CARS IN THE GROUND,

New System of Rapid Transit in London Fifty Feet Below the Surface of the Streets.

A SPEED OF FIFTEEN MILES.

Electricity Used Both for Propelling the Passenger Trains and Lighting the Interior.

CONDUCTORS WILL NOT BE NEEDED.

Difficulties Encountered in Constructing the Long Tunnels for the Tracks.

LONDON, November 6.

THE Prince of Wales has just formally opened in this city a railroad that possesses several distinctly novel features. It is an underground railroad and is called the City and South London Railway. In respect to the depth of the line below the ground, the smallness of the tunnels, the style of the carriage and the motive power it marks quite a departure, and may be a hint to Pittsburg of the possible developments in rapid transit in the future.

The method of working the line is to be simplified by the adoption of a uniform fare and a turnstile, which render unnecessary the issue of tickets and the cumbrous booking office system. The whole undertaking will be watched with keen interest by railroad men as well as the public generally, and everybody may be sure, if the experiment is successful, that the system will be extended in the English metropolis and adopted in all the great cities of both the old and new worlds. Mr. J. H. Greathead, the engineer-in-chief, may be said to be the creator of the line, as it has been by means of his inventions that its construction has been rendered possible. Meeting that gentleman the other day at Stockwell, where the line at present terminates, a representative of the *Pall Mall Budget* gathered the following information as to the undertaking:

LONG HOLE IN THE GROUND.

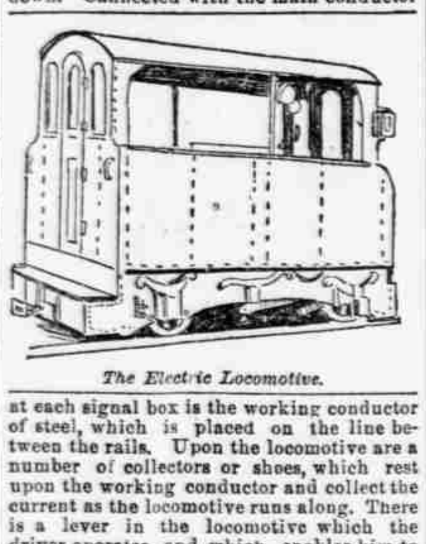
"We have been about three years engaged on the work," said Mr. Greathead, "but you will not be surprised at the length of time when I tell you that we have really had to create everything. We had nothing to guide us, for the undertaking is in every respect a novelty. The length of the line is a little over three miles. The up and down lines are in separate tunnels. We have six stations, the city terminus being at the Monument and the other, for the present, at Stockwell, while between we have stations in the Borough, at the Elephant and Castle, New street, Kennington Park, and the Oval. The platforms are 50 feet from the level of the street, but the line is deeper than that at places, especially where it runs under the Thames. We have hardly touched buildings on the way, keeping in the main under the roadways.

"In the construction of this line we have developed a new system of tunneling, which is very safe and enables work of this kind to be carried out without interfering with the traffic of the streets, and without pulling down property in the wholesale way that was done when the underground railways were constructed. At the same time the work can be carried out very rapidly. At one time Messrs. Walter Scott & Co., the contractors, were doing more than 100 feet of tunnel daily, and in one-half year did two and one-fourth miles.

WORKING IN COMPRESSED AIR.

"Near Stockwell we came on a bed of sand and gravel—we were formerly working in clay—and that caused delay, as it necessitated the manufacture of additional plant, but when we got that, and the men became accustomed to work under compressed air, the work went forward very steadily. We had to go through 200 yards of sand and gravel, which was done without pumping the water. Had we removed the water we might have done damage to the adjoining property, and to avoid any risk we decided not to do so, but to work under compressed air. It was the first time tunneling was ever carried out in that way, and to show the value of the method I may say that the St. Clair tunnel has since been constructed in the same way by the Grand Trunk Railway of Canada, and the Hudson River tunnel, which was started several years ago on another plan, is also to be executed on my method, and so will the new Glasgow subway, which will involve four tunnels under the Clyde.

"Electricity is the motive power on the line. The current will be generated at Stockwell and will be taken by a main conductor through the tunnels both up and down. Cannected with the main conductor



The Electric Locomotive.

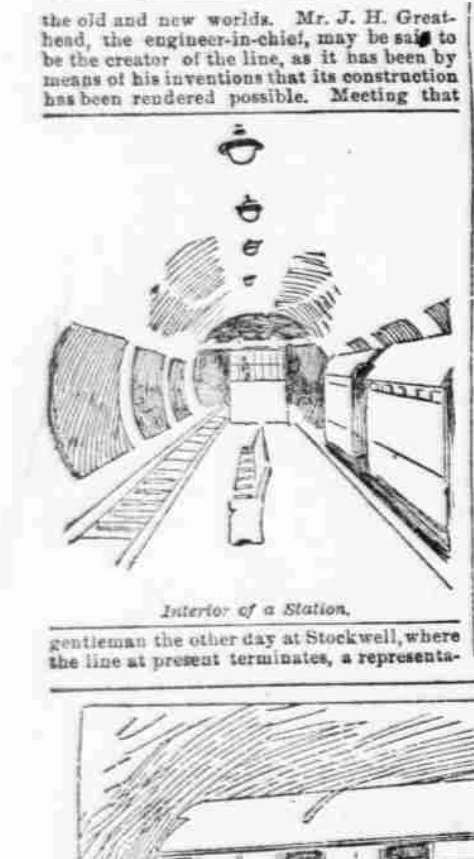
at each signal box is the working conductor of steel, which is placed on the line between the rails. Upon the locomotive are a number of collectors or shoes, which rest upon the working conductor and collect the current as the locomotive runs along. There is a lever in the locomotive which the driver operates and which enables him to send the current through the electric motors on the locomotive, or cut the current off altogether when he desires to slacken speed or stop.

A THREE-MINUTE SERVICE.

"Each train will be made up of three carriages and a locomotive, weighing altogether 30 tons. A train will be capable of seating 100 passengers. We shall begin with a five-minute service, but it is our intention to run a three-minute service, and eventually, if required, a two-minute one. For the three-minute service we shall have ten trains. Including stoppages, we expect to maintain a speed of 15 miles an hour, which is 25 per cent in excess of the speed on the Inner Circle Railway. As the approach to each station is on an incline and the departure on a decline the trains can be stopped easily and get up speed quickly. The Westinghouse brake, which has been adopted, will bring the train up in five seconds.

THE INTERIOR OF A CARRIAGE.

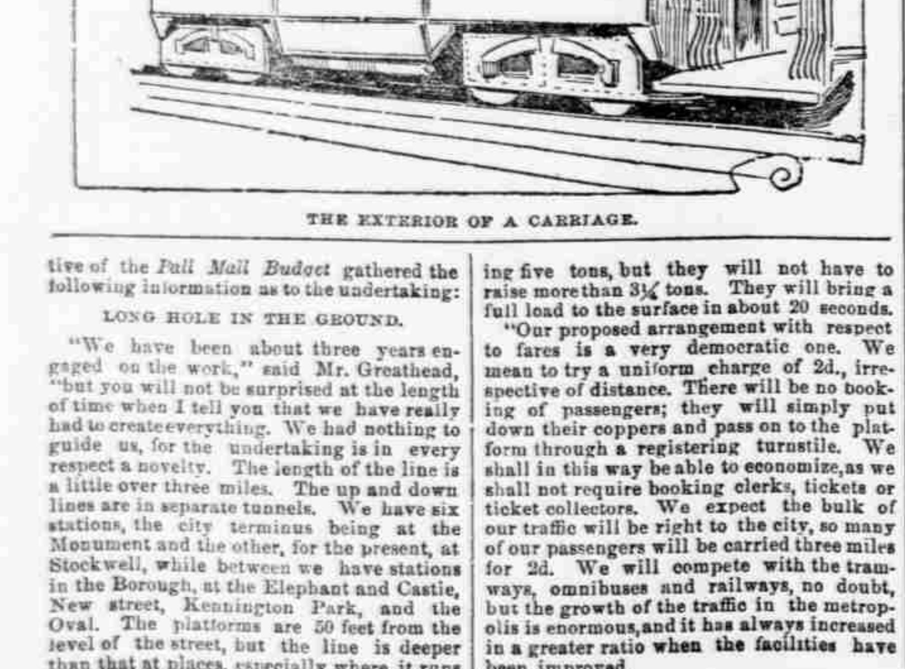
"The passengers will enter by two platforms between the carriages to which there are gates, which open and shut rapidly like a pair of lazytongs. There is a passage from end to end of the train, and only one class. The carriages are cushioned, and lighted by electricity, the current being obtained from the working conductor as the train passes along. At each station there are two lifts to raise and lower the passengers. They will each hold 50 persons, so that they can carry a full trainload. As the descending passengers leave one door of the lift those ascending will enter by another, so that no time will be lost.



Interior of a Station.

THE HYDRAULIC ELEVATORS.

"The lifts are worked by hydraulic power which is generated in the same engine-house of the electric power at Stockwell. The water passes from the accumulator through a pipe in the down tunnel extending to the city. Having done its work it returns by a pipe in the up tunnel to the pumping engines at Stockwell, and is again circulated. The pressure is about 1,200 pounds to the square inch. The lifts are capable of raising five tons, but they will not have to raise more than 3½ tons. They will bring a full load to the surface in about 20 seconds.



THE EXTERIOR OF A CARRIAGE.

"Our proposed arrangement with respect to fares is a very democratic one. We mean to try a uniform charge of 2d., irrespective of distance. There will be no booking of passengers; they will simply put down their coppers and pass on to the platform through a registering turnstile. We shall in this way be able to economize, as we shall not require booking clerks, tickets or ticket collectors. We expect the bulk of our traffic will be right to the city, so many of our passengers will be carried three miles for 2d. We will compete with the tramways, omnibuses and railways, no doubt, but the growth of the traffic in the metropolis is enormous, and it has always increased in a greater ratio when the facilities have been improved.

LOTS OF PEOPLE TO CARRY.

"In 1862, when there were no underground railways nor tramways, the London General Omnibus Company carried 40,000,000 passengers a year. Now the two underground lines, the tramways, and the London General Omnibus Company carry 420,000,000 passengers a year, or ten-fold the number. That this increase in traffic is not due to the growth of the population is shown by the fact that the addition to the population has only been 38 per cent in the same period.

"The traffic even now in London is small as compared with the traffic in New York, where they have established better facilities in the shape of tramways and overhead railways. On the average each member of the population travels annually 220 times as compared with about half that number in London. It is notorious that the main streets in London—such streets as Oxford street and the Strand—are now choked with omnibus and cab traffic. There is great need for more traveling facilities in London."

USING THE CURRENT.

Two Systems of Distributing Electricity for Practical Work.

VERY SIMILAR TO WATER POWER.

Difference Between the Parallel and Series Distributions.

LATE ELECTRICAL DEVELOPMENTS

[WRITTEN FOR THE DISPATCH.]

There are two great systems by means of which the electric current can be distributed for light and power. They are called the "parallel system" and the "series system." In the parallel system the main current is divided into as many separate currents as there are lamps or motors to be operated. The pressure in this system is kept constant, but the quantity of current varies according to the lamps or motors that are in operation. In the series system the lamps or motors are connected one after the other in the main circuit—so that the current passes successively through each piece of electric apparatus in the circuit. In this system the the current is a constant quantity while the pressure is a variable, according to the number of lamps or motors in the circuit.

To illustrate these two great systems of electric distribution and present the conditions of each case more vividly to the mind of the reader it will be well to refer to water power, and thus make comparisons with a power familiar to all—a power that appeals more readily to the eye, and, therefore, to the mind.

A SIMPLE ILLUSTRATION.

Imagine a waterfall 70 feet high and having a fall of 50 feet. If, now, we arrange seven water wheels in a row, that is, across the falls, these water wheels can be said to be "in parallel." In other words, if the water flowing over the falls is divided up into seven streams, one for each wheel, these streams will all be flowing parallel to each other, and each will have the same pressure or fall of 50 feet.

Or suppose that we have a reservoir of water giving a pressure of 50 feet, and from this reservoir we conduct the water away to seven water wheels through seven different pipes, this water power is then said to be distributed under the parallel system, even though the pipes may not be actually parallel to each other. The water wheels are then said to be worked "in parallel" and under a constant pressure. If the water is turned off from one of the seven pipes the other six will still be working as before under the constant pressure of 50 feet. In the same way if seven or any other number of wires are led off from a dynamo to as many different lamps or motors, the lamps or motors are said to be working on the parallel system. In this case, of course, each wire must start out from one pole of the dynamo, lead to the lamp and then return to the other pole of the dynamo to complete the circuit.

THE PRESSURE IS CONSTANT.

If the pressure at the dynamo is kept constant, the lamps will all burn with a constant brilliancy and one or more lamps may be turned off at will without disturbing the remaining ones. If all the lamps are turned off, the pressure still remains in the wires ready to force the current through any or all of the lamps the instant the current is turned on. However, in practice it is not necessary to run a separate wire from the dynamos to each lamp. There is another and simple way of working the lamps in parallel.

To explain the method of parallel distribution in practical use, let us once more refer to the reservoir of water power. The comparison that will now be made may require a little stretch of the imagination on the part of the reader, for, although the comparison is a good one, few people think of the distribution of water power as it will now be represented. Let us imagine a large pipe, a mile long and having its end closed, leading out from a large reservoir of water; we will thus have water pressure in the pipe but no flow, the end being closed. But if we make a suitable hole in the pipe, say a quarter of a mile away from the reservoir, water will gush out with force corresponding to the pressure in the reservoir. This gush of water can then be made to do work, say turn a water wheel, then after its work is done this water will be evaporated by the heat energy of the sun, and will next be seen high in the air in the shape of clouds.

COMPLETING THE CIRCUIT.

Now, if we imagine that this same water, which has come from the reservoirs, done work and is now in the shape and condition of a cloud, should turn into rain and fall into the same reservoir from which we have taken it, it will have made a "closed circuit," so to speak—and the water will again be in a condition to do work. We can now imagine this water going through this same cycle process over and over again, just like a belt going round and round, transmitting power from the driving to the driven pully. With the belt the engine is the motive power—with the water the sun is the motive power. The sun is evaporating water all the time, thus changing its heat energy into energy called water power. In this way water is kept circulating constantly, transmitting solar energy each time it goes around.

We may thus speak of the water as having a "closed circuit," at least it will be convenient to do so, for that expression is used with electric circuits, and the processes in each case are similar. We can now further imagine that the water, after it had gushed from the large pipe and done its work, could, instead of flowing into the ocean and from there being evaporated, as is actually the case, pass up a comparatively small pipe into the air above and then going into a large pipe with the one leading out from the reservoir. Then if this second large pipe be connected with the reservoir we shall have closed the circuit and obtained the conditions existing in the electric circuit under consideration.

A CLOSER ANALOGY.

The water will now flow from the reservoir through the main, out of the hole, turn the water wheel and then be sucked up, by the heat energy of the sun, through our imaginary smaller tube to the second main, or better say return main. From the return main it will pass once more into the reservoir and again be ready to do work. If we call the starting point of the water the north or positive pole and the returning point the south or negative pole, we can say that the water flows from north to south or from the positive pole to the negative pole.

Let us now punch three more holes in our first main, one a half mile away, another three-quarters of a mile from the reservoir and the last at the end of the main. At each hole let us place a water wheel and for each wheel a pipe as before leading the water back to the return main and so again into the reservoir. It will now be easy to understand why the waterwheels will be working in parallel without having a separate pipe from the reservoir to each wheel. If we plug up one of these holes we will stop its corresponding wheel, save the water and at the same time leave the others undisturbed. If we plug one hole, less water will be flowing through the closed circuit than if they are all left open. If all the holes are closed no water will flow—and under these circumstances, in speaking of electric circuits, the circuit is said to be "open," and when current is flowing the circuit is said to be "closed."

IN ACTUAL PRACTICE.

Now to make our comparison complete, let us imagine a good-sized copper wire running down one side of a street and another similar wire on the other side of the street. Let there be a dynamo at one end of the street, having its poles connected one to one of these mains and the other to the other main, and then at convenient places on one of the mains let there be small wires attached, leading to lamps or electric motors and from these to the other main. We shall then have the conditions described above in connection with the reservoir and system of pipes.

An engine is supposed to drive the dynamo and its energy corresponds to the energy of the sun, which did the work of evaporating the water. The dynamo corresponds to the reservoir of water. The two copper wires correspond to the two water mains. The smaller wires leading from one copper main through the lamps or motors to the other copper main correspond to the smaller pipes conducting the water from one water main to the other, and finally the lamps or motors correspond to the water wheels.

From this comparison it will be easily understood how that the electric current starts from one pole of a dynamo, flows down one main and then over to the other main through any lamps or motors that may be turned on and thus back to the dynamo, completing the electric circuit. If there are no lamps turned on, no current will flow; if there are two lamps turned on, twice as much current will flow as when there is only one lamp turned on.

THE SERIES SYSTEM.

We have now described the parallel system of electric distribution. The series is quite different. To illustrate this system with the familiar water fall and water wheels, let us imagine a very high water fall, say 1,000 feet, and under it a series of water wheels arranged so that one wheel is directly under the other. The falling water will then strike the first wheel and turn it, then strike the second wheel and turn it, and so on down, working each wheel in turn. If each wheel requires a 100-foot fall of water to turn it, then with 1,000-foot fall of water we can operate ten wheels. When the water has passed the last wheel it is evaporated by the sun into the clouds, and so passes back to the top of the falls again, thus completing the circle process, or closing the circuit as before.

It is just so with the series system of electric distribution. Instead of dividing the current as in the parallel system, the current is sent out from one pole of a dynamo into one main, through each lamp in succession, and then back to the other pole of the dynamo through the other main. If each lamp requires 50 volts of pressure to send the needed current through it, and if there are 20 lamps in series, that is, one after the other, it will require 1,000 volts of pressure at the dynamo to force the current through all the lamps. However, in this system, if one lamp is turned out all the lamps in that series will go out, for the circuit will be open or broken unless special means are provided, so that the current can skip, that is, pass around this one lamp and so continue its course. For this reason the series system is better adapted for such lamps as are intended to burn for a given length of time—as for example are lamps which are supposed to burn all night. The parallel system is better adapted for house lighting, for then one or more lamps can be turned off and on at pleasure without in any way interrupting the remaining ones.

SCIRE FACIAS.

THE ELECTRIC WORLD.

New Applications of the Current for Practical Purposes.

[PREPARED FOR THE DISPATCH.]

In an article in *Specialties* the matter of domestic electric lighting is reduced to very practical shape. Details and estimates for the requirments of a 12-roomed villa are given, and the cost of the installation is put at about $2,100. The article then describes the manner in which the master of the house can be his own engineer, starting the engine, charging the accumulators, and doing all the necessary work to put the plant in condition for the night's work. Accumulators do not deteriorate rapidly, but will work well for many years upon such an installation as that described. Although somewhat costly in the first instance, they possess many advantages, not the least of which is that the light is always available, in the sick room, or for an evening party, independently of the gas engine, which may always be stopped on Sunday at least. The possibilities that attend on such an installation are shown in colors that are very tempting to a man that desires to become his own electrician.

He may here mount his hobby to his heart's content, and may indulge in other applications of the electric current. For instance, he may drive the sewing machine, organ, bellows or a punkah, by means of small electric motors; he may divert himself by scientific demonstrations to his friends of the uses of electricity for welding metals, photography at night, chemical decomposition, and hundreds of similar interesting and instructive experiments. He may take the entire management of the installation, and perform all the duties entailed without soiling his hands, neglecting business or curtailing his leisure.

* * *

The New York *Electrical Review*, in commenting on the suggestion recently advanced by Lieutenant Fiske, and now under consideration, that an electrical corps be established in the army and navy to take charge of electrical appliances in time of war, refers to the fact that a few months ago it advanced some ideas on the same subject. It suggested that electrical men might, profitably to themselves, enroll themselves as members of the New York naval militia, and thus in a certain degree return the obligation the electrical profession owes the navy, from the ranks of which many of its most distinguished workers have been recruited.

The *Electrical Review* is inclined to think that some of the officers and men now in the service could be advantageously detailed to such work. In case of emergency a fair supply of competent engineers could be made available, but if civilians were pressed hurriedly into action their lack of military training might prove a serious embarrassment, so that a much higher standard of efficiency would by attained by having such a corps equipped with men skilled in the tactics of warfare.

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In electric street car lines the dynamo which generates the current does so by the revolution of a coil of wire near the poles of a magnet, the force which revolves the coil being derived from the engine. The current then passes over the wires, down the trolley which surmounts each car, to a small motor. This motor has an armature consisting of coils of wire traversed by an electrical current, which is attracted in succession to the poles of the stationary coils called the field magnets, through which the current also flows, flies around and transmits it motion, by means of cog wheels, to the axle of the car. The driver of the car, by the use of a lever, turns the current into the motor beneath the car or directs it to the rails at will. In the conduit system the current passes along the wire, with which connection is made, into the motor on the car, and then out through the wheels to the rails, and then back to the central dynamo.

* * *

A somewhat unique musical instrument has just been introduced for advertising purposes, consisting of a set of chimes, which are worked by electricity. They are carried through the streets on an electric tricycle, and have a keyboard attached like that of an ordinary piano, so that elaborate compositions can be played by anyone sufficiently familiar with the piano or organ keyboard. The system of operation is quite simple; attached to each of the 30 bells which constitute the set, and which are hung on a rack above the keyboard, is an electromagnet. When the keys are struck they make a circuit from a battery in the base to the electro-magnets at the bells, which are thus sounded.

* * *

The capabilities of electricity as a remedial agent have just received a new illustration. A man with an aggravated case of bone felon on the thumb consulted a physician, and was told that several months would elapse before he could use his hand. In his dilemma, he sought the advice of a physician who had done some excellent work by means of electricity. The physician operated on the diseased member with an electric battery, and the pain, which had up to that time been intense, ceased. In four days the patient was at work again. The operation was a pronounced success, and a perfect cure was soon effected.

CREAM IN THE MILK.

Dairymen Must Use Dippers to Treat Customers All Alike.

ELECTRICITY ON THE L ROADS.

A Machine for Turning the Leaves of Books for Public Uses.

PROGRESS IN THE STUDY OF ROCKS

[PREPARED FOR THE DISPATCH.]

In a now antiquated number of London *Punch* there is a drawing which satirizes the villainous decoction which used to be served to the London dairymen's customers as milk, and in which the "cream" was manufactured, and defied the ordinary laws of the blending of liquids in a most unmistakable way. A servant girl receiving the morning can from the hands of the milkman, takes off the lid, and seeing the suspiciously blue tint of the contents, says: "But where is the cream?"

"Cream," replies the unblushing milkman, "why, the cream's at the bottom, of course."

Recent investigations have shown that the "cream may be at the bottom" much more frequently than we are in the habit of imagining. A leading dairy paper recently expressed the opinion, editorially, that peddling milk in a large city, either by dipping the amount for each customer from the top of a carrying can, or drawing it from the bottom through a faucet, should both be prohibited by law—with pains and penalties just as stringent as those that now legally apply to a deliverer of milk to a factory that has in it less than 3 per cent fat. The reason given for this opinion was that cream mounts to the surface of a body of milk with far more alacrity than many suppose, and is dipped off to the first few customers served; they get more than their share of cream, and the last served get skimmed milk, no matter how goodly may be the intentions, or how vigorous the efforts of the distributor. The article in question continued: "When we were in the milk testing business, we tried it for one milk deliverer, and found there was just about half as much fat in the last drawn quart as in the first dipped off."

This matter was deemed of such importance as to be taken up by the agricultural experiment station of Cornell University. To determine just how much variation there is in the fat of milk served to the different patrons of a route by dipping, a member of the station staff accompanied a milkman on his rounds, and as the milk was about to be served to various patrons took samples for analysis. The milk was the mixed milk of a herd of native and grade cows. The dipper, such as is ordinarily used by milkmen, was provided with a long handle, so that it rested on the bottom of the can when not in use. The milk was not stirred except by the motion of the wagon and the raising of the dipper. Twelve samples were taken, and it was found that the samples in three of the cans were practically identical in quality, and that while there was much variation in the samples taken from a fourth can, much the richest one of all was taken from the bottom of the can. A second trial served simply to confirm the results of the first, and the satisfactory conclusion arrived at was that where milk is peddled by dipping from the can with an ordinary dipper and where no stirring is done except by the motion of the wagon and the raising of the dipper, substantial justice is done all the patrons so far as the amount of fat apportioned to each is concerned.

Photography Applied to Surveying.

Surveyors are becoming more and more indebted to photography for the way in which it facilitates and improves their work. For reconnoissance the camera offers some pleasant features. The public is always anxious to know what an engineer is doing with a transit, but if he has a map of the country and an aneroid in his pocket, so that, by fences or otherwise, he can tell pretty nearly where he is, he is only an amateur artist, making views of scenery, and the farmer is not suspicious that he wants to run a railroad through his corn crib. Such pictures as may thus be secured, understandingly used, may help to decide where a line will probably be best, so far as the general features of the country are concerned. Progress is the order of the day. It is not long since the engineer who used a camera to take occasional or semi-occasional records of the progress of his work was looked upon as putting on airs. Now, however, the blue print and the camera come in very handily, so much so that it is not the engineer who uses them, but rather the one who does not who is the exception. The engineer is not likely to dispense just now with his transit, but he who avails himself of such help as photography can give him, especially in such work as making close topographical surveys, will have a very great advantage over him who does not.

A New Profession for Women.

In spectroscopic astronomy, the eye has been superseded of late to a great extent by the photographic plate, which is now able to recognize fainter impressions than the eye, and to register them permanently. The instrument employed is a photographic telescope, with a prism, or a series of prisms, in front of the object glass, the whole mounted like any large telescope and provided with an accurate driving clock. It has thus become possible to complete in a comparatively short time, a general survey of the spectra of all the brighter stars of the northern hemisphere, and the survey is now being extended to the southern hemisphere, where it is already well advanced. Whenever the spectrum of a star, thus photographed on a small scale, is found to possess any interesting peculiarity, it is examined with a more powerful instrument, which photographs its spectrum on a much larger scale; and this second photograph is then enlarged again for special study. It is a notable fact that the examination of the Harvard photographs has been made almost entirely by women, who are assistants in the observatory.

Turning Over Book Leaves.

A novel machine is about to be introduced for automatically turning over the leaves of books, which is especially adaptable for libraries, hotels, railway stations, shop windows, etc. It is claimed that the machine will work for a week or longer period, according to adjustment, without attention, and will turn over any size or weight of leaves, within reasonable limits, allowing sufficient interval for perusal between each operation. When a leaf has been turned over in either direction the machine automatically reverses, and so arranges itself as to be ready to raise the following leaf, thus giving a continuous motion. If the appliance fulfills all that is claimed for it by the inventor, it is likely to be extensively used in public museums, libraries, etc.

Improvements in Diving Apparatus.

Some practical improvements in diving apparatus have been effected by a French engineer. Instead of the heavy electric hand lamp hitherto used by divers, he affixes a light but powerful glow lamp on the top of the helmet, so that the diver's hands are both at all times free for work. The lamp is connected by a conductor with a battery either on shore or in a vessel above, as the case may be. The next point is a new method of connecting the helmet with the dress without any loose parts, and this is effected by means of only one watertight joint instead of two, as in the ordinary dress. In the new method the upper part or collar of the india rubber dress is gripped in between the lower rim of the helmet and the upper rim of the breastplate and there held fast by gripping pieces attached to the breastplate.

The Rapid Transit Problem.

For a long while past the electricians of New York City have been casting envious eyes at the elevated railroad system, because they believed that if they were allowed full swing, they could there make most brilliant demonstration of their abilities to add to the comfort and convenience of the population. Two matters tend to excite them at the present time—one is the fact that Chicago and Boston are both going in for the elevated railroads, with the intention of operating them electrically. In Chicago, the road, which runs through the alleys, is already built, and it is believed that at least a portion of it will be in operation electrically early next year. In Boston the huge West End Railway Company, which owns the whole street railroad system, and is now operating several hundred cars successfully on the overhead wire system, is planning an excellent elevated system, which, it is intended, will cast the New York elevated as much into the shade as the latter does figuratively and actually the street cars that run under it.

Electric traction is a success beyond a doubt, economically and in other ways, and New York electricians cannot see why it is not applied in the Empire City, where the conditions are so eminently favorable, there being several roads upon anyone of which the first work can be done, so as to make the change gradual in its introduction and effect. On the elevated system, they argue, cars of much higher potential power than are used on the 300 street railways of the country, could be used with the utmost propriety and safety, involving, if not a great economy over steam, at least an abolition of all the nuisances of smoke, steam, gases, oil drippings, soot and cinders that have become familiar in connection with the present locomotives.

The other matter that has agitated the numerous body of New York electricians is the rumor that the elevated road proposes in the near future to try some system of electric car lighting. While the elevated company has been slow to admit that it proposes to do anything in this direction, it has certainly been making inquiries on the subject, and is even understood to have estimates in its possession. This question of car traction and car lighting is not less important to other large cities than it is to New York. Almost every one of the 2,500 electric cars now running in this country have put in incandescent lights, and the results have been most agreeable to the passengers. Even where the cars are not driven electrically they might well be lighted electrically, either on the streets or on the steam railroads, for the appliances, in a practical shape, are all at hand, and even if no economy were directly effected, that is hardly a point to worry the public, out of whose pockets come the dividends, and who are the more inclined to ride when they find their comfort considered.

Modern Petrography.

The importance of the study of microscopical petrography as an integral part of modern geology is now widely recognized. Its progress has for a long time been impeded by the ultra-conservative element to be found in every rank or profession, whether scientific or otherwise, the element which is opposed to innovation per se, and will fight to the last ditch rather than become reconciled to a new order of things on exactly the same principle that the aged Wellington scornfully refused his consent to the introduction of percussion muskets in the English army, remarking that his soldiers had beaten the French with the old flint locks before, and could do it again. Another of the reasons why microscopical petrography is making little or no headway in this country is the want of teachers who are able to make this science attractive to their pupils, and to inspire them with that degree of enthusiasm for it which is requisite for a permanent attachment. In Germany there is now no university so small or so poor but it has its regular instructor of lithology, who invariably succeeds in gathering around him a number of eager disciples. A good teacher of petrography is hard to find, for no other department of modern science embraces so wide a range of difficult studies. Optics in its most difficult aspects, crystallography, mineralogy, chemistry, geology and microscopy, are all brought into requisition, and these avail the lecturer but little if he has no teaching talent.

What is needed perhaps more than anything is a truly elementary text book or primer, a book which can be understood without difficulty by every well educated person, and which does not presuppose more scientific knowledge than the average high school graduate is likely to possess. It should be free from technicalities and all tedious detail; indeed, its chief aim should be the popularization of petrography by endeavoring to render its study as attractive as possible. Such a work could be written in simple language without any sacrifice of scientific accuracy or precision, and although it might be too much lacking in thoroughness and completeness to answer as a text book for the advanced student, yet it would be of incalculable value to beginners, by affording them an easy introduction to petrography, and smoothing the way for more serious study later on.

Instruction in Railroad Management.

C. Frank Allen attests the importance of the relation of railroads to the State, which is becoming more evident almost day by day, as a reason why a regular course of instruction in railroad management should be looked upon as a useful part of a liberal training in colleges where instruction in technical engineering finds no place. Railroad administration furnishes abundant opportunities for a well-educated young man to exercise all the ability which nature and training have placed at his disposal, and a technical training is without doubt the best foundation upon which to build, in anticipation of entering the service of any of our successful railroads. In the proposed course this requirement would be fully provided for.

Oil Upon Troubled Waters.

A suggestion has been made that oil might with advantage be used at the most exposed light-houses to reduce the force of the waves. It is thought that this end might be attained by placing, say, a couple of small steel buoys in the most exposed direction at a distance from the lighthouse o some 150 feet. There should be a pulley on the buoy and a slight rope, so that the bag or appliance for distributing the oil could always be hauled in when required. The method is most simple, and can be tested without great expense.

A New Disinfectant.

Among the latest means devised for combating the ubiquitous microbe is a new disinfectant, called "lysol," which appears to be very much like carbolic acid (whose reputation is seriously on the wane) emulsified, and thereby made more active. The emulsifying agent is an ordinary fat or resin soap, but the peculiarity of manufacture lies in the fact that the tar acid is incorporated with the soap at the moment of saponification.

ANOTHER DINING ROOM STRIKE.

Chicago Waiters Say Their Employers are Undermining the Union.

CHICAGO, November 14.—Forty white waiters, the entire night and day force, struck at noon to-day in the Boston Oyster House. The colored waiters at Milan's restaraunt are also out, having quit in a body some days ago.

The waiters claim an organized attempt is being made to break up their unions in this city by the systematic introduction of non-union men.

This is a Progressive Age.

Bangor Commercial.]

One of the pensioners of the War of 1812, in Maine, was not born until nearly a year after her late husband had served in that war.

SONG OF THE CANARY.

Facts and Stories About a Pretty Member of the Home Circle.

THE BIRDS OF ST. ANDREASBERG.

How to Teach the Little Singers to Repeat Catches of Opera.

THEIR FOOD AND THEIR MEDICINE

The canary is one of the most common of household pets, yet few people know just how to take care of them. As a general rule, when a canary is suffering from a cold, or what is more common among these delicate birds, overheated blood, most housewives try what may be termed the faith cure, and leave the bird to get well of its own accord. Dealers say that a canary is just like a human being as regards sickness, and that for most of its ills some remedy is necessary if the bird's life is to be saved.

The canary is a delicately bred bird, and never becomes hardy. The rate of mortality among them is very high, for so many are left when sick to get along as best they can, that it takes an annual importation of 200,000 to supply the demand in the United States.

The best canaries imported in America, says the New York *Herald*, are the kind known in the trade at No. 1 German. This variety is the pick of the German product. They bring as high as $80 a dozen wholesale, and are retailed at from $10 to $12 each, though some of them may be had for less. The great breeding place of the German canary is the city of Andreasburg. This place is situated in the highest portion of the Hartz Mountains, and its population is 10,000.

A TOWN FULL OF BIRDS.

It is said that every person in the town is a canary breeder, and that no other business is practiced there. Every street is lined with little shops filled with birds of all ages, and the noise of their singing is at times deafening. It is estimated that 150,000 birds are shipped to New York alone from this mountain city. Very few come to other ports in this country, for the trade centers there, and Pittsburg and other inland dealers get their supplies from New York houses.

The canary that is sent to America in the greatest quantities is the kind that is known, in contradistinction to the No. 1 mentioned above, as the "German." Of the first named quality the product is very small comparatively. They are picked out for their extraordinary singing powers, and cannot be bred regularly as a separate class. The second grade bird is the kind ordinarily seen in American households, and its singing qualities are all that an average family desires. Its song is at times as vociferous and satisfactory as that of the $10 bird, though this common songster can be bought for $2 25.

PITTSBURG GETS CHEATED.

The dealer buys them for $18 a dozen, and if he is a New Yorker he is in the constant habit of playing what he considers a huge joke on the inland buyer. The local dealers go to the wholesale house and by waiting around for an hour or two, are able to pick out all the best singers of a consignment, and the man who has to send from a distance for his stock takes the leavings. A New York bird man says that in the West the people do not know what a singer is. This, of course, is an exaggeration, but it is a fact that the New York public have the best chance to get the good vocalists. So common have become the complaints among outside dealers of the poor birds sent them, that some of the retailers have drummed up a trade to whom they send their fine birds at an advance of $3 on a dozen.

The German canary is usually gray and yellow. There is a bright yellow canary on the market which is bred in Norwich, England. These birds are fancied by many on account of their brilliant plumage. They are not nearly so fine singers as the Germans as a general thing, but they bring about the same price.

A BALDHEADED SONGSTER.

One of the curious things about canaries is the effect certain kinds of ailments have on them. There is a strange looking bird in a Brooklyn household at the present time. Either from a cold contracted in a draughty place or from overheating of the blood this little German canary has become baldheaded. About a month or more ago two red lumps began to grow just above the bill. No special attention was paid to them at first, but when the feathers began to come off the head, back of the lumps, it began to dawn on the family that something was wrong. In three week's time the bird was bald all the way down to his shoulders, with the exception of a tuft in the center of the head and a few tufts on the sides which suggested feathered side whiskers.

A bird dealer attributed this phenomenon to a cold and suggested that the bird be taken from the cage and held firmly to prevent his struggling, while a generous coating of vasaline was rubbed on his head. The next operation should be an application of warm water the next morning and a repetition of the vaseline treatment. The funny looking bird soon became accustomed to his daily greasing, but it made his head itch, and he spent hours every week rubbing his smooth and tender head against his perch to allay the irritation. His affliction has made him quite a lion in the neighborhood, and a member of the family has named him Bill Nye. The feathers are coming in again.

MEDICINE FOR THE BEAUTIES.

One of the most frequent complaints among canaries is asthma. This disease is easily cured if taken hold of at once. The bird dealers sell a powder that is mixed in the water the birds are given to drink, and there is also a bird tonic which is good for all the ills that bird flesh is heir to. When a bird has the asthma the symptoms are a heaviness of breathing at night. Canaries with this complaint have been known to breathe like human beings.

The American bred canary is more subject to illness than the pure German. The breeding of canaries here is not a success. A great many people have native bred birds and do not know it. They can be identified every time by an expert by their song, so some of the dealers claim. The breeding of birds here is not a success, according to these anthorities, because the seed used is not of fine enough quality and the bird in its earlier days does not get the proper nourishment to insure future strength. They are therefore weaklings, so to speak, and a sort of brought-up-on-the-bottle product. In Germany the very finest seed is used by breeders, and although this seed is brought here it is expensive and most of the native breeders and, in fact, most bird owners buy a cheaper variety to save expense.

PROPER BIRD FOODS.

Among bird food the summer rape seed, found in Germany, is the best kind for the use of breeders or bird owners. German breeders always use this kind of rape seed and the best product of canary seed. The cheaper substitute for the first named is winter rape and karl, found in our West and in Mexico. The best grades of canary seed come from Spain and Sicily. Lettuce acts as a tonic for a bird and prevents it getting its blood too hot. The bird ought to have it whenever it is possible to get it for him. Apples are very good for birds, too; and red pepper, if given occasionally, is good for brightening their plumage.

There is no limit, scarcely, to a canary's capacity for learning new songs if a proper method of teaching is employed. A man who has tried it claims that a canary can be taught an opera, or at least part of one. It is necessary that a peculiar note or whistle of the bird shall be duplicated. If a man can imitate this he can, with care and time, teach a canary to sing a bar of music. There are whistles made which almost exactly reproduce the canary's note, and combinations of notes blown on them will in time be memorized by the bird. He may not be able to repeat them on demand, but it is very certain that he retains the song, for he will pipe it at intervals, and if not sick at any time long enough to forget his new call he will always include it in his repertoire.

ACCURATE IN THEIR MUSIC.

A New York dealer who took a fancy to a certain bird in his stock succeeded after a time in teaching it several pretty strains from operas. He brings out his bird when customers enlarge on the singing qualities of canaries, and, as he has taught it several airs, or fragments of them, it is pretty safe to sing at least one of them for the visitor. One air that he sang recently was slightly blemished by a flat note. When the visitor commented on this the dealer claimed that the note was correct, and whistled the strain himself to prove it. It was then seen that the fault was due to the teacher's imperfect knowledge of the music, and the bird had simply reproduced it as he had always heard it.

Instances of extreme affection for their owner on the part of canaries are not wanting. All of these birds soon grow to know the person who feeds them, and they generally distrust members of the family who are not home or about the room a great deal.

An instance of the affection of a canary for its mistress is related by a gentleman who owned several of them. There was one German bird in particular who seemed to be very fond of the lady of the house. As there were no four-legged animals about the premises, the bird was allowed to fly about the upstairs rooms and it would frequently follow the lady about and perch on the headboard of each bed as it was made up for the day. It would also perch on the sewing machine when its mistress was at work and it seemed to enjoy the vibration exceedingly.

THEY LIKE THE LADIES.

The training that a canary is capable of is shown in his performance in connection with the street fakir who asks him to pick out cards from a little rack and hand them to his master. Some of these street birds are very cute, and have little tricks of tossing the head that suggests great intelligence when taken in consideration with their other performance. They have also been successfully used on the stage, doing many curious things at the command of their exhibitor, who is usually a woman. They seem to have a great deal of affection for the fair sex under all circumstances, and if they have a favored member in a household it will generally be found that it is a woman with a pleasant voice.

All kinds of music appeals to them, and the notes of a woman's voice are probably a form of music that they find very agreeable. When a man talks to them he finds but little response, unless his voice is modulated very low. Whistling softly wins the canary over in time, and they will chirp until the man speaks in his natural tone, when the bird song naturally ceases or breaks out in a louder key, as if to drown the harsh tones they seem to dislike.

TILLMAN IS SNUBBED.

The South Carolina Four Hundred Say He Wears Unboiled Shirts.

[SPECIAL TELEGRAM TO THE DISPATCH.]

CHARLESTON, S. C., November 15.—Although elected Governor of the Palmetto State by an overwhelming majority, B. R. Tillman is still out in the cold with the "Four Hundred" of South Carolina. The State's Four Hundred is known as the South Carolina Club, which gave its annual ball last night. At the meeting of the club before the ball, some of the members made an effort to get the Governor-elect invited. The proposition was met by the adoption of a resolution excluding Tillman.

Tillman is not popular with the Four Hundred set. They say he wears unboiled shirts and dispenses with collars. His friends are now talking of getting up a grand inauguration ball in his honor in December next, and it is certain that the coming Legislature, which is overwhelming Tillman, will pass a law forbidding the use of the State House by the South Carolina Club for balls in the future.

The Matter Mended.

Boston Courier.]

Miss Waltzer—Oh, dear! oh, dear! you stepped on my foot.

Mr. Clodhopper—I acknowledge the corn.