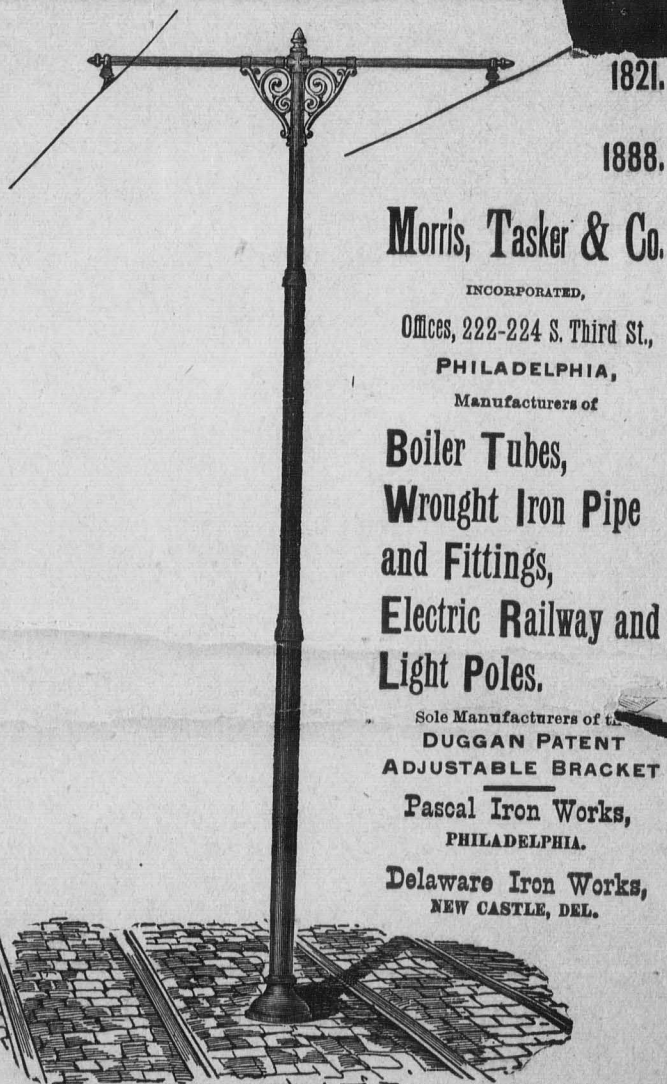
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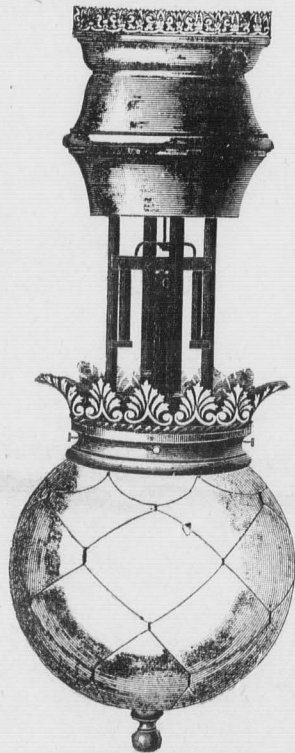
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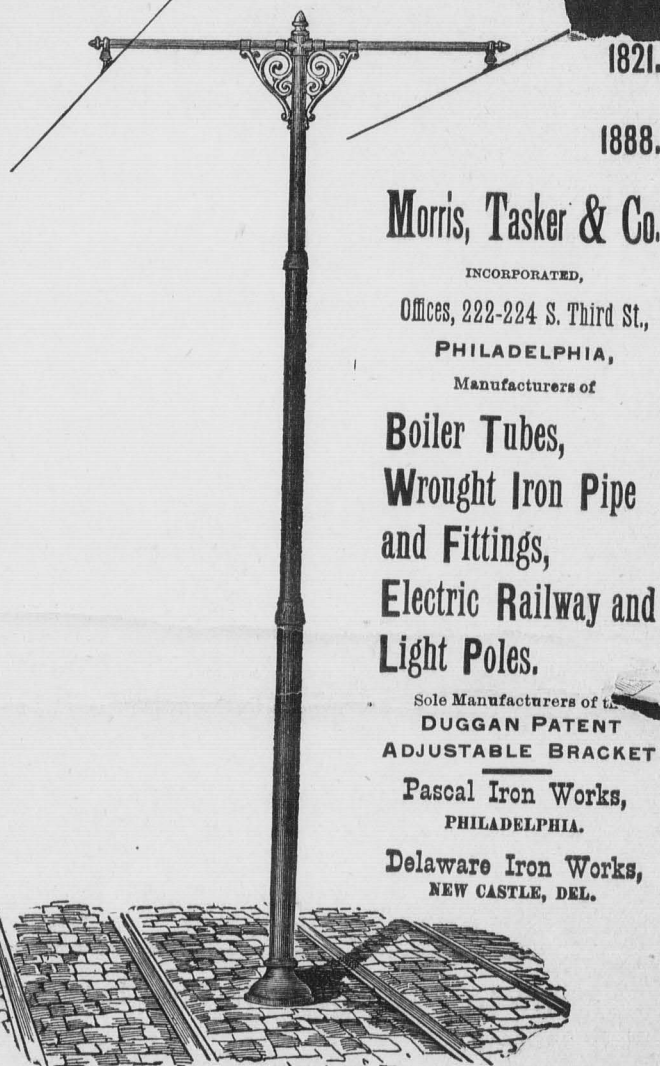
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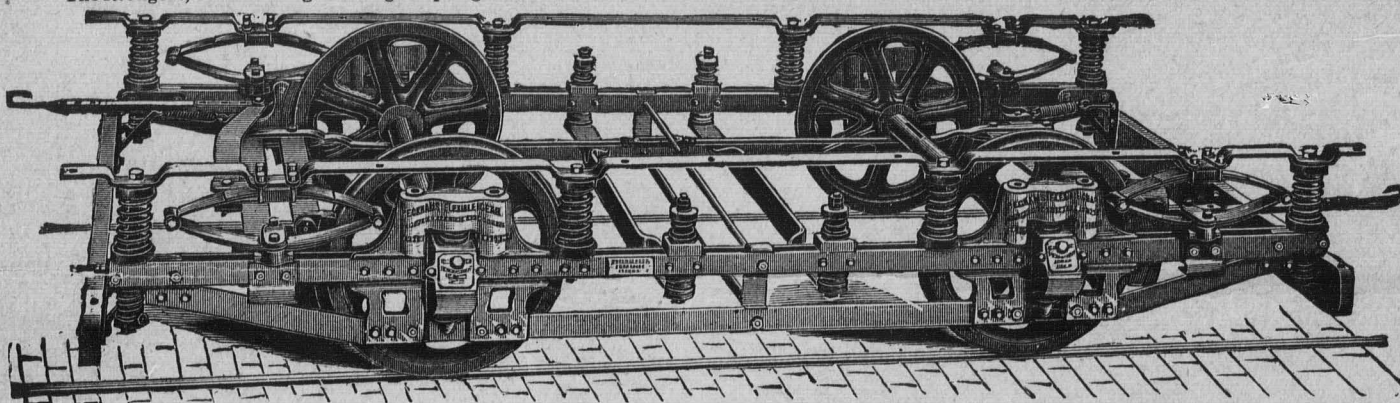
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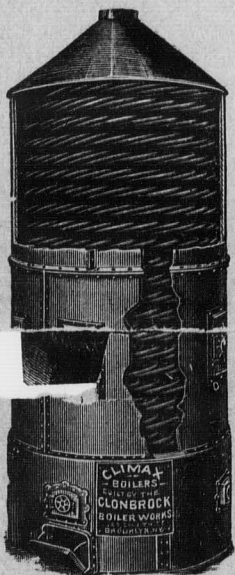
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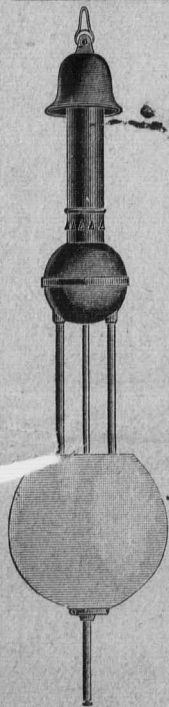
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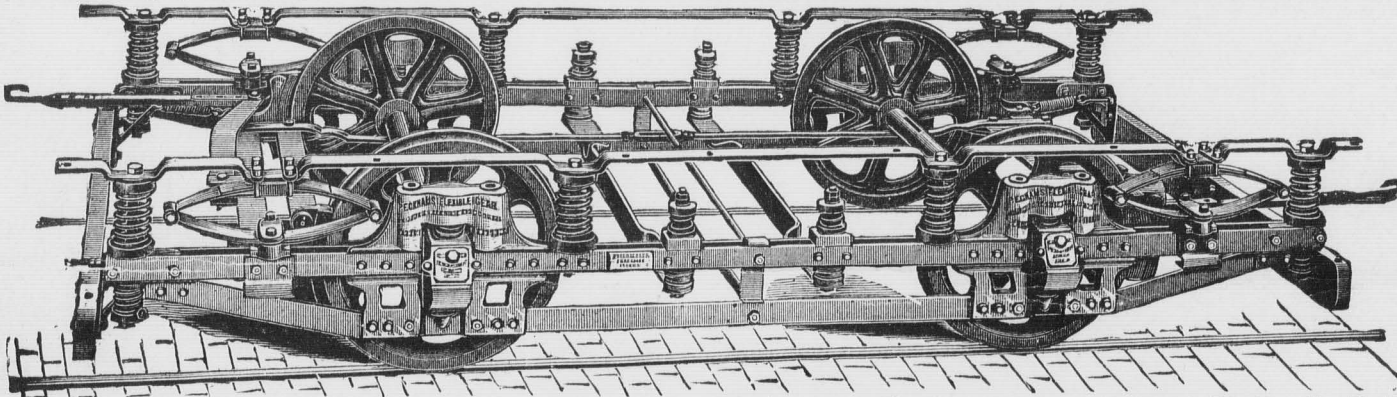
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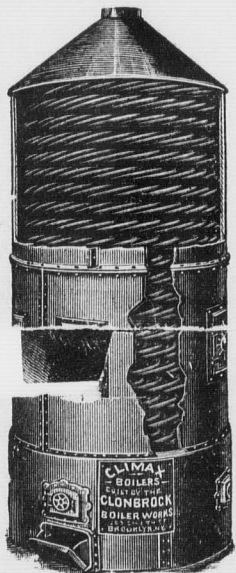
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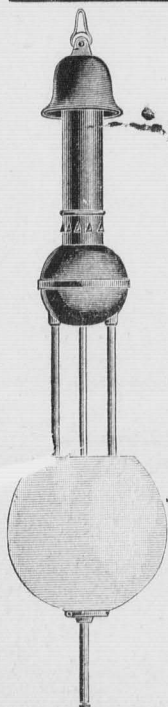
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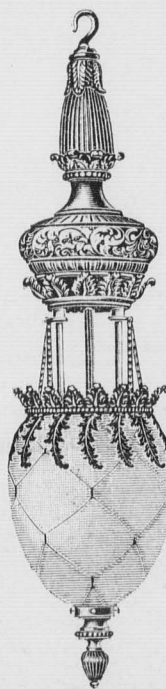
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Write to Advertisers in This Issue for Circulars and Catalogues.

Brooklyn January # 30. 1895.

Honorable W. L. Strong Mayor

New York City.

Dear Sir!

Enclosed I again forward you a copy of, "The Electrical Age", showing a part of my plan of Rapid Transit for the City of New York. I take this step for the reason, that it was impossible for me to ask you for a hearing this afternoon, when in your Office, noticing that you have been very much engaged with various Committees and others quite in number waiting to get a hearing.

After 3 to 4 years of patient waiting of the people of New York and expenditure of a vast amount on Committees, Engineers, and Experts to devise and decide upon a practical and good solution of Rapid Transit for New York City, we are to take as the final opinion and the solution for Rapid Transit from the Commissioners appointed for the purpose, the advice in granting to the Manhattan Elevated R. R. a further extension for erecting & adding to their present structure a third Track.

Now it certainly was not the intention of such an able body of Representatives of the people (The Constitutional Convention) recommending to the citizens of New York, if they desire Rapid Transit for New York City to vote upon the question at the next election, your Honor is certainly aware of the result of an overwhelming majority in favor of the same.

We hear now on the part of the Rapid Transit Commissioners they are ignoring

over

entirely the voice of the voters (or the Citizens) of the last Election.

During the past four Years the Engineer appointed by that Commission, has recommended, even to the present time a plan of three Tunnels underneath of Broadway with an estimated cost of \$ 66,000,000.⁰⁰ his recommendation of his plan as your Honor is aware, has been counteracted by the 5 Experts in pronouncing Mr Parsons's plan as inadvisable for its adoption and impracticable.

I therefore enclosed your Honor a copy of my plan, simply for an illustration for your Honor to judge, as your Honor will recognize at a glance the practicability of the same knowing, that you as the Honorable Mayor of the City of New York have the interest of your Citizens at heart of an early accomplishment of such a great need as Real Rapid Transit

I take this measure to be granted a hearing, if so desired, and remain one of your former Citizens resp^l

J. Leschziner

191 Schermerhorn st.

BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,

New York, February 6, 1895.

Dear Sir:-

A meeting of the Board of Rapid Transit Railroad Commissioners will be held at the offices of the Board, No. 256 Broadway, New York, on Tuesday February 12, 1895, at two o'clock in the afternoon.

By direction of the President the members of the Board are most urgently requested to attend this meeting as a resolution will be introduced finally establishing the routes of the rapid transit railroad.

Yours respectfully,

Lewis L. Delafield.

Secretary.

New York, Feb'y 13, 95.

Hon. Wm. J. Strong, Mayor,
N. Y. City Hall, New York.

Will the Hon. Mayor consider plans for Rapid Transit? viz:- "The Triple Service System i.e. First: a road to render the service of the surface roads. Second: a road to render the service of the L. roads. Third:- "The Real Rapid Transit", i. e. Transporting a passenger anywhere upon its lines within ten miles, in 17 minutes.

These three roads all combined can be built and can carry twice the passengers, that all the roads combined can, at the present time, and without danger to the lives of people on the street or to ordinary traffic, and eventually supercede all surface roads, whether Horse, Cable, or Electric.

Are not such plans worthy of some consideration and investigation, if we can dispense with all the surface roads, with all their attendant dangers, maiming and killing people, and their obstruction and sometimes destruction of ordinary

traffic? and especially so, if we can supply a greater convenience and efficiency of service to the travelling public, and occupy comparatively no space upon the main surface. We are willing to submit our plan to competent progressive engineers, those who can recognize a better thing when presented to them, than their preconceived ideas have impressed them with.

Is this matter not worth looking into, especially if this system can be built, for one-half the cost of the proposed underground system? Is it not worth looking into, if it has facilities, impossible with the underground system? And how can these things be determoned without looking into them?

Very Truly Yours,

J. R. Hawkins.

*Mountainville
Orange Co
N. Y.*

J. R. Hawkins
Rapid Transit

1895

70

71

BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,

New York,.....*March 18,*.....*189 5.*

Hon. William L. Strong,
City Hall,
New York City.

Dear Sir:-

By direction of Mr. Orr, I beg to notify you that the question of a change of the method of construction upon the Boulevard north of Ninety-second Street, will be considered at the meeting of the Board to be held on Tuesday, March 19th, at two o'clock, and that it is probable that the resolution finally adopting the general plan of construction will be presented at the same meeting.

To take definite action upon either of these propositions will require the concurrent votes of six members of the Board, and I am therefore instructed to urge that the members of the Board will make a special effort to attend the meeting.

Yours respectfully,

Lewis L. Delafield
Secretary.

FRIDAY, MARCH 29, 1893.

A Suggestion for New York Rapid Transit.

BY MR. FR. VON EMPERGER, C. E.

In reply to the recent letter from the Rapid Transit Commission to the people of New York City in general, and especially as a protest against the statement "they have widened the tunnel from 44 ft. to 50 ft. This has been done in the interest of safety upon the advice of all engineers," which means a track 12½ ft. wide, I have addressed a letter to the above commissioners which gives the following facts: That the Manhattan Elevated road has for instance several miles of road 11 ft. apart (against the above named 12½ ft.), and that this is the case where the greatest traffic is handled with perfect safety. More than that, the underground railroad recently built in Budapest, Hungary, by Messrs. Siemens & Halske, has only a clearance of 9 ft. with just the same size of car as our elevated road (7 ft. 10 in. without cross seats, 8 ft. 8 in. with cross seats).

The Commission has apparently been guided by the idea that the greater the clearance the better accommodation the public will receive. The public only want good-sized cars and the same in regard to stations. It does not care if the car in the tunnel has 6 in. or 2 ft. clearance, provided there is sufficient ventilation, which can be had without question in the case of four tracks communicating, but if this 2 ft. clearance means that the stations will be 1½ ft. narrower, then the public has the right to object against such an "improvement."

It may be inserted for comparison that the "City & South London Railway" and the "Glasgow District Subway" have single tubes 80 sq. ft., while the board propose four times 160 sq. ft.

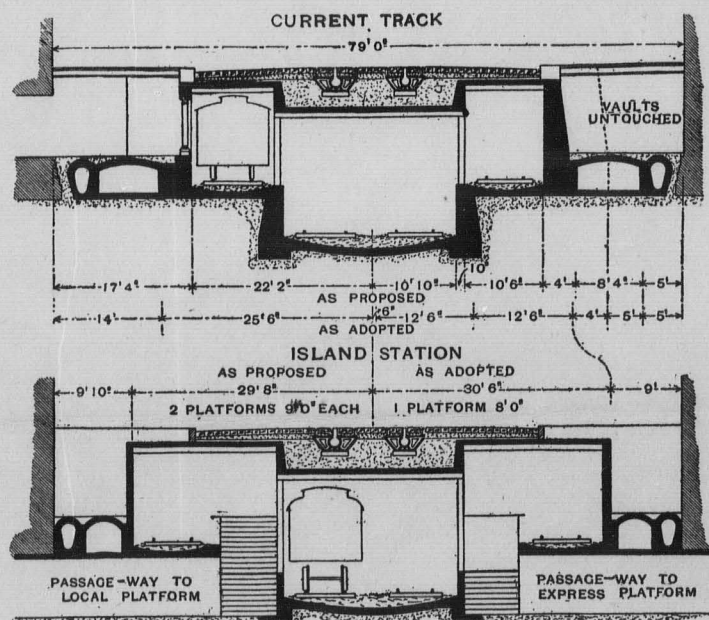
In Boston, where the street used for a subway is wide enough to allow the subway stations to be made three

Besides that, this unnecessary increase of clearance has some other far-reaching and undesirable consequences:

1. It destroys the private vaults entirely for any other use than as a pipe gallery, for which purpose alone they are too large, and it is a waste to use them as such.
2. It increases the costs of construction considerably and has compelled the Board to shorten the route already.
3. It brings the tunnel and the adjoining buildings dangerously near to each other, which latter would then have more to suffer from the noise of the working.

On the other hand, if the Board would return to the old width of 44 ft., or 11 ft. for each track, with 10½ ft. clearance:

1. The same size of cars could be used.
2. The stations could be larger.
3. Vaults could remain untouched by placing pipe galleries below them between the tunnel and the sewer.
4. Costs of construction would be smaller.
5. Further, by renting those reconstructed vaults an income could be derived to cover part of the expense. To get at a scale of what value these vaults represent we must remember that from City Hall to Fifty-ninth street there is more than 500,000 sq. ft. of vaults, and it would not be necessary to charge more than \$3.50 per square foot per annum or 3 cents a month to pay the 4 per cent. interest of the whole indebtedness incurred by the city for the subway (\$50,000,000 at 4 per cent., \$2,000,000). This is of course too high, but it will serve to show us the value which we propose to throw away thoughtlessly.
6. Adjoining buildings would be safer during construction and the tunnel would not be endangered if new buildings were erected.
7. In future the crowded sidewalks of Broadway will have to be relieved by a covered sidewalk to be con-



Von Emperger's Plan for a Rapid Transit Tunnel.

Note.—The car on the way track is the city transit car, 8 ft. 8 in. wide; that on express track is a Pullman

times as large as on our elevated roads, they can, of course, afford to allow the track a clearance of 12 ft., too, but in this city this means a reduction of the island platform from 9 ft. to 7½ ft., which leaves for each side, after deduction for railing, less than 3 ft., which is entirely inadequate, especially for a tunnel station.

To improve this condition I propose *First*: To build a tunnel, with a track of 10½ ft. clearance, track 11 ft. apart including columns, which is enough even for a Pullman car 9 ft. 10 in. wide, and gives 11 in. clear to a common car 8 ft. 8 in. wide. *Second*: To place tracks on a different level. *Third*: To specify 16 ft. in the clear as the smallest size of an "island platform."

This would allow a platform of 9 ft. in the clear, which is sufficient for a single station. In island platforms serving for two tracks this width alone is even not enough, but my plans for each track show that a separate platform can be used, one above the other, connected by a stairway, thus giving the whole station a width of 18 ft.

The step-like arrangement of the track is further adopted, as a reference to the plans will prove: (1), to reduce the quantity of excavation; (2), to bring the local track nearer to the street; (3), to allow a shorter stairway to the express track below it, and (4), because it is desirable to make the excavations nearest to the buildings as shallow as possible, and place the deeper excavation in the centre of the street.

structed in these vaults, and which can be continuous from the Battery to 59th street. So that I consider it absolutely necessary to repeal this "improvement."

All these things are in shape to be final now, and so it is high time to bring this necessary change before the public in general and to the knowledge of engineers especially, because the adopted plans do not permit the construction of an express station between 14th street and City Hall, now or in the future.

[This communication from Mr. von Emperger was in hand for publication last week, but was unavoidably held over. Since that time a certain change in the situation has taken place. The Rapid Transit Commissioners have made public what are termed the final plans, and have said that the inner tracks may be depressed below the level of the two outer by a depth of not more than 10 ft. Mr. von Emperger is inclined to think that this was consequent upon his suggestion, as above, which was filed with the Board March 12, and believes the Board will comply with further suggestions if it takes time properly to consider them. He objects to the use of the word "final," believing that the subject is of such great magnitude that it should receive much more study than has been given to it. He thinks that to submit complete plans to the criticism of the public would in the end save time and money and secure better work and better accommodation.]

FR. VON EMPERGER,
CONSULTING ENGINEER,
71 BROADWAY.

New York, 3rd April 1895.

Hon. William Strong,
Mayor,
New York City.

Dear Sir,

I am in receipt of your favor of 2nd instant and beg to thank you for your courtesy.

I now beg to enclose you herewith a reprint from the Railroad Gazette of March 29, and want to state that I filed with your Board yesterday an additional report giving my reasons why I consider the adopted width excessive.

Yours truly,

Fr. von Emperger

Dictated.

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BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,

New York, April 3, 1895. 189

Job E. Hedges, Esq.,

Secretary,

Mayor's Office,

New York City.

Dear Sir:-

I beg to acknowledge the receipt of your favor of the 2nd inst. addressed to the Board of Rapid Transit Railroad Commissioners, containing a communication from Mr. F. Von Emperger. I have acknowledged the receipt of Mr. Von Emperger's letter and will submit it to the Board.

Yours truly,

Lewis G. Delafield

Secretary.

Alton
CONSULAT GÉNÉRAL
DE FRANCE A NEW YORK.

NEW YORK, LE *April 16th* 1895.

35 South William Street.

Dear Sir.

Although I have not the honor of your personal acquaintance, may I apply to your kind assistance in favor of the Mayor of the City of Lyons (France), who would be much obliged, should you be at liberty to favor him with some information at your command on the system of rapid transit through trolley-electric street cars.

There is an application presented to him for establishing trolley-cars in the streets of Lyons, a city of 300.000 inhabitants. But, before granting said demand, Mr. Crailleton would like to have a practical information about the advantages and the inconveniences of said system of transit.

The President of the "Rapid Transit Commission".
City Hall. N.Y.

As this system is at work in Jersey City, could you kindly favor me at your earliest convenience with such report that your experience might find useful to impart to the Mayor of Lyons.

With thanks in advance for anything you could do in the premises, I have the honor to remain, Dear Sir, with high consideration

Yours truly

Edmond Bruwaert

French Consue Gen'l

BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,

74
New York, April 20, 1895.

Job E. Hedges, Esq.,
Secretary,

Dear Sir:-

I beg to acknowledge the receipt of your communication of April 17th, containing a letter addressed to the "President of the Rapid Transit Commission" by Mr. Edmond Bruwaert, the Consul General of France in this City, in which he asks for information concerning systems of rapid transit by means of trolley electric street cars.

I have written to Mr. Bruwaert acknowledging the receipt of this letter, and I have sent a copy of it to Mr. William B. Parsons, the Chief Engineer of the Rapid Transit Board, with the request that he would supply Mr. Bruwaert with all the information in his possession.

As requested by your note I return the original letter to you.

Apart from what Mr. Parsons may know about trolley systems as the result of his private investigations there is no

BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,

New York,.....189

2.

information in the possession of the Rapid Transit Commissioners which will prove of service to the Mayor of Lyons, but I assume that before the right to use the streets of the Annexed District was granted to the trolley railroads valuable information as to railroads of that character must have been submitted to the authorities of this City which you could doubtless obtain if you desire to pursue the matter further in response to the request of Mr. Bruwaert. I am,

Yours respectfully,

Lewis E. Delapfield
Secretary.

To His Honor,

William L. Strong,
Mayor.

Dear Sir:-

I wish to say a word about Rapid Transit for New York, fearing the present plan proposed by the Rapid Transit Railroad Commissioners is too expensive and will lead to no end of litigation. What is wanted is the means of carrying the people from the upper end of the city to the lower end, or from their homes to their places of business below 42nd Street in quick time. My way of doing this would be to start at Centre & Duane Streets, or near there, if necessary taking the small blocks east of Centre, between Duane & Chambers Sts., to get the tunnel out of the street; then go under-ground to Park Row, along under Park Row to Mail St., to Broadway, to Chambers St., to Centre St., keeping well under the Park sidewalk, say with four tracks, which would furnish two tracks of this circle for the storage of cars; then up Centre St. by Elevated Road to Canal, up Canal to Hester, widen Hester and cut through block to 7th Avenue, up 7th Ave. to about 39th or 40th St.; then under-ground to Broadway, under Broadway to 58th St., through and under the block to 59th St., under the Central Park Entrance, then under and through Central Park, keeping along near 8th Avenue to the upper end of the Park, then by Viaduct to Morningside Park, through and along Morningside Park under-ground and by Viaduct to Convent Ave., and above as was thought most desirable, across the Harlem River to the upper end of the city with a loop near Washington Bridge and another at the upper end of the city. A spur could leave this route in Central Park above the Reservoir going to the East Side and continue up across the Harlem River accomodating that section of the city. A spur could also leave the main route at 42nd St. going under 42nd St. to Grand Central Depot, returning by 43rd St. The point of land at B'way

7th Ave. 42nd and 43rd Sts. should be used as a Depot; also the land at B'way, 58th & 59th Sts., taking the Depots out of the Sts. as much as possible. A two track Spur should be built from the Main route to the North River and down West Street. Depots could be constructed at several points to receive light freight to be conveyed at night and during such hours of the day as would not interfere with passenger traffic. A road of this kind could be built without interfering with business during its construction and at about one-third less cost than the Rapid Transit Commissioners proposed plan, and would do the work better, furnish the people with more air and comfort and without interfering with the present sewerage system, no small item of expense, and give quicker transit, as the two miles through Central Park could be made in about two or three minutes, with safety, and the entire road could be built in three years. With judicious planting the road through the Park would be no more objectionable than the transverse roads now in the Park, and with skillful engineering the Viaducts and Depots could be made very ornimental by planting vines and shrubs. The East and West Sides of the Park would be well accomodated with transportation as they now are if you would remove from them the traffic above 95th St. I would have no station in Central Park, and have stations on the line only at prominent Street Railway Crossings, as it will be impossible to have Rapid Transit and stop every few blocks. If the East Side demands more Rapid Transit it must be built with a view of a Greater New York and the Bridges and Tunnels that will connect Brooklyn with that section during the next few years. I give these views on Rapid Transit hoping that they may be of advantage to the Tax-Payers and the people of this City, as the plan proposed by the Rapid Transit Commissioners looks to me like loading Broadway with more traffic than it

(3)

requires or can stand, and loading the city with more debt than
is necessary, as well as a delay of ten years.

Yours respectfully,

A. Lyman Thright
84 Gold St
N.Y.
April 24 1895



111 E. Twenty-fifth Street,
NEW YORK, May 3d, 1895.

Hon. Wm. L. Strong,
Mayor's Office,
New York City.

Dear Sir:-

At the suggestion of one of the Rapid Transit Commission, I beg leave to specially call your attention as a member of the Board, to the inclosed draft of a supplementary act conferring additional powers upon it in respect to the application of a fund heretofore created by law for collateral transit improvement purposes, but never thus utilized.

The origin of the fund, and of my connection with it as the engineer named in chapter 554 of laws of 1885, will be explained by the inclosed press communications relating to the same.

By advice of the Counsel of the Board having charge of its legislative interests, this bill was not presented heretofore, lest complications should arise in respect to other amendments which have since been passed in due form.

Approval of the objects of this bill is now desired, to facilitate its legislative enactment, and for the reason that it will bring before the Board for its official inspection the latest improvements in the development of the motive power which has points of superiority beyond all others for use upon the Commission routes.

I shall be pleased to attend at the next Board meeting and give any further information which may be desired by yourself or any of the members.

Yours very respectfully,

John S. Hanning

THE PROPOSED LAW.

An Act supplementary to Chapter IV. of the Laws of Eighteen Hundred and Ninety-one, entitled "An Act to provide for rapid transit railways in cities of over one million of inhabitants."

The people of the State of New York, represented in Senate and Assembly, do enact as follows:

Section 1. The Board of Rapid Transit Railroad Commissioners, appointed in pursuance of Chapter IV. of the Laws of 1891, entitled "An act to provide for rapid transit railways in cities of over one million of inhabitants," or of acts supplementary thereto or amendatory thereof, and exercising the powers therein provided in and for the city of New York, is hereby authorized and directed to supervise the disbursement and application of the fund created by Chapter 489 of the Laws of 1867, entitled "An act to provide for an experimental line of railway in the counties of New York and Westchester," as supplemented by Chapter 855 of the Laws of 1868, entitled "An act supplementary to Chapter 489 of the Laws of 1867, and to provide for the collection and application of revenue in the county of New York in certain cases," which fund was by the provisions of the laws aforesaid to be expended in the improvement of the condition and appearance of the streets or avenues to be occupied more or less by the experimental railway conditionally authorized by said laws. To accomplish such purpose in a practicable way it is hereby directed that said fund shall be primarily used to promote the realization and introduction of improvements in the methods of constructing and operating rapid transit, elevated or underground railways which are or may be located over or under the streets or avenues indicated in said laws, or in proximity thereto.

The Comptroller of the city of New York shall, in pursuance of the laws aforesaid, keep the revenues devoted to said purpose separate and apart from all other funds, and shall hereafter pay or transfer therefrom only such amounts upon the order of the treasurer of said board as it shall authorize by a majority vote thereof. Said Comptroller shall also forthwith file a statement with said board showing the receipts and disbursements of said fund to the date of the passage of this act with the balance then to its credit, and the status of deferred or litigated payments due thereto, if any such there be, and shall likewise file statements of the condition of the same on the first day of July following and quarter-annually thereafter.

The receipts of said fund are to be applied to the purposes hereinbefore designated for its use, at the discretion of said board, except that the sum of two hundred and six thousand six hundred and eleven 70-100 dollars is hereby authorized and directed to be paid by said board from said fund as its receipts shall permit, to the order of the engineer named in Chapter 554 of the Laws of 1885, in the manner following, to wit: Fifty per cent. of said sum to enable him to demonstrate upon an elevated track of not less than one mile in length the feasibility of maintaining a train speed of forty miles per hour with traction cable appliances, and when such result is proven to the satisfaction of said board, by tests applied under its direction, then the remainder of said sum shall, as fast as the increments of said fund will permit, be paid to said engineer to enable him to prepare for exhibiting to the board models on a full scale of sections of an elevated and an underground railway, upon plans in accordance with which the aforesaid motive power may, in his judgment, be constructed and operated to the best advantage to improve the condition and appearance of the streets or avenues hereinbefore referred to. If the board shall deem the plans thus illustrated by models to be meritorious, or superior to any existing styles of such railways in use at the time of the passage of this act, it shall report thereon to the next Legislature in session thereafter, together with its opinion as to the equities of the claim of said engineer for a special allowance for interest upon a like sum to that hereinbefore mentioned as having been expended by him upon the original illustrative section of the aforesaid experimental railway, and from which said fund originated, according to the findings in the legislative reports heretofore made on that subject.

Sec. 2. It shall be lawful for said engineer to appoint a trust company, located in said city, to act as his trustee and as his legal representative in prosecuting and completing the illustrative demonstrations herein provided for in case of his death or disability, and also for said board to recognize such company in that capacity.

Sec. 3. All acts or parts of acts inconsistent with this act are hereby repealed.

Sec. 4. This act shall take effect immediately.

[From The Mail and Express of Wednesday,
May 1.]

RAPID TRANSIT HISTORY

The Valuable Experience of the Best-Informed Man Living on the Subject.

To the Editor of the MAIL AND EXPRESS:

SIR—Will you kindly give publicity to the following communication?

A CARD.

To the Citizens of New York:

An unprecedented chain of circumstances leads the undersigned to invoke your attention and influence in shaping the destinies of the new system of rapid transit now in the formative stage of development in your city, and to utilize to the utmost the light which past experience sheds upon that subject; about which I can doubtless speak from a more accurate personal knowledge than any other person now living.

To this end a retrospective view will first be taken.

The practical beginnings of improvement in rapid transit facilities on Manhattan Island date from the creation by the State Senate in 1866 of the first special commission to consider and report upon the best methods for relief of the dire distress of the city in that regard.

It adopted the policy of soliciting plans by advertisement on behalf of the State and by arranging to obtain the plans and details of the only system then existing in the world, to wit, the underground railway, then coming into use in London. The prevailing opinion of the commissioners and of the public was favorable to the idea that the only safe course was to copy the London example, which was claimed to be a complete success.

But the invitation of the State Commission was not confined to that method, and led me to bring before it the then novel theory of elevated railways as now in use, except as to the motive power. As to that I had adopted the same rule as the present Transit Commission, which forbade the products of combustion on moving trains. As electrical transit power was then unknown, I adopted the only alternative, namely cable traction appliances, of which no example then existed on the globe.

Propounded as a theory only, the elevated plan would have received little attention, and probably have remained undeveloped to this day, but I coupled with it the proposal to erect an illustrative section of half a mile in length at private expense, and to be removed altogether if the State by its Executive did not approve of the same upon a trial of its merits. To make the demonstration as proposed, I expended in cash \$306,611.70 of my own and associated private funds, not counting previous preliminary expenses, which would bring the aggregate to a quarter of a million, of which I was the largest individual contributor.

This large sum was risked upon the positive pledge of the State, under the solemnity of statutory law, that it would cause three conditions to be fulfilled:

First—That the undertaking was to be deemed an experimental and not a perfected system. The original law specified in its title that an *experimental* railway was thereby specially authorized.

Second—That the motive power was a leading feature, which the law stated was not to be changed from the traction cable

method first to be tried, except after due experiment.

Third—That a special fund of 5 per cent. of the net earnings should be created for subsequent use in improving the condition and appearance of the streets through which the experimental railway was to pass.

Under these conditions I secured the capital for and supervised the building of the first section of the first elevated railway ever constructed. The Governor came from Albany, accompanied me in riding over it in a car moved by a traction cable, and immediately filed his certificate of approval with the Secretary of State, where it now remains.

From this beginning the expansion of the elevated system to its present proportions followed; and the published official estimate made several years ago that it alone had added three hundred millions to taxable values in the city is without doubt much below the actual result at the present time.

To this may be added the statement of the Senate Investigating Committee in its report published as Senate Doc. 28 of 1885, that the plot of the "Tweed Ring" in 1870-1 to legislate the elevated transit system out of existence and substitute in its place a viaduct system to be built by bonding the city to an extent of from fifty to one hundred millions (and doubtless to prove an eventual loss) was frustrated directly and almost solely by my individual efforts and expenditures.

It would naturally be supposed that an inventor and promoter who secured such results might count upon public favor and substantial rewards, but the reverse was an outcome in this instance to a degree that, doubtless, entitles it to head the long list of experiences of injustice which has become proverbial in that class of public benefactions. The nearest in resemblance was probably the famous case of Whitney and his cotton gin. But in that oft quoted record there was no prior invitation by the State, or pledge of its good faith by statute, features which render the injustice in this case unparalleled in the category of such wrongs.

It happened that the most powerful and unscrupulous ring of stock speculators of that day, with possibly one exception, conceived the idea of realizing great profits out of the experimental railway by securing control and "freezing out" minor interests by collusive foreclosure and reorganization methods before the earning value of the enterprise became apparent to ordinary investors. My plan to proceed with the perfecting of the new transit system as fast as practicable would interfere most seriously with their game.

They frankly told me so, and required my acquiescence in prostituting one of the greatest possible achievements in engineering to subserve the worst form of stock swindling. On this alternative we parted company. Their money power enabled them to hold the property while I appealed to the State for the protection guaranteed to me by law. It failed me utterly.

The special provisions of laws, requiring "due experiments" were not enforced, and later on were repealed, and an illegal transfer of my railway interest confirmed by purchased legislation. All this was the outward manifestation of the hidden hand of the money power arrayed against me. A long struggle followed, with incidents of the most sensational character, but which will be herein omitted for the sake of brevity, except to mention that all the experimental appliances (costing over \$150,000) were needlessly removed and destroyed to give color to the rumor, purposely started, that the experiments were failures and the structure itself was about to be abandoned; but at the same time agents of the "ring" were supplied with funds to buy out innocent holders of interests at a small percentage of the real value of the same. This they succeeded in doing to a large extent.

The speculators who thus inflicted a

terrible wrong upon myself have long been in their graves, but, alas! the baneful effects of their repressive policy remain!

They could thwart and eliminate my means and methods of reaching transit perfection, to promote their stock manipulations, but when the latter no longer required depressing appearances, and a "boom" was next in order, the only motive power ready for their use was the locomotive, and consequently the limitations of this inferior substitute controlled the features of all subsequent rapid transit extensions in that connection.

This it is that caused the top-heavy structures which cover public thoroughfares in the lower end of the city to such an extent as to practically convert sun-lit streets into damp and dismal tunnels, and in some of the up-town districts to exhibit iron scaffoldings on the avenues nearly a hundred feet high, and trains passing on a level with fourth and fifth-story windows! The unnecessary noise, the clouds of escaping steam, the noxious gases, the dripping oil, falling coals and interference with light and air, are mainly the result of the suppression of the progress toward experimental perfection which I had instituted at the outset, but could not find moral and legal support in the interest of equity and justice sufficient to enable me to carry to completion against the wiles and powers of rampant covetousness. Had such support materialized, there would be to-day at least three times the transit route facilities, with twice as efficient service as at present, the necessity of aid from the municipality would not have reached the fifty million point so soon, to say the least, and meanwhile all danger of any further extensions of the present defective structural and operating system of nuisance-breeding elevated transit in the streets of this city would now be permanently avoided.

During the progress of the events thus indicated, prominent managers of the substituted locomotive system stated publicly, that the motive power I had advocated was undeniably the best, and that they would without further experiment present a new plan for the successful application of my theory upon the elevated railway lines.

This announcement was made, however, during the last decade (in the eighties), and time has since then evidently proven that, for the want of progressive "due experiments," they failed to find the key to the success needed to verify their predictions.

But there is another phase of the history of rapid transit development in New York equally infamous as the foregoing. After the repudiation of two of the three mentioned State guarantees had worked out the results just stated there remained one still susceptible of just and equitable fulfillment, namely, that in regard to the application of the improvement fund. This grew from year to year, until it equaled and then exceeded the cost of my first demonstration, of the fruits of which I had been so scandalously robbed. I memorialized the Legislature to authorize me to utilize that for the purpose for which it was dedicated by statute, and to the extent of my original outlay, to which it owed its existence. After exhaustive investigations by several legislative committees, their unanimous report in favor of my proposition was followed by the passage of a law in 1885 (chapter 554), accompanied by a special memorandum of Executive approval, sanctioning my request. Then another element of perversity was disclosed in the hostile attitude of the leading city officials, particularly the then Comptroller, as the head of the finance department. The fund was on deposit with him, and apparently without drawing interest; at least none was reported as accruing to it, although the law explicitly required it to be "kept separate and apart from all other funds."

The Comptroller refused payment to me as required by the new law, and carried the question of its validity into the courts, which finally invalidated it on technical grounds. Meantime I was made the target of unlimited personal abuse through newspaper innuendoes, apparently prompted by that official.

The Legislature, after further investigations, undertook to cure the technical defects of the law by an amended statute, which passed the Legislature during three succeeding sessions by nearly unanimous votes, only to be met by Executive vetoes after final adjournment, in which the opposition of the

city officials was given as the moving cause thereof.

But in 1893 occurred a climax of the duplicity and effrontery for which the municipal government of New York City had so long been infamous. The Corporation Counsel inserted a provision in a bill before the Legislature having no apparent reference to the transit improvement fund, by which the power was claimed to be conferred on the Comptroller to divert it altogether from its special purpose to general city uses, and to constitute himself sole auditor of its past expenditures. As the identical Senate through which the fraud was smuggled had previously by a unanimous vote, over four-fifths being present, passed a bill directing the appropriate use of the fund under my supervision, the city officials knew that their end could only be gained by grossly deceiving the Legislature. But that circumstance did not deter them in their scheme, and thus the last guarantee of the State in my case, was legislatively, although unwittingly, repudiated.

All the details of this proceeding, including a secret meeting in the Mayor's inner office, can be found in Senate document 80 of 1894. The disclosures of municipal rottenness in the subsequent investigations of the Lexow Committee are not of a deeper dye of infamy than the record which that document perpetuates for all time.

But the injury done to the fame and welfare of the city by such representatives may in part be indicated by the assertion that it will require more than 100 and perhaps 1,000 years to place this city in as favorable position, in one important respect, as it was when its officials first denied justice to the author of its existing rapid transit system, in 1885.

The explanation of this last remark is to be found in the fact that, magnificent as the World's Columbian Exposition at Chicago proved to be, the same amount of expenditure, if made upon the far superior site which New York possessed in its Pelham Bay Park marine location, would have taken on a permanent character in its improvements, which would now be in readiness for use in grand exhibitions to usher in the dawn of the twentieth century, and the third millennial of the Christian era, and would doubtless have enlisted the co-operation of all of Christendom in making them a success beyond anything yet attempted in that line of achievement, not excepting the preparations now being made by the city of Paris to celebrate these advents.

The opposition of city officials to the law of 1885 prevented an exhibition of improved transit facilities which would have overcome the objections made to the last-named site on the score of its inaccessibility, and which, coupled with instances of notorious incompetency and corrupt motives of action in other respects, caused the loss of those opportunities to New York, which will not occur again until the cycles of one or of ten centuries shall reappear on the dial of time.

Thus far as to the record of past experience.

SHALL ITS BEACON LIGHTS SERVE AS GUIDES IN CHOOSING THE BEST CHANNELS FOR FURTHER ENDEAVOR TOWARD PERFECTION IN URBAN RAPID TRANSIT IN THE FUTURE?

This is the pending question which you have a potent influence in deciding.

I have waited long and patiently for a change to occur in the character grade of the official representatives of the city, and it has come at last.

New incumbents now occupy the leading offices of Mayor, Comptroller and Corporation Counsel, who can be reasonably expected to give public interests a preference over "political pulls."

The transit perfection which I was seeking a quarter of a century since under unreliable guarantees of the State is still an unsolved problem. A transit commission of respect-commanding eminence has been appointed to take charge of the city interests in that regard, and I now feel safe in making the suggestion that the law-respecting citizens of New York will do well to secure the aid of its ability and integrity to carry into effect authority which might be specially conferred upon it, to remove, in some degree, the taint of injustice which attaches to the development of rapid transit in this city thus far, as a prelude to obtain

ing the best results in that direction for the future.

Reasons why transit honesty is the best transit policy will be reserved for another communication. Charles T. Harvey.

[From The Mail and Express of Friday, May 3.]
RAPID TRANSIT POSSIBILITIES.

To the Citizens of New York—A Card—Continued.

In continuation of my previous communication, addressed as above, I beg to say that experience proves that the rapid transit problem contains possibilities of great failures as well as of pronounced success.

The most stupendous mistake ever made by any transit corporation management took place when the original New York elevated railway interests were "reorganized" on the basis of ignoring the question of improved methods of motive power being made available by "due experiment," and proceeding to erect structural extensions with the possibility of such improvement yet undetermined. That involved a fundamental principle which dominated all minor conditions, and multiplied a basic error in geometrical ratio, as a defect in a foundation is multiplied by increasing the weight and height of the structure resting upon it.

When the "reorganizing" president, with the recklessness of a gambler, gave orders in the game of "bluff" which he was then playing to tear out all the experimental cable power appliances, which were already yielding surprisingly favorable results, he would not have believed a prediction that in subsequent years that despised method would be successfully utilized by a rival interest directly beneath the elevated railway for several miles, as now to be seen on Third Avenue, in this city, under far more difficult conditions upon the surface than would exist upon the elevated tracks. With that contemptuous kick at possible improvement in such directions, the elevated transit system lost the key to an ideal success of almost unlimited proportions. All of its structural features could have been made ornamental instead of unsightly. The same factor of safety for transit strains would have permitted a large reduction of structural dimensions, while no loss of speed or power would have resulted from conforming to the street gradients.

A noiseless non-steam escape and smokeless service at higher speed and shorter train intervals would have rendered the system so popular that almost every main longitudinal avenue on Manhattan Island would have been opened to its extension, and would have reduced the many millions paid or yet to be paid for property damages to insignificant proportions.

To place the loss in actual profits to stockholders up to date at fifty millions is a very low estimate, and yet it is now evident that the same were relinquished for the sake of a few hundred thousands in immediate stock-deal gains, and uncommonly dishonest ones, at that.

Another great failure was the outcome of the "Viaduct" transit scheme. It was great, as an instance of the insufficiency of capital to insure success without directing skill. No corporation was ever launched in New York with such a backing of rich sponsors as this. A. T. Stewart headed the list, with Marshall O. Roberts and a score or more of multi-millionaires as a tail to the kite, and with the credit of the city of New York and County of Westchester pledged by law for subscriptions to an unlimited amount as its reserved emergency fund. But notwithstanding all this financial prestige, when it came into experimental rivalry with the elevated system it faded completely out of sight, leaving no trace of its existence, except upon the statute book. The fact became apparent that at a far greater expenditure it could not accommo-

date a tithe of the area reached by the elevated lines, and that even in its immediate vicinity approach to its stations would be too tedious and difficult for usually hurried patrons.

Passing by other stranded transit schemes, like the New York City Underground Railroad Company, the Arcade Railway Company, the District Underground Transit Company, the Pneumatic Tunnel Company, which severally secured the backing of capital from half a million up to a million and more, beside other organizations with smaller sums, I will briefly continue references to past experience in transit promoting affairs, by calling attention to the notable escape from a monumental failure which occurred to the first Rapid Transit Commission of 1866-7.

At that time the flood tide of public opinion raised the underground transit theory to the highest level of general favor, as the report of the commission and the newspaper columns of that date abundantly prove. The example existing in London of nearly three miles in length, built under a charter dating back to 1853, was claimed to preclude all argument for other methods, and a Mr. Joseph Wilson will be remembered by habitués then at Albany as very much in evidence before legislative committees as the representative of London builders and contractors who were willing under sufficient inducements to initiate New Yorkers into the mysteries of urban transit tunneling. But for my appearance as the advocate of further experiment before deciding, the adoption of the London plan was, doubtless, a foregone conclusion. New York was, however, switched off on to elevated tracks, while London continued solely on its sub-surface levels. A full quarter century having intervened, a comparison of results is quite instructive. New York has extended its original half-mile of illustrative elevated railway to thirty-six miles of double track lines, represented as to actual cash cost by about one million per mile of bonds, and the value of the original inventions by nearly one million per mile of stock in the proportion of thirty millions of capital shares to thirty-five millions of mortgage securities. The latter, on the basis of 6 per cent. interest, average 20 per cent. premium. The stock has fluctuated between 70 and 20 per cent. premium during recent years, standing now at the latter point, while paying formerly 10 per cent. dividend, and now 6 per cent. after doubling the share capital by an extra stock dividend. It pays the largest mileage profit of any railway in the world, and its yearly passenger traffic, having passed the 200 million mark, stands without a rival in transit efficiency.

The London two and one quarter miles of sub-surface lines first operated has been extended by two corporations to about thirteen miles of like construction, and connected with suburban tracks and traffic to such an extent as to render a statement of the exclusive subway traffic unobtainable; over three-fourths of the routes being of the ordinary railway type and outside of the city limits.

Some sections of the subways are stated to have cost upward of \$5,000,000 per mile, when labor and materials were averaging 40 per cent. less than in New York. The financial results appear in the official returns of the two operating companies as showing: Invested capital, \$100,013,805, of which 38 per cent. is in "debentures" and guaranteed shares; 25 per cent. in preferred, and 37 per cent. in common stock. The exact cash cost can only be ascertained by averaging sales of the stock on company account, from 40 per cent. premium to 80 per cent. discount. In 1893-4 one company paid nothing on its common stock, and the other 2% on the same. The total of passengers carried was 123 1-3 millions, to which a large freight business was added, or a deficit of net income might have resulted. The average speed was 12 miles per hour. The atmosphere in the tunnels is foul and the transit repulsive to sensitive persons, according to recent official reports.

It will be readily seen that with such results in a city of more than twice the population of New York, the introduction of a like system here, without municipal or

State aid, must have resulted in a collapse long before paying terminal points could have been reached, and it would have remained in the condition of the Hudson River tunnel or the Broadway Pneumatic Underground Railway at the present time.

From solely recommending such a predestined failure the first commission was barely, but happily, saved by leaving an open door for experimenting with other and more novel plans.

If any representative citizen of those days had been asked if the person who might save New York from such a failure by risking a quarter of a million of dollars in educating it into a better theory would be finessed out of his outlay, and a fund devoted to still further improvement diverted from its purpose, at a time when the city was receiving over \$600,000 per annum in direct taxes from the transit system he introduced, an exclamation substantially copied from Scripture might have been used: "Are its citizens dogs to permit such a thing?"

Respecting the important query: How can the experience of the first Transit Commission be utilized by the present one?

The answer is: By copying its example in opening a wide door for the encouragement and adoption of any and all improvements in plans or in execution.

The new feature of the use of the city's credit to the extent of fifty millions imposes on this commission the duty of providing for a financial, as well as an engineering, and transit success; the first condition being the most difficult of all.

By inviting plans without affording suitable guarantees that superior merit would secure adoption advantageous to the authors, it will rule out the most valuable grade of constructive talent which will propose to execute what it plans.

Exclusively adopting professional or popular methods or theories because founded on precedents, and requiring construction to conform thereto without competition from new ideas, will invite financial failure. Enough has already been done in this direction to render financial success impossible, unless under timely modification. The armor for this Goliath may be costly and heavy and yet not compare in effective value with a stone smoothed under nature's laws in a "running brook," when used with a keen eye and a skilled hand.

By way of application of this simile it may be said that there is a method by which Broadway can be tunneled from one end to the other, and utilized with entire success for rapid transit purposes, without disturbing a surface paving stone, injuring an adjoining building foundation, or incurring any damages to private property; and furthermore, that a system could be devised, upon the general outlines adopted by the present commission, by which a financial success could be achieved, and better construction results obtained at a saving of over 10 per cent. on present estimates of cost, and in less time than generally deemed possible. But it is so unindorsed by precedent that the chances are probably not one in a hundred of its being utilized. It is a possibility, however, nevertheless.

Two steps might suffice, under favorable circumstances, to bring it into sight and consequent service.

The first is for the city, or its citizens, to see that the injustice done to the author of its present transit system is measurably removed.

The second is for the present Transit Commission to imitate the first one in favoring new proofs before adopting old precedents.

Charles T. Harvey.

[From The Mail and Express of Friday, May 3.]
Now for Rapid Transit.

The approval by Mayor Strong of the desired amendments to the rapid transit law sends them to the Governor, and if the bill receives his signature, as it is universally believed it will, the Rapid Transit Commission ought at last to feel fully empowered to go ahead and do busi-

ness. The people have waited long, and been reasonably patient, but now they expect and demand action.

Having secured this legislation, the commission should take the step which has given New York the only rapid transit relief it has yet received, that of inviting plans for the most efficient and economical construction and operation of the new system. This was the course adopted by the first Rapid Transit Commission in 1867, when the present elevated system was submitted by a distinguished engineer, and adopted after an elaborate test at private expense. An article published yesterday, written by the inventor of the present system, and an article in another column to-day, show not only the extent to which he was himself despoiled of the fruits of his labor and enterprise, but how a fund created by the Legislature for the purpose of continuing rapid transit experiments and developments was maliciously diverted by Tammany city officials to another fund.

It is not too late, however, to rescue, by legislative act, the Experimental Rapid Transit Improvement fund from the municipal fund to which it was illegally diverted, and to turn it over to the present commission, to be applied in further experiment, under the direction of the engineer to whose original expenditures of money and effort that fund owes its existence. It is understood that such a bill has been prepared, supplemental to the amendments now in the Governor's hands, and it should be hastened to enactment if the commission is to have at once the benefit of this fund of over \$200,000 for experimental purposes.

Let the Rapid Transit Commission invite the submission of plans for construction and operation, and let the Legislature place in its hands for experiment the fund created for that purpose, and New York will soon have, at a minimum of expense and a maximum of efficiency, a rapid transit system which will lead the world. This need not at all delay the obtaining of consents, but both proceedings could go on simultaneously.

(From The Mail and Express, May 3, 1895.)

It is worthy of notice that the engineer who supervised the greatest national public work in this country at the date of its execution, where open cut and submerged excavation extensions were combined and pushed forward to completion with phenomenal rapidity, asserts that the proposed rapid transit routes can be made both an engineering and a monetary success, although the financial part of the undertaking will be the most difficult. We refer to the communication of Charles T. Harvey, C. E., to be found in another column, of whom a biographical sketch appeared in our columns some weeks since. That article made mention of the fact that he was the supervising engineer of the great Lake Superior ship canal, which was commenced and completed within twenty-three months, under conditions which made it the greatest engineering feat of its kind on record. A favorable opinion, backed by such experience, should inspire confidence in the outcome of the commission's labors.

BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,

New York, May 6, 1895.

My dear Sir:-

Mr. Orr directs me to inform the Rapid Transit Commissioners that the business to be transacted at the meeting to be held on Tuesday May 7th, at two o'clock, includes, among other things, the final adoption of a general plan of construction and of the report thereupon to the Common Council.

To take action upon either subject requires the concurrent votes of six Commissioners, and the members of the Board are therefore urged to use every effort to attend the meeting.

Yours respectfully,

Lewis L. DeLafeld
Secretary.

BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,

New York, May 16, 1895.

Job E. Hedges, Esq.,

Secretary,

City Hall,

New York City.

My dear Sir:-

74
Referring to your letter of April 20th in which you forwarded to me a letter from Mr. Edmond Bruwaert, the French Consul-General, asking for information concerning "systems of rapid transit by means of trolley electric street cars," I beg to inform you that after writing to Mr. Bruwaert acknowledging the receipt of his letter, I referred the matter to Mr. William B. Parsons, the Chief Engineer of our Board, who now reports to me that he immediately called upon Mr. Bruwaert and that he has since furnished him with a large amount of printed reports, etc. which in his (Mr. Parsons') opinion, completely cover the subject of Mr. Bruwaert's inquiry.

The subject is of course a technical one about which I know nothing personally, but from what Mr. Parsons tells me, I

BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,

New York,.....*189*

2.

am satisfied that he has furnished Mr. Bruwaert with all the information obtainable.

I returned Mr. Bruwaert's letter to you on April 20th.

Yours respectfully,

Lewis L. DeLofield

Secretary.

BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,

New York, May 24, 1895.

SIR:

A meeting of the BOARD OF RAPID TRANSIT RAIL-
ROAD COMMISSIONERS, will be held at the offices of the
Board, on Tuesday May 28th, 1895
at two o'clock in the afternoon.

Yours respectfully,

LEWIS L. DELAFIELD,
Secretary.

To

Hon. William L. Strong.

The by-laws of the Board prescribe that the
annual election of its officers shall take place
at this meeting.

•
Bluff in
Rapid Transit

72
Hon H. L. Strong.
Mayor.

LENNON & OWEN,

Real Estate

Agents, Brokers, Managers and Appraisers,

No. 1915 AMSTERDAM AVENUE,

BET. 154TH & 155TH STS.,
WASHINGTON HEIGHTS,

New York, _____ 18____

Geo. J. Gould Esq
President Manhattan Railway Company.

We the undersigned citizens and taxpayers, residing on the northern part of Manhattan Island, respectfully request the Manhattan Railway Company to make application to the Rapid Transit Rail Road Commission for permission to extend their road to Fort George, over one of the following routes, viz:

1st. Commencing at the Battery and running through West Street to 10th Avenue, thence up 10th and Amsterdam Avenues to Fort George.

2nd. From present structure at 9th Avenue and 109th Street, westerly through said street to Boulevard, up Boulevard to Hamilton Place, along Hamilton place to Amsterdam Avenue and thence to Fort George.

3rd. Continuing through 53rd Street to Amsterdam Avenue, and thence to Fort George.

4th. By plan presented to Rapid Transit Commission by the late Jay Gould, on May 12th 1891.

Edward P. Griffin
Chairman

George D. Lennon
Secretary

Copy of Petition to Manhattan Railway Company.

LENNON & OWEN,

Real Estate

Agents, Brokers, Managers and Appraisers,

No. 1915 AMSTERDAM AVENUE,

BET. 154TH & 155TH STS.,
WASHINGTON HEIGHTS,

New York, _____ 18____

Julius H. Caryl
Chas A. Briggs
William Seggie
Resolved Gardner
Geo. M. Cushing
Jno W. Bull
Jacob Dux
Chas L. Fleming
Isaac Evans
Wright Gillies
Asbury Lester
Ola Hanson
Chas H. Holland
Wm A. Blauvelt
Robert C. Winters
John W. Fleck
Paul B. Pugh
Alex. White
Charles St Clair
John McCormick
George W. Glass
Napoleon J. Haines
Herd L. Baumann
Hugo Reiger
John Kennedy.

Edward P. Griffin
William C. Stillings
Henry Batterman
James Mangano
Edwin L. Fay
Alvin H. Bontecou
James E. Tyler
J. Harkness Boyd
Cornelius Sewilleger
James Robertson
John Devlin
Richard T. Irwin
Ogden K. Linabury
Daniel Polhamus
William Dreunen
Thomas J. McGuire
Henry H. Stodtman
Chas E. Deppermann
Edward R. Cortigan
Henry Gotlibb
Clarence H. James
John Fethkoter
David J. Stein
William Broadbelt
George D. Lennon

Committee of Fifty, signers to petition.

2. LENNON & OWEN,
Real Estate

Agents, Brokers, Managers and Appraisers,

No. 1915 AMSTERDAM AVENUE,

BET. 154TH & 155TH STS.,
WASHINGTON HEIGHTS,

New York, _____ 18____

Committee of Fifty, Washington Heights.
Edward P. Griffin. Chairman.

I presented the petition handed to me by your Committee, on behalf of the property-owners of Washington Heights, relative to Rapid Transit to our Executive Committee, together with a verbal communication of my statement to you. They endorse fully what I said, "that we were willing to build the line to Fort George, on any of the routes suggested in your communication to me on proper terms".

They did not think it expedient for the Manhattan Railway Company, to go before the Rapid Transit Commission, as I representing the Company, went before a commission last year, which gave very little consideration to us, and they also feared the Company might be laid open to the charge of endeavoring to do something that would hamper the Rapid Transit Commission in their present plans and schemes.

If the Rapid Transit Commissioners desire at any time to see representative of the — Manhattan Railway Company and will so communicate to us, we hold ourselves in readiness to meet them and discuss the matter fully.

Very Truly Yours
George J. Gould.
President

Copy of letter from Geo. J. Gould to Committee.

3. LENNON & OWEN,
Real Estate

Agents, Brokers, Managers and Appraisers,

No. 1915 AMSTERDAM AVENUE,

BET. 154TH & 155TH STS.,
WASHINGTON HEIGHTS,

New York, _____ 18__

Rapid Transit Rail Road Commission
Alexander E. Orr, President

Gentlemen.

At a meeting of citizens residing on the northern part of Manhattan Island, held at the Athenaeum, Washington Heights, on March 21st 1895. a Committee of Fifty Taxpayers was appointed to petition the Manhattan Railway Company to extend their road to Fort George.

In pursuance of the above named action the Committee presented a petition to the Manhattan Railway Company, (a copy of which is hereto affixed) and received the enclosed reply.

The Committee asks of your honorable board to set a time and date when you will hear them in regard to this petition.

With great respect

Edward P. Griffin

Chairman

George D. Lennon
Secy.

Yours respectfully
Lewis L. Delafield
Secy.

Copy of letter of Committee to Commission

4 LENNON & OWEN,

Real Estate

Agents, Brokers, Managers and Appraisers,

No. 1915 AMSTERDAM AVENUE,

BET. 154TH & 155TH STS.,
WASHINGTON HEIGHTS,

New York, _____ 18__

Board of
Rapid Transit Rail Road Commission
256. Broadway.
New York June 6th 1895.

E. P. Griffin Esq.

Dear Sir,

your favor of May 29th addressed to the Board of R. T. R. R. Com^{tee} in which you ask for a hearing, concerning certain matters referred to in a petition to the Manhattan Railway Company and the reply of Mr Geo. J. Gould, the president of that company, (which petition and reply were enclosed with your letter), has been duly received and was submitted to the board at a meeting held on June 4th - 1895. And thereupon, on motion of Mr Low, it was resolved, "that the secretary be instructed to reply to Mr Griffin, that - whenever the Manhattan Railway Company shall apply to this Commission for the right to extend its tracks to Fort George, this board will carefully consider such application upon its merits, until then it appears to be - unavailing to grant such a public hearing as is proposed.

Yours respectfully
Lewis L. Delafield
Secy.

Copy of reply of R. T. R. R. Com^{tee} to Committee

5. LENNON & OWEN,
Real Estate

Agents, Brokers, Managers and Appraisers,

No. 1915 AMSTERDAM AVENUE,

BET. 154TH & 155TH STS.,
WASHINGTON HEIGHTS.

New York, _____ 18__

George J. Gould Esq
President, Manhattan Railway Company.

Dear Sir.

On May 29th 1895, a Committee of Petitioners residing on the northern part of Manhattan Island, addressed a communication to the Rapid Transit Rail Road Commission - (enclosing the copy of petition to your company and the reply of your President), asking the Commission to name a time when they would be pleased to hear them in regard to their - Petition, and on June 6th 1895. Received the enclosed reply.

I am directed by the petitioners to send you this, their communication and request your company to make application - at your earliest convenience to the Rapid Transit Rail Road Commission for permission to extend your Railway System to Fort George, over such route as the Commission may determine.

With great respect
Edward P. Griffin

Chairman

George D. Lennon
Secy.

Copy of last letter of Committee to Manhattan Co.

BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,

New York, June 6., 1895. *189*

Dear Sir:-

Pursuant to the directions of a resolution adopted at the last meeting of the Rapid Transit Board, I beg to hand you herewith for your consideration the proof of the report of Mr. William B. Parsons, Chief Engineer.

Yours respectfully,

Lewis L. Delafield,

LD
Secretary.

BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,

New York, June 7, 1895.

Dear Sir:-

At the request of Mr. Low, I send herewith to each member of the Rapid Transit Board copies of the appendices to the report of the Chief Engineer.

Yours respectfully,

Lewis L. Delafield,
Secretary.

HAWKINS AND DELAFIELD,
COUNSELLORS AT LAW,
111 BROADWAY,
NEW YORK.
EUGENE D. HAWKINS.
LEWIS L. DELAFIELD.

November 18, 1895.

Dear Sir:-

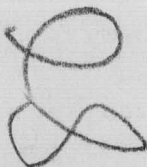
The detailed plans of the Chief Engineer are not as yet ready for presentation to the Rapid Transit Board.

Mr. Orr accordingly requests me to notify you that there will be no meeting of the Rapid Transit Board to-morrow. (Tuesday, November 19th).

Yours respectfully,

Lewis L. Delafield,

Secretary.



HAWKINS AND DELAFIELD,
COUNSELLORS AT LAW,
111 BROADWAY,
NEW YORK.

EUGENE D. HAWKINS.
LEWIS L. DELAFIELD.

December 2, 1895.

Dear Sir:-

The Postmaster of this City will attend before the Board of Rapid Transit Railroad Commissioners at its meeting to be held on Tuesday, December 3rd, at two o'clock, to make certain suggestions with respect to the facilities required for the transportation of the United States mail.

Mr. Orr accordingly directs me to notify the Commissioners of this fact and to urge a full attendance at the meeting.

Yours respectfully,

Lewis L. Delafield

Secretary.

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HAWKINS AND DELAFIELD,
COUNSELLORS AT LAW,
111 BROADWAY,
NEW YORK.
EUGENE D. HAWKINS.
LEWIS L. DELAFIELD.

December 23, 1895.

Dear Sir:-

Mr. Orr asks me to notify you that inasmuch as the Chief Engineer of the Rapid Transit Board will be engaged tomorrow (Tuesday) afternoon as a witness before the Supreme Court Commission, and it will therefore be impossible to consider his detailed plans, he thinks that it would be useless to hold a meeting of the Rapid Transit Board.

I accordingly beg to notify you that no meeting of the Rapid Transit Board will be held on the afternoon of Tuesday, December 24th.

Yours respectfully,

Lewis L. Delafield

Secretary.

Alexander E. Orr, Esq.,

Produce Exchange Building,

New York City.

HAWKINS AND DELAFIELD,
COUNSELLORS AT LAW,
111 BROADWAY,
NEW YORK.
EUGENE D. HAWKINS.
LEWIS L. DELAFIELD.

December 27, 1895.

Dear Sir:-

The Supreme Court Commission will be in session at the Rapid Transit Rooms on Tuesday of next week, and even if the protracted cross-examination of Mr. Parsons shall have been finished by that time, the counsel state that his presence will be required at the hearing.

Under these circumstances, it seems evident that it will be impossible to take up the consideration of the detailed plans upon that day; and, as there is no other business of an urgent character to be considered, Mr. Orr directs me to notify the members of the Rapid Transit Board that no meeting will be held on Tuesday, December 31st.

Yours respectfully,

Lewis L. Delafield

Secretary.

BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,

TELEPHONE NO. 2006 CORTLANDT.

New York, January 11, 1896.

Dear Sir:-

The time of the Chief Engineer will be fully occupied next week with the performance of the work entailed by the sessions of the Supreme Court Commission, and as the Counsel require his presence at the sessions of that Commission, he reports that it would be impossible for him to attend a meeting of the Rapid Transit Board next week or to perform any work in connection with the detailed plans.

As there is no other business which requires immediate attention, Mr. Orr directs me to notify the Rapid Transit Commissioners that no meeting of the Board will be held on Tuesday, January 14th.

Yours respectfully,

Lewis L. Dole

Secretary.

(Copy)

New York, Jan. 14th. 1896.

To the Members of the Rapid Transit Commission.

Gentlemen:-

I enclose herewith a letter just received from our Counsel, Edward M. Shepard. I heartily approve of the suggestion and if you also approve please so signify at the bottom of this letter and it will avoid calling the Commission together.

Very truly yours,

A. E. Orr.

10847
New York, 14th January, 1896.

Hon. Alexander E. Orr,

Produce Exchange Building.

Dear Mr. Orr:-

We are almost at the point in the Rapid Transit hearing where we have to decide as to the experts whom we shall call. In my judgment we ought to call all of the four experts who served with Mr. Hewitt. I do not include Mr. Hewitt, because the examination would be as to cost, and, as I understand, he did not make himself an investigation of that subject. The production of these experts involves expense. They must be asked to give their time, especially Mr. Chanute. Do you approve that expense, and if you do, do you think that we are under obligations to wait for a meeting of the Board? In the latter case I think the Board should meet this week. The property owners case will be concluded perhaps this week, and we shall then be required to proceed with our case next week.

Faithfully yours,

Edward M. Shepard.

BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,

TELEPHONE No. 2006 CORTLANDT.

New York,.....January 15, 1896.

Dear Sir:-

I beg to send you herewith a circular letter addressed to the Rapid Transit Commissioners by Mr. Orr, the President of the Board, and a copy of a letter sent to Mr. Orr by Mr. Edward M. Shepard, one of the counsel of the Board.

These letters will sufficiently explain themselves, but I should perhaps add that Mr. Shepard tells me that as he is unable to foresee how long he will require the services of the experts, he is unable to give any estimate of the amount of their fees.

If you approve of authorizing the counsel to obtain the services of such expert witnesses as they may deem it necessary to call, will you very kindly write to Mr. Orr as speedily as possible. To call a special meeting of the Board requires a notice of two days, and it is a matter of real necessity that the counsel of the Board should be enabled to prepare their case at once.

Yours respectfully,

Lewis I. DeLaford
Secretary

BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,

TELEPHONE NO. 2006 CORTLANDT.

New York, January 18th, 1896.

Dear Sir:-

Mr. Orr directs me to notify the Rapid Transit Commissioners that no further meetings of the Board will be held during the pendency of the proceeding before the Supreme Court Commission, unless some contingency not now foreseen shall require the holding of such a meeting.

Yours respectfully,

Lewis S. Delafield

Secretary.

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State of New York.

No. 211.

Int. 210.

IN SENATE,

January 20, 1896.

Introduced by Mr. PAGE—(by request)—read twice, and by unanimous consent ordered printed, and when printed to be committed to the committee on commerce and navigation.

AN ACT

To amend chapter eight hundred and forty-two of the laws of eighteen hundred and sixty-eight, entitled "An act to provide for the transmission of letters, packages and merchandise in the cities of New York and Brooklyn, and across the North and East rivers, by means of pneumatic tubes, to be constructed beneath the surface of the streets and public places in said cities, and under the waters of said rivers," and to authorize said tubes to be operated by electrical power.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

- 1 Section 1. Section seven of chapter eight hundred and forty-
- 2 two of the laws of eighteen hundred and sixty-eight, entitled "An
- 3 act to provide for the transmission of letters, packages and mer-
- 4 chandise in the cities of New York and Brooklyn and across the
- 5 North and East rivers, by means of pneumatic tubes, to be con-
- 6 structed beneath the surface of the streets and public places in

EXPLANATION.—Matter underscored is new; matter in brackets [] is old law to be omitted.

1 said cities and under the waters of said rivers," is amended so as
2 to read as follows:

3 § 7. The corporation organized under this act shall be here-
4 after known as the New York Parcel Dispatch company, and
5 shall possess all the powers conferred by this act and the acts
6 amendatory thereof. All work shall be done under the super-
7 vision of the commissioner of public works or the commissioner
8 of city works, or other officer having charge thereof, of the city
9 wherein such work may be, and subject to such reasonable regula-
10 tion not inconsistent with the due exercise of the substantial
11 powers authorized by this act, as may be made by such commis-
12 sioner or officer. The said corporation may construct the tubes
13 contemplated by this act after it shall have constructed and put
14 in successful operation a line or lines from the post-office, or some
15 point easterly thereof, in the city of New York, to a point or points
16 east of Broadway, which line or lines in the aggregate shall be
17 at least one mile in length.

18 § 2. Section eight of said act is hereby amended so as to read as
19 follows:

20 § 8. Said corporation may use any electrical motive power,
21 in whole or in part, in addition to the power now authorized for
22 the purpose of carrying on its business.

23 § 3. Said act is further amended by adding thereto three sec-
24 tions, which shall be known and designated as nine, ten and
25 eleven, to wit:

26 § 9. Said corporation may issue its bonds, secured by mortgage

1, or otherwise, upon vote of its directors and a majority of its
2 stockholders, to such an amount as shall be needed for its cor-
3 porate purposes.

4 § 10. The trustees or directors or officers in control of the opera-
5 tion of any bridge over any rivers mentioned in this act, or the
6 Harlem river, may consent that said tubes be carried on such
7 bridge instead of beneath the waters of said rivers.

8 § 11. All acts or parts of acts inconsistent with this act, so
9 far as they are so inconsistent, or so far as they require the con-
10 struction of any other preliminary or experimental section, or
11 consent or approval of any person or officer are hereby repealed.

12 § 4. This act shall take effect immediately.

JOHN E. PARSONS.
DAVID B. OGDEN.
EDWARD M. SHEPARD.
HENRY B. CLOSSON.

*Parsons, Shepard & Ogden,
Trinity Building,*

No. 111 Broadway,

New York, 7th February, 1896

Hon. Alexander E. Orr,
President of the Board of Rapid Transit
Railroad Commissioners.

Sir:-

We have your communication of the 6th inst. enclosing Senate Bill No. 211 referred to the Rapid Transit Commissioners by Senator Parsons, the Chairman of the Senate Committee on Commerce and Navigation.

In our opinion this bill should not pass without material amendment. The bill is in form an amendment of chapter 842 of the laws of 1868. The act of 1868 gave power to Alfred E. Beach and other persons named in the act and their assigns, to lay down and maintain in the streets of New York pneumatic tubes having a mean interior diameter not exceeding fifty-four inches, for the purpose of conveying letters, packages and merchandise by a pneumatic system of propulsion. The only limitations prescribed in the act upon the use of the public streets were as follows:

- (1) That the tubes should not extend through any vault or under any sidewalk fronting on private property without the consent of and compensation to the owner of such property;
- (2) That the tubes should be located and laid under the direction of the Croton Aqueduct Department "at such depth below the

"surface and in such manner as shall effectually prevent any
"injury to or unnecessary interference with the surface of
"said streets, squares, avenues and public places, or any
"change or alteration in the existing sewers, water pipes or
"gas pipes;"

- (3) That the work of constructing the tubes, the number of men employed on the construction, and the like, should be subject to such regulations prescribed by the Croton Aqueduct Department "as will prevent as far as possible the obstruction of
"any street, avenue or public place and as will secure the
"completion of such part or section of such work with the
"least possible delay".

The act of 1868 declares the use of the streets for these pipes to be "a public use thereof consistent with the uses
"for which the said respective cities or the corporate authorities
"thereof hold the said streets, squares, avenues or public places".

The proposed bill gives the corporators the name of the "New York Parcel Dispatch Company" and relieves the company of the necessity of constructing an experimental section and securing the approval of it before proceeding with their principal work. It directs the work to be done under the supervision of the Commissioner of Public Works, "subject to such reasonable regulations not inconsistent with the due exercise of the substantial powers authorized by this act as may be made by such com-

"missioner." The proposed bill adds a final section to the act in these words: "Sec. 11. All acts or parts of acts inconsistent with this act so far as they are so inconsistent or so far as they require the construction of any preliminary or experimental section or consent or approval of any person or officer are hereby repealed."

If this bill shall pass it will be a later legislative enactment than the Rapid Transit acts. It may be, therefore, claimed and with reason that the rapid transit act, so far as it is inconsistent with this act, is repealed. The result of this would be that the grant of power to the New York Dispatch Company would be a grant superior to the grant to the Rapid Transit Commissioners. The act permits the pipes of this company to be laid under any of the streets proposed to be occupied by the new rapid transit railroad or to be placed under the sidewalk under which the appurtenant structures of the new railroad are, in the discretion of the Rapid Transit Commissioners, to be placed. The proposed bill expressly relieves the New York Parcel Dispatch Company of the necessity of any consent or approval of any public officer except only the provision that the work is to be subject to reasonable regulation by the Commissioner of Public Works, which regulation, however, shall not be inconsistent with the due exercise of the substantial powers granted by the act.

This act seems to us to be a fair illustration of the sort of bill by which, indirectly, serious obstacles may be placed in the way of the construction of the rapid transit railroad. There are other objections of policy to this act with which the Rapid Transit Commissioners are not specially concerned and to which, therefore, we do not draw attention.

It seems to us that the Rapid Transit Commission should strenuously object to the passage of this act and should ask the assistance of the Mayor and Corporation Counsel in its opposition, unless the act shall be amended by the addition of a provision like the following:

"No tube shall be laid nor any construction or interference with any street take place under any provision of this act or the act amended hereby, in, under or above any street, square, avenue or public place of any city, occupied or proposed to be occupied by any rapid transit railroad without the consent of the board of rapid transit railroad commissioners of such city. And in case the board of rapid transit railroad commissioners of any city shall desire to lay out or construct or extend any rapid transit railroad in any street, square, avenue or public place occupied by any such pneumatic tube or any construction under this act or the act hereby amended, the right to construct or maintain any such pneumatic tube or any such construction shall be absolutely subject and subordinate to the powers of the board of rapid transit railroad commissioners and subject to their control or regulation."

Very respectfully yours,

Edward M. Shepard.

Albert B. Boardman.

BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,

TELEPHONE No. 2006 CORTLANDT.

New York, February 14, 1895

Hon. William L. Strong,
Mayor of the City of New York.

Dear Sir:-

I beg to hand you herewith a copy of Senate bill No. 211 which amends a bill granting to certain individuals the right to lay pneumatic tubes in the streets of this City. This bill has been referred to the Senate Committee on Commerce and Navigation, of which Hon. C. R. Parsons is Chairman, and it was brought to the attention of the Rapid Transit Board by the courtesy of that gentleman.

As it seemed probable that the rights granted by this bill might conflict with the plans of the Rapid Transit Board, it was referred to the counsel of the Board who have rendered an opinion regarding the same of which I beg to enclose a copy.

Apart entirely from the fact that the rights granted by this bill may conflict with the prosecution of the Rapid Transit plans, I venture also to bring it to your attention that the proposed legislation not only abolishes certain of the safe

BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,


TELEPHONE NO. 2006 CORTLANDT.

New York, 189

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guards which were required by the original act, but it also, in effect, grants an exceedingly valuable franchise without requiring that any compensation shall be made to the City.

Yours very truly,


President.

BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,

TELEPHONE No. 2006 CORTLANDT.

New York, March 6, 1896.

Sir:-

An adjourned meeting of the Board of Rapid Transit Railroad Commissioners will be held at the offices of the Board, Number 256 Broadway in the City of New York, on Thursday, March 12th, 1896, at three o'clock in the afternoon.

And notice is hereby given, as required by Article 11 of the By-laws of the said Board, that, at the said meeting, a motion will be made to amend the said By-laws in the following particulars, namely:

First: By striking out the words "This Board shall hold stated meetings on Tuesday of each week at two o'clock P. M." in the first Article of the said By-laws, and by substituting therefor the words "This Board shall hold stated meetings on Thursday of each week at three o'clock in the afternoon;" and,

Second: By striking out the words "They shall respectively hold office until the first Tuesday in June, 1895, and on the last Tuesday of May in each year an election for all such offices shall be held" in the third Article of the said By-laws, and by substituting therefor the words "They shall respectively hold

BOARD OF
RAPID TRANSIT RAILROAD COMMISSIONERS,
256 BROADWAY,

TELEPHONE NO. 2006 CORTLANDT.

New York,189

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office until the first Tuesday in June 1895, and on the last
Thursday of May in each year an election for all such offices
shall be held."

Yours respectfully,

Lewis L. Delafield
Secretary.