THE TROLLEY SYSTEM.

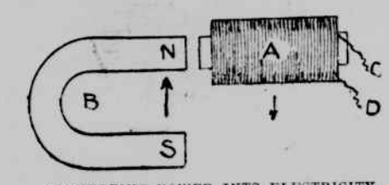
OPERATION OF ELECTRIC RAILWAYS.

A WONDERFUL CHAPTER IN THE HISTORY OF TRACTION—DYNAMOS AND MOTORS EXPLAINED—OVERHEAD WIRES AND CONDUITS—COMPARATIVE COST—POSSIBILITIES OF FUTURE SPEED.

Harnessing the lightning is one of man's boldest, as well as most recent, achievements. The swiftness, potency and invisibility of this wondrous agent make all its work seem like magic. Novel and useful, however, as was its earlier service in the telegraph and telephone, the tasks now imposed upon it in lighting, driving mills and in traction are more enormous. The torch-bearer, the coach-horse, the water-fall and steam engine, whose functions men have made it assume, perform more and heavier drudgery than the fleet-winged carrier pigeon.

Although electricity was used for propelling railway cars by Werner von Siemens as early as 1867, and exhibition and experimental roads operated by this form of force were known in 1880, the first one in America run as a commercial enterprise was opened hardly ten years ago. To-day nearly 1,000 such lines are in service in the United States, all of them short, yet having a total length exceeding 6,000 miles. In fact, the chief development has been confined to the last four or five years; and in the immediate future a vast number of new roads, operated in the same manner, are to be started in various parts of the country.

In all systems of electric railway there is a structure, nearly midway from the ends of a line, in which several steam engines are employed to convert



CONVERTING POWER INTO ELECTRICITY.

motive power into electricity. This is done by driving dynamos. Every car on the route is equipped with a motor which changes this electricity back into motive power. To refresh the reader's memory regarding the workings of these machines a simple diagram is here introduced. In this A represents a bar of soft iron which has been wound with insulated copper wire (C D). Now, if this be quickly moved past the north pole (N) of a strong stationary magnet (B), very close to the latter, the soft iron becomes momentarily magnetized itself, and a current of electricity is excited by induction in the coil surrounding it. If, immediately afterward, A be similarly passed in front of the pole S, the phenomenon will be repeated, but with this difference: the end of the core nearest to the permanent magnet was made a south pole before, but is now converted into a north pole. And not only has the polarity of the temporary magnet been reversed, but the direction of the induced current in the coil C D has been changed also. By grouping a large number of such soft iron cores and coils upon a cylindrical frame, so that the rotation of the latter brings them directly in front of and near to a collection of fixed magnets, the same thing takes place. All the temporarily excited currents can be merged into one of great intensity, but intermittent; and not only intermittent, but alternating in direction. That is what a dynamo does. A motor, constructed on much the same principle, reverses this operation. Referring again to the diagram, suppose A to be fixed and B movable. If an alternating current be sent through C D, the end of the core nearest to B would rapidly change its polarity. At first, let us say, it would attract N; and if the latter were not directly in front of A, it would be drawn thither by magnetic force. Having thus acquired motion, however, it would tend to swing beyond the point of closest proximity; and, as a repelling influence, would promptly succeed the attractive, it would now be driven further away, but in the same direction. The change of polarity which did this would attract S; but scarcely would S yield to this persuasion before a fresh alternation of the current would send it along after N. The framework on which B is fastened having been rotated a little on its axis by this proceeding, another magnet would be brought into the place of its predecessor, only to be served in like manner. Sufficient repetition of this process would cause a complete revolution of the movable apparatus; and the power thus developed could be transferred from its axis to other machinery. In practice, both dynamo and motor differ in several details from the device here described; but the principle is the same. A motor, it may be remarked, aids from 1,200 to 2,200 pounds to the weight of a car.

It now becomes necessary to convey the electricity from dynamo to motor. For this purpose it is customary (except where "storage batteries" are used), to have two metallic conductors; one to take the current out, and the other to bring it back. And then some method has to be devised for so connecting each car with these two conductors as to put the motor "in circuit"; that is, to lead a portion of the current into and out of that mechanism.

The device employed on all the electric railways of the country, with few exceptions, is known as "the overhead wire and trolley." Over the centre of the track, from one end of the line to the other, and about seventeen feet from the ground, is strung a bare copper wire. This is either sustained by projecting arms from poles beside the track, as in the illustration given herewith, or else by a wire stretched from a pole near one curbstone over the street to

THE OVERHEAD WIRE AND TROLLEY.

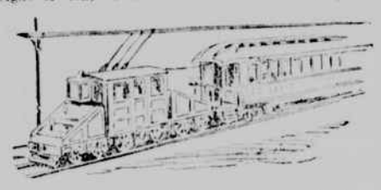
another. The former is called the "centre-pole" system; the latter, the "cross-suspension." The bare copper wire is either connected directly with the generators, or else has the current supplied to it at intervals of two or three miles (perhaps less, where travel is heavy) from "feeders," which are heavy, insulated conductors carried along the route on the poles, parallel with the central, or "trolley" wire. Extending upward and backward from the centre of each car is a slender pole, at whose upper end is a grooved metallic wheel. This is the "trolley," which gives its name to the whole system of propulsion. The trolley is kept pressed upward against the overhead wire by a strong spring at the base of the pole. From that little grooved wheel, downward into and through the car another wire leads to the motor, thus providing a route for the current, which, when it has done its work, is led to the car wheels, and flows from them into the rails. Between these, covered by a few inches of earth, is a "return wire," also bare copper, with which each of the rails is connected by short sections of lighter wire. Thus the circuit is complete. Mr. Lieb, in the railway department of the General Electric Company, says that it would be more correct to speak of this wire as an "auxiliary"; since the return current is mostly borne by the rails, which, being much larger, are much better conductors, and which are connected with each other with bits of copper wire called "bond wires." It is to these loops, by the way, that the branches of the "auxiliary" extend. Where this return current has not been properly provided for, damage to water and gas-pipes, telephone wires and other property sometimes occurs.

The controlling apparatus on the car has various forms, according to the manufacturers' systems, but the essential features are the same. An upright shaft, with a crank at its head, rises from the front platform. In appearance it closely resembles the brake lever beside it. By rotating the first of these devices, the motorman, standing in the place of the driver, whom he has supplanted, can regulate the current entering the motor as easily as a locomotive engineer does the steam with his throttle valve. And not only is the speed of the car under perfect control, but it is also possible instantly to "reverse" if desired, without a change of position by the motor man. It is surprising how quickly a car can thus be stopped and backed. If, however, the controlling apparatus fails to work, the current can be cut off by the conductor on the rear platform, who has a cord reaching up to the trolley wheel, and can thus break the contact. But the chief use of this cord is to swing the trolley pole around upon its pivoted base, so as to incline in the opposite direction when the car is about to begin its return trip. It is also of service when switching off from a main line to a branch. The slight readjustment of the trolley to the overhead wire thus made necessary is easily effected by the cord. Both ends of the car have the same equipment; and the motorman and the conductor exchange places at the terminus.

Every car along the whole line, in this manner, taps the main current, takes what power it requires, according to the varying grades, loads, curves and speed; and the power-house responds to each demand, big or little, like a big bank account to checks of all sizes. Thus, between the two main wires, overhead and underneath, there are a number of connections, each transferring a portion, but not all, of the current from one to the other. This same "multiple circuit" is seen in the arrangement of incandescent electric lights. At the power-house there are instruments which register exactly the total demand upon the line at any moment; and the engineer in charge can therefore adapt the number of dynamos at work, and the speed of his engines, to the requirements of the hour, which, as every one knows, vary greatly through the day.

Siemens, in his experimental road, near Berlin in 1867, used one of his rails for his feeding conductor, and the other for a return conductor. Later (in 1879) he employed a third, central rail to supply the current. Edison's half-mile road at Menlo Park, N. J., in 1880, worked on a somewhat similar plan. Leo Daft, in his street railway in Baltimore in 1885, employed two overhead wires, one to conduct the current each way; and there were two trolley wheels jutting up against them, one leading the current down to the motor, and the other returning it.

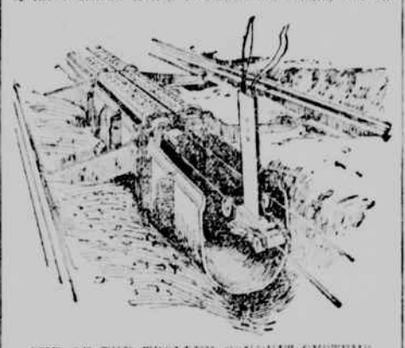
The electric railway motor is odorless, and leaves the streets clean; one advantage over horses. It scatters no cinders, throws off no blinding smoke or steam, does not go puffing and hissing so as to frighten passing teams, and has no safety valve to pop open and deafen human bystanders. It takes an extra load without hesitation, draws a "trailer" or second car perhaps, and even then climbs grades too steep for horses and possibly for the cable. Curves do not bother it as they do cable roads. It is said that electricity is being substituted for the cable on one of the lines in San Francisco. And when it comes to speed, the horse is nowhere. Inside a city, legal restrictions keep the speed down to eight or ten, or ten or twelve miles, usually; but



AN ELECTRIC MOTOR FOR HEAVY TRAINS.

outside—and hundreds of electric roads extend beyond municipal limits—twenty and twenty-five miles an hour are not uncommon. The schedule time of the Newport News and Hampton Roads line is thirty; and thirty-seven is reached on the road from Alexandria, Va., to Mount Vernon. For that matter, far more startling figures than these are promised in the near future. On short experimental roads a velocity of 120 miles an hour has been made. Sanguine electricians expects to see the trolley beat steam in this respect ere long. Ordinarily, the electric railway is operated advantageously only a few miles from the power-house, five or six, perhaps ten. One expert makes sixteen the limit of commercial efficiency. And yet it is maintained that a train could be run nearly 150 miles with only four power-houses en route! When the great trunk lines are operated by electricity, if they ever are, possibly an engine like that here portrayed will draw the vestibuled "limited" express. The motor will be so large and heavy as to require trucks and a cab of its own, instead of being attached to the cars.

But with all its virtues, the trolley system has its drawbacks. Most of the accidents which result from it, to be sure, grow out of the speed of the car or the carelessness of the motor-man; and against these the civil law, the interest of the railway corporations and public education will in time effectually provide, as they have on the steam lines. But the overhead wire and its supports disfigure the streets; they offer an obstacle to the fire department; and enhanced perils to property and to comfort, if not to life, result from the electric current. The voltage (only about 500) is not so high as on electric-light wires, and it is declared that the death of no human being has yet been traced to a trolley current. Nevertheless, a strong popular prejudice prevails against the overhead wire; and so enlightened a body as the New-York Board of Underwriters formally protested to Mayor Grant last August against the introduction of the overhead trolley to Manhattan Island, and expressed the belief that if that system came into use here there would be a general rise in rates of fire insurance in the metropolis. Much human ingenuity has therefore been devoted to obviating both the real and imaginary evils incident thereto.



ONE OF THE TROLLEY CONDUIT SYSTEMS.

A simple way of doing so is to place one or both conductors in an underground conduit, and to adapt the trolley wheel to this change of situation. In the Love system, now in use on that portion of the Rock Creek Railway inside the city limits of Washington (over a mile long), the feeder and return wire run side by side, as shown in the accompanying cut. A cement conduit is constructed, about sixteen inches deep and twelve broad, with split rails on top. Above ground the arrangement looks like a cable road. From the under side of the car there projects downward a hanger, about seven inches across (fore and aft) and over half an inch thick, sustaining at the lower extremity two trolley wheels, each having a wire connection with the motor above. The motor is exactly the same as would be used with the overhead wire. Indeed, the latter is employed on this same line, outside the city limits; and when a car reaches the right point the underground trolley is detached from the car and left behind. Only twelve or fifteen seconds are required for this operation. The overhead trolley, with which also the car is equipped, then comes into play. At the present time, however, this is not done; and passengers are transferred from one car to another. Occasional openings of the proper size in the slot-rails permit the hanger to be removed from the conduit entirely. The great point of interest is that the conduit plan has been in actual operation on the road since early in March, and the officers of the company pronounce it a perfect success. In fact, they declare that in wet weather the leakage of electricity is less underground than overhead. The chief difficulty to be anticipated with such a device is water in the conduit, which, after a January thaw or a heavy summer shower, will accommodate to a depth that will submerge the wires. This would discharge the whole current instantly and paralyze the line. But so perfect is the drainage from the conduit into the sewers that thus far no such trouble has been experienced. A street car line in Chicago was operated on this same plan two or three years ago; but, upon being bought up by Philadelphia capitalists, it was stopped. Recently, however, it is said, it has resumed business. Mr. Yerkes, its president, testifies heartily to its excellent service, and freedom from interruption by water in the pipe.

Several other conduit roads are running, either commercially or experimentally, in this country. One is at Arlington, opposite Georgetown, D. C., and its owners intend to bring it over into Washington. The plan there used, invented by Malone Wireless, has only one wire in the conduit, and resorts to the rails for a return conductor. A special feature of this system is that the trolley wire is cut into lengths of about 300 feet, and only that one over which a car is at any moment takes any current from the feeder, buried beside the track. Better insulation and lessening of leakage are claimed for this arrangement. George Westinghouse, Jr., of Pittsburg, member of one of the great firms which manufacture electrical apparatus, has also invented a conduit, in which the lower part is separated from the upper by a horizontal partition. He has also devised original apparatus for making contacts between cars and electric conductors. Two or three more plans of greater or less promise, have recently been described in the electrical periodicals of this country.

In Europe the most famous conduit for an electric railway is at Buda-Pesth, Hungary. Three or four roads are there in operation by this plan, which is fathered by the great Berlin house of Siemens & Halske. In this system the conduit is constructed under one of the rails, instead of half way between. The apparatus which connects the motor with the underground wires differs in detail from that used in America, but it is not necessary to go into particulars. The roads have been described more than once by that progressive and trustworthy publication, "The Electrical World," and are pronounced highly successful from an engineering and pecuniary point of view. A new line was opened only last year. The first of these has been running over three years.

Aside from a flooding of the subway with a heavy shower or the spring thaw, which in a properly drained city is virtually impossible, there is another feature of this plan to be considered. As on a cable road, the hanger is subject to some friction, and needs occasional renewal at the expense of a few dollars, and a sharp eye must be kept on the slot for obstructions. Still, accidents from this cause are unheard of, and they are avoidable with vigilance, since inside of a city the cars are seldom allowed to run more than ten or twelve miles an hour.

Such are the advantages of the conduit system that it would doubtless soon come into extensive use in America were not the first cost of the road greater than that with the overhead wire. The latter can be built for from $10,000 to $20,000 a mile; the conduit needs from $28,000 to $45,000; yet the cable road, for which much deeper excavation is required, and in which much more iron work is used underground, is still more expensive, and yet pays well. It is said that these roads cannot be built for less than $40,000 and sometimes take $75,000 a mile. Possibly the plan followed in and near Washington, of using a conduit in densely populated districts and an overhead wire outside, may find general acceptance elsewhere.

IN EVERY Receipt that calls for baking powder use the "Royal." It will make the food lighter, sweeter, of finer flavor, more digestible and wholesome.

"We recommend the Royal Baking Powder as superior to all others."—*United Cooks and Pastry Cooks' Association of the United States.*

A STRANGE EXPIATION.

DROWNED AFTER RESCUING THE MAN HE HAD WRONGED.

San Diego, Cal., June 8.—The drowning of an elderly man near Coronado Beach some weeks ago has brought to light a romance which has rarely been equalled, and the story in the hands of a novelist or playwright could be made of exceptional interest. According to the correspondent's informant, shortly before the beginning of the war there resided in a prominent Southern city two young men. The one was a merchant and the other an aspiring attorney. They were stanch friends and spent much of their leisure moments in each other's society. The lawyer, at the death of a distant relative, had been made the guardian of a girl who, as she grew up, blossomed into a most beautiful woman. A warm attachment existed between the two and it was understood that some day they would become husband and wife.

At last the war broke out and a call for volunteers was made. Young men were urged to go to the front, and the aspiring lawyer, finding his practice small, and being desirous of making a reputation, responded, leaving his ward in charge of his friend, who promised to see that she should never want. As time passed, reports were frequently received telling how the young attorney was achieving fame for his valor and promoted to the rank of a captain. In the mean while the friendship that had existed between his friend and ward ripened into love and the announcement of their intended marriage was made public. The ceremony finally took place, notwithstanding the encouraging letters that were being constantly received from the battlefield; and toward the close of the war a child was born to the couple. They lived happily until one day a letter was received announcing how within a fortnight the gallant soldier would return, bringing with him the title of colonel, which had been bestowed for his bravery. A feeling of remorse came over the merchant for his cowardice in betraying a confidence bestowed, and he begged his wife to go with him to some distant place and commence life anew. On being met with refusal, he one day disappeared, taking with him his child.

When the former lover returned he swore vengeance, but some months later a newspaper clipping was received telling him father and child had been killed in a railroad accident. Then he took it upon himself to continue as guardian for the woman. A year or so later, when the cried wrong was gradually being forgotten, the two were married and with the birth of a boy in later years their life was marked with prosperity and happiness.

The life of the betrayer after he disappeared with his girl baby was more eventful. Not wishing to stand in the way of his wife's happiness, he took advantage of a railroad accident in which both his child and self narrowly escaped death to give his name as that of an unfortunate who had been instantly killed and whose identity was unknown to the others. It was about the time of the mining excitement in Leadville, and the famous Carbonate camp was soon reached. Good fortune appeared to meet his every effort, and within a year he was considered among the camp's wealthiest men. As years passed his child followed in the footsteps of her mother and grew up to be her perfect image. Money was lavished upon her education without limit, and much time was spent in travel. For some years past father and daughter have resided in southern California, spending considerable time at Coronado.

During the latter portion of April there arrived here a prominent Southern attorney, accompanied by his wife. He was none other than the betrayed friend. One evening mother and daughter met. The close resemblance proved astounding, and when on the following day she recognized her supposed dead husband the shock proved almost fatal. During her brief illness, however, she avoided confiding the truth to her husband, but managed to ascertain the abode of her daughter. A visit was paid, and a speedy departure urged. Father and daughter had arranged to leave on the following day. That day, while the two were on the beach watching bathers, a cry of distress was heard in the distance, and the piteous cries of a drowning man near the danger line soon attracted their attention. In an instant the man recognized as the unfortunate the friend whom he had betrayed, and without a moment's hesitation he threw himself into the water, and being an excellent swimmer, reached the man in time to save his life. He carried the unconscious form to the ropes, where aid soon arrived. At that moment, however, a heavy current dragged the man who had risked his life under the water, and being unable to grasp the ropes in time he was drowned. The daughter is now with her mother in their southern home, while the man who gave up his life is at the bottom of the Pacific.

BEACONSFIELD'S WORK IN THE BALKANS.

From The Pall Mall Gazette.

The great Sobranje has sanctioned the changes in the Bulgarian constitution which the lesser Sobranje lately voted; sanctioned them with an amazing unanimity of obedience. There is no possible reason why these alterations should prove displeasing to the Powers, since they provide the country with a dynasty and tend to stability the nation. A strong Bulgaria between Russia and Constantinople is most desirable, and the present condition of the Balkans affords the surest proof of Lord Beaconsfield's sagacity at the Berlin Conference. His compliance with the desires of Russia on that occasion startled many people. Russia wished to manufacture a composite of small and independent states in order that she might occupy them in the day of her good pleasure. Lord Beaconsfield knew that independence is the last gift which a nation will willingly surrender; and the event has proved him wise in his hour. Indeed, the recent act of the great Sobranje is the last disaster which has fallen upon the expansive panslavist party as a result of the Russo-Turkish war; the last revenge brought in by the whirligig of time upon the victors.

TRANSLATIONS OF FICTITIOUS BOOKS.

From The London Telegraph.

M. Alphonse Daudet is justly indignant at the discovery on a bookstall on the quays of a novel in German, called "Frau Putiphar," purporting to be the translation of one of his works. The author of "Sapho" and the "Immortel" is, however, not surprised at the fraud. He says that there exists in Germany a band of literary pirates, who manufacture novels, not only in the name of M. Daudet himself, but also in the names of other notable French fellows, as the Zola, Bourget, Marcel Prevost and Edmond de Goncourt. Some of the pages in "Frau Putiphar" resemble extracts from M. Marcel Prevost's writings, and M. Daudet thinks that the pirates must occasionally jumble names, so as to deceive readers. In a publisher's list at the end of "Frau Putiphar" there are also advertised books by Zola and Adolphe Retté which these authors have never penned. Curiously enough, M. Daudet has also been the victim of an impostor similar to the reverend gentleman in England who once used to pass himself off as George Eliot. Some years ago, at a dinner given by M. Duclerc when Minister for Foreign Affairs, an impudent rogue who was among the guests coolly gave out that he was Alphonse Daudet, and interested his innocent neighbors at the table by talking of his past literary work and his future plans. With reference to the book "Frau Putiphar," it must be added that M. Daudet received a letter from a German publisher, who stated that he had been hoaxed by the alleged translator of the volume, which is now out of print.

THE SUNDAY QUESTION IN BELGIUM.

From The London Star.

M. Vandenpeereboom, the Belgian Minister of Railways, Posts and Telegraphs, is a warm advocate of Sunday rest for postmen. At present there is but one delivery on Sundays throughout Belgium, but this is too much for M. Vandenpeereboom. He has therefore caused a special stamp to be made, which is to be known as the "dominica stamp," bearing in French and Flemish the words, "Not to be delivered on Sunday." This stamp will be issued on Saturday, and it is desired that those who are in favor of no sunday delivery will tear off the portion containing the words in question. The idea is to obtain a sort of "referendum" on the question of Sunday delivery, and also at the same time to call public attention to the matter, and by that means arrive at a solution of the question in a complete postal day of rest on Sundays.

RATTLESNAKE HABITS.

STUDIES OF REPTILES ON THE PLAINS.

THE POWER OF SNAKES TO "CHARM"—UNWELCOME GUESTS OF THE GOPHERS—CURES FOR BITES.

Los Angeles, Cal., May 26.—John C. Moore, of Otay, in San Diego County, has made a study of rattlesnakes, and has come to some interesting conclusions regarding these interesting serpents. Mr. Moore says that this snake has been greatly lied about, and that he is little understood or appreciated. This may be so, but most Southern Californians do not care to form a close acquaintance with the reptile. As a matter of fact, however, the injuries resulting from this source are comparatively few.

Mr. Moore, who has observed him in many regions, destroys a number of traditions about him. For example, it has always been held that he is a magnanimous enemy, and will give a sort of warning by rattling three times before he strikes. Mr. Moore says: "I have seen a rattlesnake in July lie in the shade and rattle steadily for an hour. He was either amusing

himself or, perhaps, taking a music lesson, for he did not see me, and I am sure he had no intention of hiding himself. When I was in Texas I have known a rattlesnake to strike a horse without the least note of warning. Another picturesque error regarding him," continues Mr. Moore, "is the supposition that when spoiling for a fight he coils himself up like a doughnut, or a halyard on board of a man-of-war. The snake simply gathers himself in a series of irregular folds like a series of superimposed S's. He can at best strike but three-fourths of his own length, and rarely accomplishes that in actual warfare."

This authority also asserts that the rattlesnake is quiet, unobtrusive, and strictly minds his own business. He is cleanly, taking frequent baths when the opportunity occurs, and in the Carolinas and Florida becomes a water snake of great size and weight, some specimens having been captured measuring nine feet. He is a splendid and swift swimmer, and becomes chummy with the alligator, as they are frequently seen sharing the same log and taking a sun bath together.

The ordinary or "banded" rattlesnake is found anywhere in the country south of the forty-sixth parallel. This variety is generally inoffensive except when he has reason to believe that he is in danger, when he is not slow to defend himself. Small birds, mice, gophers, chipmunks and squirrels are his favorite dishes, and Mr. Moore in a recent article asserted that he can swallow rabbits. He says: "I helped once to dissect a rattlesnake which had an immense lump amidships, which proved to be a full sized and half digested jack rabbit. The snake's neck was not two inches in diameter, so I leave it to others to explain how he wrapped himself around that rabbit." The largest ones are found in Texas on the lower Rio Grande, where Mr. Moore states that they have been known to reach a length of twelve feet, while the smallest, or "horned" snakes, are found in Arizona, New-Mexico and Southern California. This latter variety has the peculiar power of being able to move backward as quickly as forward, and can go into his hole tail first. They have rattles, but seldom use them until they have struck, and they have a disagreeable habit of half burying themselves in the sand and resenting an unintentionally intrusive step by a fanged remonstrance.

The peculiar companionship of prairie dogs, rattlesnakes and owls has often been noted, but never satisfactorily explained. Mr. Moore lays out the owl portion of the problem, but states that his researches show that the snake shares the dog's quarters for purely selfish reasons. In the first place, the prairie dog is an acute little animal, and does not care to provoke a combat with so formidable an enemy. The dog's burrow is the only shelter from the heat of the plains afforded to the reptile, and as the little creature always sinks a well at the bottom of his burrow, this is the snake's only means of getting water, something that he is peculiarly fond of. But the main attraction is the young of the prairie dogs. The rattler does not believe in over-production among his hosts, and he makes way with a proportion of the puppies at their generally regularly timed appearance. He does not swallow them all, but just sufficient to keep him in good condition, and have enough at the same time to perpetuate the race. In fact, the rattler is not unsocial when his personal comfort is in question. Mr. Moore cites instances when in New-Mexico and Texas, where the nights are cool, it is the custom of these snakes to crawl between a traveller's blankets and snuggle up close to him till morning. He states that members of them are killed every year by soldiers, but he holds that the snakes rarely abuse hospitality by biting their bed fellows. Still this is, to say the least, unpleasant for the owner of the blankets, and "Ben" Davis, of Orange, who is an old "desert man," has had some experiences of this sociability on the part of the snake that are quite crawly in their harrowing details. Mr. Davis has been so long on the frontier that he does not mind snakes, tarantulas, scorpions and such things as much as would a tenderfoot. As he puts it, "A man on the desert gets in the habit of shaking out his boots before he puts them on in the morning." He was for many years the foreman on a large cattle ranch in Arizona, and one of his experiences was to wake up one morning warm in camp and see a tremendous rattler coiled up within a foot of his eyes. He dared not make a move, and lay there hoping the snake would wake up and pursue its course. The creature in the course of half an hour uncoiled and commenced to move, but, to Mr. Davis's horror, came straight for him. He had nerve enough to keep perfectly quiet, however, and the rattler drew its slimy folds right across the man's bare throat and went on its way. As soon as he felt sure it had got sufficiently far away to make it safe, Davis jumped to his feet and, getting a weapon, dispatched the snake.

Another episode that Mr. Davis relates is that on another of his expeditions he woke up to find a rattler coiled on the breast of a sleeping companion. Davis got his six shooter and, taking careful aim, blew the reptile to pieces and nearly scared the sleeper into forty fits, as at first he thought he was murdered. Mr. Davis asserts that if a rattler strikes a man in a vein death is as instantaneous as by lightning. He cites a case that came under his notice on the Colorado River. A number of Yuma Indians were bathing, and would plunge in the river, come out, roll in the grass for a while, and then take another dip. Davis noticed one large buck who was a picture of strength and health. Suddenly this fellow, without even a cry, straightened himself spasmodically on the grass where he had been frolicking, and in an instant was a corpse. Investigation showed that a rattler had struck him square in the jugular.

The power of rattlesnakes to "charm" birds and animals is open to question, and Mr. Moore is a non-believer in this theory. He asserts that what is considered fascination on the part of a snake for a bird is nothing more than a foolish hate. He says: "I have been a witness of encounters between snakes and birds, and each time have been convinced that the bird was endeavoring to frighten the snake away from her nest, or to punish him for his larceny of her eggs. We all know that birds are not cowards. I have frequently seen small birds attack a hawk and make his life a burden to him. An English sparrow will cheerfully undertake to thrash a bird four times his weight, and the naid mannered dove will fight the intruder who enters her cote, be he cat or man. A bird's confidence in her powers of flight makes her rash in regard to snakes. She sees a rattlesnake near her nest, and at first takes wing; but on observing the lethargic quality of her opponent, proceeds to sit on a twig and scold him. Meanwhile the snake has lazily invested the nest. Having exhausted all the profanity she knows, and emboldened by the snake's sluggishness, the bird comes nearer, with wings outstretched and quivering, feathers ruffled, and beaks open, all symptoms of anger, not fear. The snake slowly gathers for a spring and remains perfectly still. Each moment of his inaction serves to make the bird more aggressive, and at last the dead line is reached, there is a sudden straightening of the hideous folds, and the poor little nut colored warrior feels the stab of those dreadful needles whose touch is death. If she had as much sense as pluck she would not have stayed for a row. One thing is certain, that when a snake captures a bird he does it less by his own prowess than by the natural tomfoolery of the bird, and he certainly effects nothing by 'charming.'"

Now, against Mr. Moore's testimony, I have collected that of an eye-witness to a case of a snake "charming" a rabbit, being the evidence of a resident of Pomona, who writes saying: "As I was out several miles in the country on horseback riding between Edwanda and Pomona, I saw a jack rabbit standing still only a few feet from the road. I rode up close to the animal, which still refused to scamper away. On the contrary, the rabbit sat there as if transfixed, though making a constant shuddering motion. I was surprised that the rabbit did not flee at the approach of myself and horse, and when I looked closer I saw a rattlesnake coiled up under some bushes, his head uplifted, about six feet from the rabbit. I shall never forget the scene. The rabbit was looking with indescribable eagerness straight at the slowly approaching snake, and needed nothing else. I dismounted and, seizing a long stick, pushed the rabbit away, when the snake instantly swelled with rage and rattled violently. I killed the snake, but the rabbit continued apparently benumbed for a moment or two, when it recovered and hopped away."

This, to my mind, is a case of "charming" on the part of the snake. There are many who refuse to believe in such things, and I have always had my doubts, but to one familiar with the eyes of rattlesnakes it does not seem unreasonable that they should have such power. If you will examine the eye of one when he is dead, you will perceive that it has an extremely malignant and terrible expression. When he is alive and excited, I know of nothing in all nature of so dreadful an appearance. It is enough to strike with terror more than birds and little animals. I have on several occasions examined the eye of a rattlesnake closely with strong glasses, and I am confident that there are few men who can look upon an angered rattlesnake through a good glass, bringing him apparently within a foot or two of the eye, and stand it more than a moment.

As to cures for these reptiles' bites, there are numbers which have proved good in individual cases, but none appear to be specifics. Mr. Moore states that the venom is a thin clear fluid resembling serum, of a slightly bluish tinge in some cases, and yellowish in others. The quantity is about four minims, or two for each fang. Mr. Moore says that in Florida he saw a negro who had been bitten, place a freshly cut onion soaked in whiskey on the wound, and he got well. Turpentine in large doses in combination with the whiskey and onion cure is also recommended. A freshly killed fowl, split up the middle and laid across the wound after it had been opened with a knife has also been known to effect a cure, as has whiskey and ammonia. A case which came under my own observation was that of Charles Eberle, who was bitten at West Riverside recently on the hand and arm. The attending physicians cleansed the wound with an antiseptic wash, after lancing the places where the fangs had struck. Then a 33 1-3 per cent oily solution of camphorated phenic acid was injected into some twenty-five places in the limb. The only remaining treatment was to keep the arm perfectly clean. Mr. Eberle has entirely recovered.

Some of the Californians swear by the weed Euphoebia as a cure. T. K. Fisher, an old resident of Santa Barbara, says he has found out that the remedy used by the Colorado desert Indians for rattlesnake bites is the plant above mentioned. This receives corroboration from Frank Smith, who has lived on the edge of the Colorado desert for twenty-two years. He spoke most of the dialects of the desert Indians, and is familiar with their habits. The weed, he says, is a Euphorbia, and is common throughout Arizona and California. It grows close to the earth, and the leaf resembles the clover, but it is less than half as large. When a stem is broken a milky exudation follows, similar to that of the milkweed of the East. Mr. Smith says the weed should be applied as follows: The green weed should be macerated in water, the skin about the bite should be scarified, and the pulpy mass of the plant placed on it and rubbed in well; this should be repeated at intervals for fifteen or twenty minutes, and then a poultice of the same plant should be bound on and left. The average countryman, however, trusts to whiskey, and it must be admitted that in a number of cases this remedy has proved effectual.

BLACK STOCKINGS FOR ALLIGATORS.

A NOVEL METHOD OF BOAT-PROPULSION.

To the Editor of The Tribune.

Sir: Last winter, during a visit paid a Florida plantation, a novel and effective method of catching alligators came under my notice. There were half a dozen young people in the house at which I was staying, and, wearying of commonplace comfort, they decided to camp out for a few days. A pleasant piece of woodland was chosen and preparations began at once. The camp was near the plantation, but was separated from it by a creek, one of the innumerable tributaries of the St. John River. At least twice a day some of the young people went over to the camp in an awkward but roomy old flat-bottomed boat, carrying various articles which they supposed would be useful. The day before our outdoor life was to begin the old boat made a great many trips. On one occasion there were four of us going over and we were burdened with tools, hammer and nails, ropes, canned meats, etc. As we were nearing the opposite shore a young woman in the party cooed some beautiful wild flowers. There was a submerged log directly in front of the bank where they grew, but as our boat was strong, and she said that she would be broken-hearted unless she could have them, we rowed directly over the log and one of us leaned out to pick the blossoms.

Suddenly our boat began to move in a most extraordinary manner, going neither forward nor backward, but straight up. "Alligator!" shrieked some one, and we instantly realized that the supposed log we had seen was in reality a living saurian. Three of us were almost paralyzed with fear, but the fourth and brightest of our party was equal to the emergency. In far less time than it takes to tell it he had snatched up the hammer and nails and was using the first article to drive the second through the bottom of the boat. "You'll have to help; we must be quick! Take off your shoes and use the heels as hammers!" he cried; and, realizing the necessity of immediate obedience, we began driving nails too. His intention dawned on us by the time it had become a finished action, and we complimented him on his idea of pinning the alligator to the boat with nails.

But our prisoner was not pleased and began thrashing the water violently. Again our clever friend came to the rescue. "Does either of you girls wear black stockings?" said he. One of us did. "Then sit up in the end of the boat and dangle your feet in the water. No, don't put your shoes on! Now swing your feet to the right!" The young woman followed his directions, and, wonderful to relate, the boat slowly moved to the right. Oars were useless; the alligator bore us home on his back and we showed our gratitude by putting him out of his misery as soon as we could.

"But how did you know he'd carry the boat, and why did he go where I steered? And, above all, why were black stockings necessary?"

"Have you ever heard of tying a carrot to the end of a whip and dangling it in front of a balky horse to make him go? My idea was based on that. You swung your feet in the water, and seeing the black hosiery, the 'gator fancied you were his favorite article of diet—a nice, plump little darky. He followed where you led; the nails prevented his reaching you, though his bite was so tough they hurt him but little, and certainly didn't interfere with his powers of locomotion, as we've seen."

The end of the adventure came some months later in the shape of an alligator-skin pocketbook for each member of the party. The skin used was that of our captured foe, and in the upper corner of each purse was a tiny golden nail. HELEN GRANBERY.

Irvington-on-Hudson, N. Y., June 16, 1893.

PARIS SOCIAL FUNCTIONS.

M. CARNOT ENTERTAINS THE PAINTERS—DINNER TO THE DUKE D'AUMALE.

Paris, June 3.

The usual banquet was given at the Elysee on June 1 to the Committees of the Champs Elysees and Champs de Mars Salons and to the leading exhibitors there who fill no official position. M. Jules Breton and his son-in-law were invited, but Mme. Demont Breton, the eminent painter, and the daughter of the one and the wife of the other, was not bidden. The Third Republic is far too masculine. This fact always came home painfully to my mind at the many State festivities that I attended during the centennial of the Revolution. It was the women of Paris who prevented the plan of Marshal de Broglie for attempting a military coup d'etat against the National Assembly in the autumn of 1789. They marched to Versailles to take the King, Queen and royal children back to Paris. There was no recognition of this fact in the centennial fetes. The wife of the President of the Republic was as completely ignored as though she were a wife of the Grand Turk. Her husband drove about in state, and she stayed at home. One of the few festivities that she went to was the ball given at the Palais de l'Industrie to the workmen who had been engaged in building the Exposition Palace.

The situation of women in regard to education is better than it was under the Empire, but in most other respects it is not so good. Women are excluded from all the inaugural ceremonies in which the head of the State takes part. In Roll's great painting of the celebration at Versailles of the hundredth anniversary of the meeting there of the States General which was the commencement of the Revolution one sees Rouvier, Roche de Freycinet, Ballaut, who is now doing time in a State prison, in the cortege of M. Carnot. There are nothing but scrubby masculine faces, white cravats and black coats and trousers in the Presidential procession. Women only have the privilege of looking at the file of official men, in a shoving, rude crowd, in which men push before them and knock over the chairs on which they wanted to stand. Why should not Mme. Demont Breton, whose "Childhood of Joan of Arc" is a wondrously poetic work, with a technique that is faultless, be invited to the banquet? Her painting of the sailor's return to his seaside home is a masterly work. Mlle. Buchet has contributed one of the best portraits in the Champs Elysees Salon. There are also there and at the Champs de Mars works of great merit by Mlles. Raury Saurel, Louise Breslau and others. The artists' dinner at the Elysee is generally followed by a reception and concert, but the custom was departed from on account of the state of the President's health. A painter who sat near him and who studied medicine in his youth tells me that M. Carnot struck him as suffering from jaundice. His skin was of a dark yellowish hue, and he seemed emaciated. He scarcely ate, and drank no wine, but was amiable and conversed freely with those beside him. Toward the close of the banquet M. Carnot looked so weary that most of the guests felt that they should retire immediately after coffee was served.

The dinner in compliment to the Duke d'Aumale, which came off a few evenings ago at the British Embassy, was an affair of some interest. No prince of the Orleans family had been entertained there with so much distinction since the revolution of 1848. Lord Dufferin is too much the diplomatist by instinct and profession to give this entertainment without a good reason, or without feeling that he might do so without in any way throwing the interests of his country into jeopardy.

Indeed, I cannot forbear from coupling this incident with the nomination of General Gallifet to be Ambassador Extraordinary to the Court of St. James on the occasion of the Duke of York's wedding. The Marquis de Gallifet no doubt rallied to the Republic, made up to Gambetta when he was Speaker of the Chamber, and became his personal friend. M. Deville, an advocate of the Court of Appeals and now the Foreign Minister, says he appointed him for two reasons. The General is one of the friends of the Prince of Wales, and has been so for nearly thirty years. He is frank of speech, besides, and would be able without giving offence to say that France has very decided intentions, both in regard to Egypt and the Kong River as the western boundary of Annam.

The Duke d'Aumale is seventy-one years old. He has