

Vof. LVII.-No. 11. [NEW SERIES.]

NEW YORK, SEPTEMBER 10, 1887.

[\$3.00 per Year.

THE BARRETT SYSTEM OF LIGHTING RAILROAD CARS BY ELECTRICITY.

The problem of maintaining the electric light satisfactorily on rail cars has always been esteemed a diffi cult one. Everything militates against it. The motion of the cars by its jar tends to disturb the lamp connections, and in effectively providing against this trouble some degree of ingenuity has been called upon. The use of a storage battery as the immediate pro-

The system which we illustrate to-day, due to Mr. S. H. Barrett, of Springfield, Mass., embodies both dynamo and storage battery, so as to obtain the merits of both. It seeks to overcome the defects of one source of electricity by the use of the conjugate generator. The main lighting agent is the dynamo. As this machine with its motor steam engine works more economically when large, a single generating plant is used to light four or five cars. Not only is economy of generation

were necessary to detach one or more of the cars supplied by it, the cars so uncoupled could receive no more electricity from the dynamo, and would be left in darkness. To provide against these contingencies, each car is provided with its own storage battery. Of this, twenty cells are placed in a box under the floor of each car. They are stored or charged from the same dynamo that lights the cars.

Just under the centrifugal governor of the engine an ducer of all the electricity used has already been illus- thus attained, but space is also saved, as the passenger automatic switch is arranged. By the action of this



THE BARRETT SYSTEM OF LIGHTING RAILROAD CARS BY ELECTRICITY.

trated and described by us.* This class of plant certainly has done excellent work, but has its attendant disadvantages. Primarily, the storage battery is not as economical as the dynamo. It is charged from a generator at some station, and in discharging itself through the lamps does not return the full amount of electricity absorbed from the dynamo. Again, a storage battery can only run for a certain period at a given rate. If all the lamps are kept lighted, it is only a question of some hours when it will run down completely.

The storage battery by its portability, however, seems to overbalance its defects, and does good work for this special application. The unassisted dynamo, necessarily dependent upon a supply of steam for its running, seems ill adapted for train lighting.

* Sée SCIENTIFIC AMBRICAN, vol. lvi., No. 19, page 287.

heat the cars, and to annoy by the jar and motion. The dynamo and engine is placed in the baggage car. Steam is supplied from the engine. An eight horse power Colt disk engine with a Tremont Electric Light Company 60 light dynamo is used. A steam hose coupled through to the engine provides the necessary steam connection.

This, with incandescent lamps, fifteen to a car, forms an effective and complete lighting plant, with one exception. As long as the engine is attached, the system will work. It matters not whether the train is stopped or in motion. The dynamo being run by an independent engine will always generate current. But if the locomotive is uncoupled, then the dynamo engine, ually provided for. being deprived of its steam, must come to a stop. If it | The effect of a car thus lighted is very fine. In place

cars have no encumbering engine to take up room and | mechanism the batteries are thrown into or out of the dynamo circuit as required. When they run down and the current weakens, the switch closes and they receive a charging current. As soon as charged the switch opens, and cuts them out, leaving them in condition for service whenever called upon. Normally, the greater part of the charging would be done in the day time, so that the action of the dynamo at night, when the cars have to be lighted, need not be greatly complicated by the production of a charging current.

> Switches to be operated by hand are also present in the system. By them the car lights can be turned from dynamo to battery or the reverse. Thus the contingency of a breaking down of the dynamo is effect-

of the unsatisfactory oil lamps a quantity of brilliant incandescent lamps illuminate every corner of the car. so that it is as easy to read by night as by day. The light in its satisfactory qualities compares with gas. The element of safety is also of importance. The danger of fire is the greatest dread attaching to a collision or upset of a train. This danger is greatly increased by kerosene lamps, and it is far from certain that a high pressure gas reservoir may not be an element of risk in a disaster of this class. The electric light would seem the safest of all. The danger of the production of an arc is certainly quite remote. The first action of a collision would be to break some of the electric light leads and cut off the current entirely. It would be verv exceptional for the conditions for an incendiary arc to be brought about. At the same time, this is among the possibilities.

The electric light leads are connected between the cars by an extremely simple arrangement. Two half cylinders, whose faces form the contact plates, are held together in a spiral spring socket. This secures them so that no shaking can detach them; while a direct pull, as by the cars uncoupling, will draw them apart without injury. For the steam coupling a species of union or faced joint is employed, held together by a screw and yoke. The joint is a metal to metal one, packing being dispensed with. It is so well made that the faces can be turned or twisted upon each other while the steam pressure is on without an escape. A self-acting plate or valve drops over and above the opening when the line is uncoupled, to exclude sand and dirt. This coupling is of the simplest description, and does away with one of the difficulties of the problem.

The plant we have illustrated is now at work on one of the trains of the Connecticut River Railroad. It forms at least an interesting study of the subject of car lighting, and in its combination of storage batteries and dynamo indicates a distinct step in advance. Sooner or later the electric lighting of cars, like the block system of running trains and safe car heating, must be introduced on our leading roads. Once introduced, they will have come to stay.

A New Heat Measurer.

Mr. C. Vernon Boys exhibited an instrument which he terms the radiomicrometer to the Royal Society, March 24. The instrument is a modification of one invented by M. D'Arsonval, and consists of a minute thermal junction forming one side of a parallelogram of which the other three sides are of copper. This thermo-electric circuit is suspended between the poles of a magnet. It is evident that when radiant heat falls upon the thermo-electric junction forming one side of the parallelogram, an electrical current is formed which turns in the magnetic field, where it is placed so as to include the greatest number of lines of force. The parallelogram made by Mr. Boys embraced one square centimeter. The thermo-electric junction consisted of a bar of antimony and of bismuth, each piece being $5 \times 5 \times \frac{1}{6}$ mm., soldered edge to edge. The circuit was supported by a torsion fiber and provided with a little mirror. With a magnetic field of only 100 units the instrument showed the heat which would be cast on a halfpenny by a candle flame at a distance of 1,168 feet. With a stronger magnetic field the instrument is canable of a much greater sensitiveness. The author calculates that an instrument can be made which would show a change of temperature at the junction of 10000000 of a degree of heat. Mr. Boys also showed a motor which consisted of a cross, the center being antimony and the arms bismuth. To the ends of the arms are soldered four copper wires, the three ends of which are joined by a ring of copper. When the spark from a blown-out match is held near this arrangement, it rotates rapidly. If the spark is held on the righthand side of the north pole, the motor revolves indifferently in either direction. If the spark is held on the left-hand side, the motor stops. "We have, therefore, an electro-magnetic motor which goes having neither sliding nor liquid contacts."-Nature.

The First Lightning Rod.





MUNN & CO., Editors and Proprietors. PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

_ =-A. E. BEACH. O. D. MUNN.

TERMS FOR THE SCIENTIFIC AMERICAN.

Australia and New Zealand.—Those who desire to receive the SCIENTIFIC AMERICAN, for a little over one year, may remit £l in current Colonial bank notes. Address

MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, for U.S. and Canada, \$6.00 a year to foreign countries belong-ing to the Postal Union. Single copies, 10 cents. Sold by all newsdealers throughout the country.

(combined Rates.-The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, to any address in U. S. or Canada, on receipt of storn dolars. The safest way to remit is by draft, postal order, express money order, or

egistered letter. Australia and New Zealand.—The SCIENTIFIC AMERICAN and UPPLEMENT will be sent for a little over one year on receipt of $\pounds 2$ cur-ent Colonial bank notes.

Address MUNN & CO., 361 Broadway, corner of Franklin Street, New York

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid peri-dical, issued once a month. Each number contains about one hundred odical, issued once a month. Each number contains about one hundred large quarto.pages, profusely illustrated, embracins: (1) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERI-CAN. with its splendid engravings and valuable information. (2) Com-mercial, trade, and manufactuling quinches of lacding houses. Terms for Export Edition, \$5.00 a year, sent prepaid to any part of the world. Single copies, 50 cents. **EF** Manufacturers and others who desire to secure foreign trade may have large and handsomely displayed an-bouncements published in this edition at a very moderate cost. Address MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

NEW YORK, SATURDAY, SEPTEMBER 10, 1887.

Contents.

(Illustrated articles are marked with an asterisk.) Air, jet of. heating, device for*... 152 Asphalt, industrial uses of......162 Bacillus of scarlet fever, discov-Balance for measuring for ma-netic conductivity*... Bengine, dangers of. Books and publications, new... Brass, polished, colors for... Bridge, msknetic, Edison's*... Carstarter, improved*... Chenical exhibits, notable... Correspondence Diet of strong men... Do yous... Belipse, lunar... Electric Light Association, Na-tional, meeting of..... 168 171 170 169 163 170 161 165 169 170 166 fction on railways. as, natural, in 1827... reen lake color.a.. 161 168 168 Freen lake color, a... Heat measurer, new. Home industries....
 161
 Draws r shall we plant mattee draws r shall we plant mattee draws r shall be proved in the shall be readed and read of the shall be readed and re nmigration, restricted. nk, stencil. Iventions, agricultural Iventions, engineering Iventions, index of.... Inventions, miscellaneous,..... Kindling wood industry, New York.....

TABLE OF CONTENTS OF

SCIENTIFIC AMERICAN SUPPLEMENT

No. 610,

For the Week Ending September 10, 1887.

Price 10 cents. For sale by all newsdealers.

- 9747
- 4 illustrations.
 III. ELECTRICITY.—Practical Electricity.—Lighting and extinguishing theory ing button and an automatic commutator for using Leclanche cells on a closed circuit.—2 illustrations. Storage Batteries.—Factors and data of the prominent secondary 9745 9744
 - Telephone Investigations.—By J. R. PADDOCK.—Some of the most recent investigations by this distinguished expert, with ralu-able tables of heat factors.—I illustration. The Electric Working of Metals.—The electric arc as a heating, soldering, and welding a ent.—I illustration. 9740 9745
- 9742

Erformer and the second The Transporti the bed of the ocean. 9781 9736

RESTRICTED IMMIGRATION.

It is agreed all around that unrestricted immigration is becoming too much of a good thing for this country, and that the immigration laws should be thoroughly revised, with the view of regulating the coming of foreigners to our shores. The reasons urged against unrestricted immigration are, first, the great increase of crime which is directly traceable to that element in our population proved to be alien to our institutions and unused to our atmosphere of liberty. The statistics collated by Rev. Frederick H. Wines indicate an alarming increase of crime ever since immigrants began to come from Europe in great numbers. This authority has made it pretty evident that in seven States, containing nearly 15,000,000 of the population of the United States, there has been a proportional increase of commitments to State prisons and penitentiaries, from 1820 to 1880, vastly greater than the growth in population.

In New York City, where immigrants delight to herd together, instead of going westward, the police last year made 74,035 arrests, which gives 1 arrest for every 20 persons. Making allowance for those who were arrested more than once, we can still assume that 1 out of every 25 was arrested last year; while the number of persons who had committed crimes but have escaped the clutches of the law is not known. This is a record that should move the serious attention of every patriot to a consideration of an efficient and speedy remedy.

Secondly, the increase of the death rate in the United States, and especially in New York, is said to be largely due to unrestricted immigration. Dr. Eklund, of Stockholm, makes the startling statement that the infants dying under one year of age in the United States average fifty per cent of the number born, while in Europe the death rate of infants under one year of age is twenty-five per cent of all deaths. He attributes this high death rate in America to the fact that "the European defective classes, whose natality and infantile death rates are enormous, are forcibly exported in great numbers to this country."

The Medical Record virtually indorses his statement by acknowledging that "it is very true that the numbers of our sick and defective classes are enormously swollen by the immense tide of immigration. It is safe to say that four-fifths of the infant mortality is among the children of the immigrants."

Thirdly, it is said in favor of restricted immigration that the immigrants' opportunity for getting employment is now less than it was fifteen years ago, when there was much railroad building and great industrial expansion. This is not so easily proved as the first two statements. For it is absurd to say that a man's opportunity to obtain work is less now because fewer railroads are in process of construction, when there is plenty of capital lying idle waiting for good investments, and an immense tract of country ready to receive the plow of the sober and industrious husbandman. The reason why a laboring man has not the same chance to make a living now as he did fifteen years ago is because of the disturbances in the labor market-the strikes, the boycottings, and the attacks on others' right to work, of which labor organizations have been guilty. The fault, then, lies in the character of workingmen themselves, and not in the supposed industrial decline of this growing country. But, as the lately arrived immigrant is generally the most discontented of laborers, the conclusion is easily reached that unrestricted immigration is chargeable with most of the labor troubles, which have resulted disastrously for laborer and capitalist alike, although the latter can stand it much longer than the former.

In view of these facts, there can be hardly any difference of opinion concerning the *necessity* of building a breakwater to resist the tide of immigration by legislative enactments and rigorous execution of the same. But in regard to the minor details, the modus operandi, there is likely to be much diversity of opinion. We do not wish to exclude those industrious and sober people whose intention is to seek honest work in America. On the other hand, Uncle Sam decidedly objects to having his substance eaten up, and the safety of his house threatened by organ grinders, beggars, tramps, socialists, anarchists, and other parahere.

Marble, snowon, effects of..... Nailset, improved*..... Naval maneuvers, British..... 163 165 163 160 **165** Navai maneuvers, British.... Oaks, gigantle.... Paper coloring machine, im-proved. Parcel post, the... Patent, English provisional,does not antedate American pat-ent of subsequent date... Photographs notes.... Photographs mountant for. Pilocarpine, artificial production of 163 164 165 161 168 164 166 161 166 163

If we are to believe an Austrian paper, says La Lumiere Electrique, the first lightning rod was not constructed by Franklin, but by a monk of Seuftenberg. in Bohemia, named Prohop Diwisch, wno installed an apparatus the 15th of June, 1754, in the garden of the curate of Prenditz (Moravia). The apparatus was composed of a pole surmounted by an iron rod supporting VI. twelve curved up branches, and terminating in as many metallic boxes, filled with iron ore and closed by a boxwood cover, traversed by 27 sharp iron points, which plunged at their base in the ore. All the system $\frac{1}{2}$ vir was united to the earth by a large chain. The enemies of Diwisch, jealous of his success at the court of Vienna. excited the peasants of the locality against him, and under the pretext that his lightning rod was the cause of the great drought, they made him take down the lightning rod which he had utilized for six years. What is most curious is the form of this first lightning rod, which was of multiple points like the one which M. Melseu afterward invented.

's method for determining 3747 sites of society. We must draw the line somewhere	
A valuable table of factors 9741 It is not hard to determine where we ought to draw it	
to some of the Petroleum tes and Canada.—By BOV- installment of an exhaus- se of statistics and general ROLLANDFurthernotes Tation	e ,-
h KitesCurious experi- tracting electricity, etc4 sras rsh's method of sub-irriga- rsh's method of sub-irriga- sray 4 its achievements in long sray 4 its achievements in long sray 5 sire to come to America in the quality of immigrants.	0
n on the Lower Seine.—The t executed.—6 illustrations 9738 ng account of the ships of dels in the English Royal The recent maneuvers of the British fleet did little	e
g the Axis of a PrismBy nation of prismatic spec- sing with apparatus	s e h e n
dels in the English Royal station of prismatic spec- sing with apparatus	f the British fleet did little a their faith to monster ship , even the unbelievers in thi red for the sorry spectacle t fleet afloat, for in the Irish Baird essayed to defend the ult of Fitzroy, and again in

₽▲G