detect, with the hand, any change in the temperature of the gun.

The velocities of three consecutive shots were measured. The tenth bullet traveled at the rate of 482 feet per second, the eleventh 492 feet, and the twelfth 523 feet per second.

After the last shot had been fired the tube was disconnected from the gear, and, the valve at the magazine being opened, the visitors were allowed to examine the inter-atomic ether as it issued from the pipe.

It had but a trace of odor, no taste, and had no effect upon the lungs. This ended the trial.

We saw nothing done by the Keely Vaporic Gun which cannot be duplicated by the aid of compressed air.

A gas check made of the same material Mr. Keely used and held in the same way is strong enough to withstand air at a pressure amply sufficient to drive a bullet with the velocity he obtained.

At the lowest calculation and allowing a wide margin for safety, his reservoirs would hold air at a pressure of 20,000 pounds to the square inch; this quantity would be sufficient to fire twice nineteen rounds, and since the thickness of the gas check would govern the velocity of the ball, the last shot would have a velocity equal to the first. Many more than nineteen shots could be thrown by the aid of the same apparatus he used, substituting air for inter-atomic ether.

We estimate that Keely used an air pressure of 800 to 1,000 pounds to the square inch to break his gas checks and discharge the bullets.

Although when new inventions appear it may be necessary to coin appropriate terms, we should not think it essential to resort to a heterogeneous commingle-ment of absurdities.

Furniture Woods.

A generation or more ago the most admired wood for furniture purposes was mahogany. Until quite recently the taste for mahogany has been held in abeyance, and black walnut has long reigned the king of the furniture woods. Before mahogany controlled the popular desire, cherry was a favorite, and our white walnut or hickory was used to a considerable extent. These old fashioned woods are coming into favor again, and very fine effects are produced by the contrasts of cherry and hickory, and by mahogany and hickory. Mahogany and cherry blend admirably as shades of color instead of contrasts. The so called "branch" mahogany, that in veneers on the fronts of bureaus and in the frames of mirrors formerly produced such impossible effects of grain, has given place to that of plain straight grain, the effect of color rather than of grain being desired.

Except yellow and black birch and the satin and birdseye maple, there are few of our native woods that show a very distinctive grain. This makes them valuable as foils to the more erratic grained woods of the tropics. One of these, the *coco bolo*, of a deep red color, with broad striated grain, works up beautifully with the cherry, making a complement of tints, or with the hickory, showing a contrast of color and of grain.

According to the statement of a prominent dealer in furniture woods, our cherry and hickory are coming rapidly into demand, and for foreign woods the mahogany and the comparatively little known *coco bolo* are much called for by makers of fine furniture, carvers, and internal finishers.

John W. Garrett.

John W. Garrett, President of the Baltimore and Ohio Railroad since 1858, died in Baltimore, Sept. 26, in the 65th year of his age. He was born in Baltimore, graduated from Lafayette College, entered his father's banking house at the age of 19, and was made president of the great railroad with which his name has since been associated at the instance of Mr. Johns Hopkins. From that time the road has regularly paid dividends, and the stock has advanced from $57 to something over $200 per share, largely due to his enterprising and energetic management and constant personal supervision, under which the road has been extended and branches built to make it one of the main trunk lines of the country. Mr. Garrett was also during this period the head of his banking house, was one of the trustees of the Johns Hopkins estate, and connected with many other local institutions.

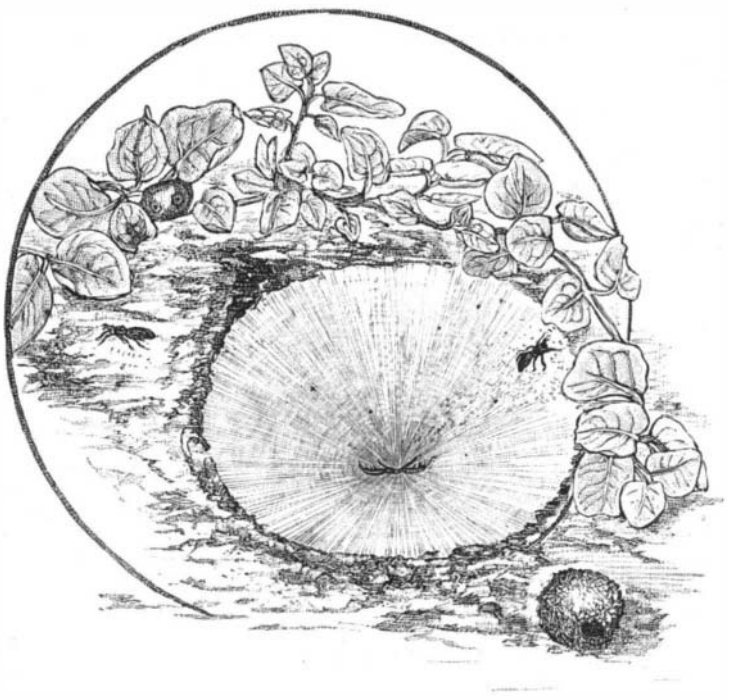
Snow Water Impurities.

Under the heading of "The Beautiful Snow," the *Microscope* points out the kind of organic impurities found in snow, which, added to what we recently quoted on the same subject, very conclusively shows the fallacy of the idea that melted snow forms a good substitute for distilled water. The impurities are as follows: Living infusoria and algæ, bacilli and micrococci, mites, diatoms, and great numbers of fungi spores; also fibers of wood, mouse hairs, pieces of butterfly wings, skin of larvæ of insects, cotton fibers, pieces of grass, epidermis, pollen grains, rye and potato flour, grains of quartz, minute pieces of roofing tile, and bits of iron and coal!

THE ANT LION.

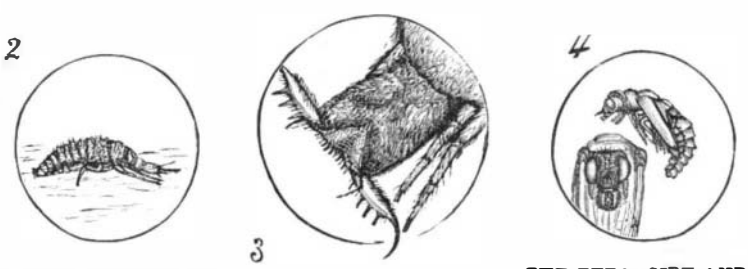
BY H. C. HOVEY.

Although the peculiar habits of the ant lion (*Myrmeleon*) have been repeatedly described by naturalists, many persons do not yet seem to be aware of his existence. Hence it may be worth while to lay before the general reader some of the facts that have been gathered, partly by inquiry, but chiefly as the result of my own observations.



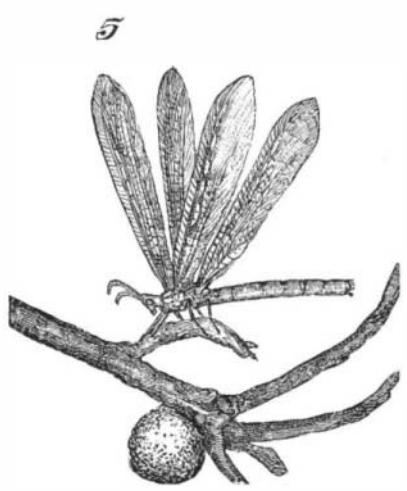
THE PIT OF MYRMELEON, WITH A COCOON NEAR THE MARGIN.

In quiet nooks, where the soil is dry and sandy, and especially in the hollows left by the roots of decayed and fallen trees, the chosen resort of busy colonies of ants, one may have noticed conical pits, from half an inch to two inches in diameter. Each of these pits is a trap, a den, inhabited by a creature as ferocious as the tiger and as subtle as the serpent. Scoop up the sand thus excavated, spread it out on a paper, and you will see a small, oval, sluggish bug, whose main anxiety is to get out of sight as quickly as possible by crawling backward into the sand. Observe him closely, and you will see that his head is furnished with a formidable pair of jaws. This ugly little fellow is the larva of *Myrmeleon*.



THE LARVA—NATURAL SIZE. THE JAWS—MAGNIFIED. THE PUPA—SIDE AND FRONT VIEWS.

In my library I have placed a box of sand in which are kept a number of these ferocious pets. It is interesting to watch the process of digging the pits. The ant lion plows a circular furrow, going backward all the while, and shoveling the sand with his broad and flexible tail. It is invariably thrown outward from the center. A second and inner circle succeeds the first; and this continues until a conical pit is completed, at the bottom of which the ant lion lies, wholly concealed except as to his jaws. Occasionally a small pebble, or other obstruction, will tax the ingenuity of the insect worker. He will lift at the load with either head or tail, as is most convenient, trying to jerk it out of the pit. I have seen the effort repeated twenty times before patience met with its reward. In other instances the obstruction would exceed the ant lion's combined skill and strength, and then the only thing to be done was to abandon the pit and dig a new one in a more favorable location.



THE IMAGO OF MYRMELEON, JUST EMERGED FROM THE COCOON.

When all is made ready, the ant lion lies motionless as if dead, and will continue to do so for days and even weeks, awaiting his prey. Voracious as his habits are, he rejects whatever is dead. To one that had fasted a fortnight I offered a luscious blue-bottle fly, but in vain, because the fly was not alive. On catching another, and a large one, stripping off its wings, I let it fall directly into the expectant jaws, and it was seized instantly and dragged under the sand to satiate the hunger of the voracious foe. The fly was three times as large as the ant lion, but in an hour the carcass was tossed out of the pit, bereft of its juices; the damaged walls of the pit had been repaired, and *Myrmeleon* was ready for further supplies. Seldom does any victim escape.

A young ant lion was seen by a friend of mine to grasp the abdomen of a large fly that had invaded his den, and not being strong enough to conquer, it held on with a grasp so tenacious as to be lifted into the air and carried to a considerable distance before relaxing its hold. It is frequently the case that an ant, on finding himself slipping into the pit, will use his utmost endeavor to escape; but usually a shower of sand brings him down into the vortex. It is not true that the sand is aimed directly at the victim. It is thrown up at random, and one shower is followed by another till the desired object is accomplished. The ant lion varies his methods with different sorts of ants. When the carpenter ant, whose jaws rival those of his foe, falls into the pit, he is seized and held aloft in such a way as not to be able to fight, while the ant lion complacently sucks out his juices. Equal caution is manifested in attacking the pavement ant, which carries a sting. I have to acknowledge that I once left six ant lions of about the same age and size in a cigar box half full of sand, where each had a separate pit, and neglected to make provision for their being fed during my absence of several weeks. On my return I found but one symmetrical pit, inhabited by a sleek, fat ant lion, while around the margin lay the five dry shells of his brothers. This case of cannibalism is the only one of the sort that has fallen under my observation.

Having existed for a long time in a larval state, the *Myrmeleon* prepares for himself a spherical cocoon, in which he passes forty-two days. Toward the last of the pupa state the jaws become serviceable, as the insect uses them to gnaw his way through the walls of the cocoon, whence he escapes as an imago, leaving the jaws behind with the larval skin cast in the transformation. The imago is an elegantly shaped dragon fly, bearing as little resemblance to its primitive form as does the butterfly to the crawling caterpillar.

My experiments have been limited to a single species, *Myrmeleon immaculatus* (De Geer); the specimens being from Indiana and Michigan. This species, however, is widely distributed, from Massachusetts to Georgia and Minnesota. There are two or three species of pit-forming *Myrmeleons*, besides several other kinds that prowl around on the surface for their prey. Those desirous of investigating further will find that there have been excellent descriptions published by Dr. Hagen, in the "Smithsonian Miscellaneous Collections," vol. iv., and by the same author in the *Entomologische Zeitung*, 1873. Other authorities are Brauer, Emerton, McLachlin, and McCook.

It gives me pleasure to acknowledge obligations to Mr. N. B. Pierce, of Ludington, Mich., not only for facts and references, but also for the drawings serving to illustrate this article.

Cholera and Macaroni.

If it is a fact, as alleged by Professor Koch, that cholera is the result of a microbe, what is to prevent the transmission of this dread disease to other countries from Italy, not only through the export of fabrics, etc., alone, but from olives, olive oil, pressed and preserved fruits, macaroni, and other edible commodities shipped from that beautiful and productive country, where the cholera has been raging with such dire results? Be that as it may, a correspondent of the London *Times* writes to that journal, warning people against the use of macaroni and other pastes made in Italy, and specially in the neighborhood of Naples. Supposing the theories of Professor Koch to be correct, we cannot imagine a more likely agent for receiving and transmitting microbes than macaroni, from what we have witnessed of its manufacture in the neighborhood of Naples. The factories for the manufacture of macaroni, between Naples and Pompeii, do not present, during the coolest and healthiest seasons, a pleasing or appetizing sensation to those who are fond of the paste and witness its manufacture for the first time. Macaroni in the course of its manufacture is hung to dry in the open air amid clouds of dust, flies, and stench of all kinds, the locality where it is made being in the dirtiest and poorest districts, and where it is said the cholera has been raging the severest. The *Times* correspondent cheerfully, if not playfully, closes his article by remarking: "One has only to think of this important article of food, which is so much used, being manipulated by plague stricken workmen, who no doubt sicken and die amid the macaroni which is being prepared, under such horrible conditions, to send broadcast over the world and spread the pestilence."

Does Death Sting?

Dr. G. L. Beardsley, in the *Medical and Surgical Reporter*, concludes that the dread of dying is quite as intense as the instinct of self-preservation. Indeed, it is not improbable, adds the doctor, that numbers would care less about living were the modes of leaving the world a theme for happy contemplation, or an innovation to the routine of plodding that was agreeable. One is remarkably exempt from the crime of hasty induction if he affirms that there is no sane or healthy mortal who anticipates his extinction with any degree of pleasure. The function of dying is absolutely vegetative—we fall to pieces like a flower. This very fact, that the process is chemical, confirms us in the conclusion that the final "throe" is as painless as the inconvenience is nothing to the fœtal pilgrim when he touches on daylight. A moment's examination of the way we are to die will show marks of goodness in our "taking off." The degree of sensibility is proportioned to the integrity of the tissues. An inflammation heightens it; age depreciates it. Any defect in nutrition disturbs the comfort of the individual until the carbonic acid generated in the devitalization of the blood becomes fixed in the cells or is no longer displaced. The sensory ganglia everywhere part with their irritability by virtue of this poison, and cease to conduct currents. The criteria of death are being satisfied, and the process is consummated when this extinction of sensibility prevails at the ultimate filaments. During the progress of this dissolution of the nerve force, this creeping on of the numbness of death, the individual is rapidly passing into a condition of repose, and instead of torture or pangs, a degree of self-satisfaction oft approaching to enthusiasm is realized. The sensations peculiar to the therapeutical operation of opium, hashish, ether, etc., are not improbably akin to the mental activities of the dying. Barring the hallucinations experienced in the stupor as it gains on the subject, the moribund is familiar with naught that borders on suffering. This carbonic acid has poisoned or narcotized the several ganglia, and reflex productions are interdicted. A consummate analgesia prevails. In short, the notion of pain is forbidden the instant that any stimulus fails to excite a response. The condition to this irritability is that the nerve center and track be sound. If this vigor vanishes, reflex phenomena are at an end, and suffering, physiologically speaking, is impossible, because of the arrest of the function of the sympathetic.

Fortunately, for a wholesome study of one's demise, there are assurances abundant, from vivisection, the testimony of those who have been restored to consciousness, and the affirmations of the dying, that there is no physical recoil from death. Burney tried hard to resist the efforts made to resuscitate him from drowning, so bewitched was he by his prolonged slumber. Dr. Solander, the traveler, was so delighted with the sensations of excessive cold, that he was the first to lie down in the snow to realize the luxury of such a death. Wm. Hunter was sorry he was not able to "write how easy and delightful it is to die." Infants die as serenely as they breathe, and not a few among the advanced in years treat death as a friend to their infirmities. Hanging is naturally rated, next to crucifixion, a most distressing procedure. But it is reported of those who have been saved from strangulation, that the agony promised to be brief, and was rapidly replaced by hallucinations of a fascinating variety.

One would fain believe that the kind God who suffered us to feel no sigh in coming would take no delight in turning our farewell into writhing—nay, he does not quit us at the last. He is our greatest benefactor in allowing us to sleep out of weariness. Death is, assuredly, no tax collector; its "jaws" are not the clutches of an assailant; there is no "victory to the grave;" the ghost speeds away from us as it entered, with no ruffle. The sense of death, as Shakespeare has it, is most in apprehension. It is the fear of the lonely night, not the throes of nature, that makes the leaving painful.

Medical Herbs.

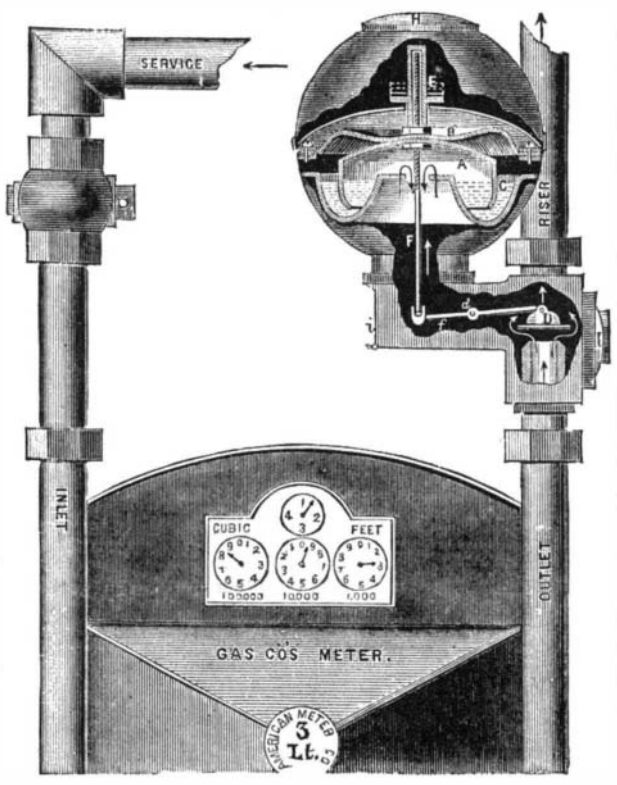
The indigenous plants of Great Britain are too much neglected in the present age, for persons are apt to run after all that is rare or novel in the form of medicine in preference to cultivating our native herbs, so many of which are rich in curative properties. The balm and the dandelion, for instance, are little valued, yet the first is an admirable tonic, and the other a first-rate liver medicine. The balm is, strictly speaking, a native of the south of Europe, but it has been grown in our gardens from time immemorial, and the first record I can discover of its being used medicinally rests with the Arabs, who are said to have taken it to strengthen the nerves: but I can remember the time when "balm tea" was drunk by the laboring classes in South Wales almost as freely as tea is now taken by English cottagers, and most certainly hysteria was at that period a disease unknown among the working classes. Not so now, alas!

Dandelion is admitted into our British Pharmacopœia under the name of Taraxacum, and regularly prescribed in diseases of the liver and spleen; but the poor people were at one time accustomed to make a decoction with the roots, which answered nearly as well as the chemically prepared extract, and the leaves when blanched are taken by the French in salads. It is likewise a valuable antiscorbutic. People put great faith in the doctrine of signatures during the fourteenth and fifteenth centuries, but it is now nearly exploded. It was based upon the following hypothesis, that every natural production indicates by some obvious external mark the diseases in which it is efficacious; and for my own part I really believe that there is a great deal of truth in the idea that not only the colors of a flower, but various other marks on leaves, stems, or roots are typical of their medicinal properties; for example, the spotted lungwort possesses healing powers in consumption, the scarlet poppy has been used with good effect in erysipelas, and the asarabacca, provincially called the foal's foot, or wild ginger, with its curious ear-shaped leaf, was formerly an unfailing remedy for all the pains that affect that organ.—*Science Monthly.*

GAS PRESSURE MODERATOR.

March 18, 1880, we had occasion to notice this invention. The inventor says he took the advice given in our hand book to inventors, entitled "Hold the Fort," to retain the controlling interest in his patent; and that from small beginning thousands of these machines have been manufactured and are now in use.

The manner in which this pressure regulator operates will be readily understood by reference to the illustration. The gas is received from the street through the service pipe, and passes into the meter at its inlet; there it is measured, and passing up into the moderator (the arrows indicate the course of the gas), fills the space under the float, A. When one burner is open this float drops and opens the valve, D, and lets out of the gas meter just enough gas for that one, at a rate of pressure from which all the light is derived from the gas, and so on for every burner that is opened. If one burner is closed, the float, A, rises, causes the valve,



DE PALOS' GAS PRESSURE MODERATOR.

D, to close also, and so on for every burner that is closed. If the pressure from the gas works increases while one or more burners are in use, the valve, D, drops and retards the flow of gas. If the pressure of gas goes down from the works, the valve, D, opens and lets out more gas, which is not forced to the burner or burners, but is admitted through the meter just as the demand is made.

Those who have used this invention furnish some striking testimonials of its efficiency as a gas saver. One large New York house, whose consumption formerly amounted to $6,000 per annum, claim to have reduced the same by the use of this moderator to $4,000 per annum; and the inventor estimates 33⅓ per cent as a fair average of the reduction of gas bills by its use. Among other things, which is not a very small matter, it accomplishes a more perfect combustion of the gas, thus preventing the smoking and sooting of the ceilings, due to imperfect combustion. Also, where "water gas" is used, it reduces the amount of carbonic oxide. This water gas is now a large proportion of the production in this and many other cities, although the companies usually try to keep it a secret.

The inventor says: "The consumer who neglects to place this invention on his meter loses every three to six months a sum of money equal to the cost of one of these instruments; that is to say, he pays the gas company for the value of the gas wasted in his house." About September 21, 1881, and up to November 27, 1883, this instrument was known as "the Owl Gas Pressure Moderator," but by legal proceedings the name was changed.

The inventor is Mr. James S. De Palos, No. 822 Broadway, New York.

Manufacture of Etching Ink.

According to Muller, a liquid for etching on glass has recently been introduced into commerce, and can be used with an ordinary pen. It consists of hydrofluoric acid, ammonium fluoride, and oxalic acid, and is thickened with barium sulphate. A better ink is obtained as follows: Equal parts of the double hydrogen ammonium fluoride and dried precipitated barium sulphate are ground together in a porcelain mortar. The mixture is then treated in a platinum, lead, or gutta-percha dish with fuming hydrofluoric acid, until the latter ceases to react.—*Dingl. Polyt.*

The International Electrical Exposition, Philadelphia.

(FIFTH PAPER.)

These are the last days of the Exposition, and, as one succeeds another, it brings with it an increased number of visitors. Barring Philadelphians, there may safely be said to be very few, if any, visitors who come here out of pure curiosity. The observations of the officers of the Franklin Institute, favorably situated to learn the facts, do much to prove that those visitors who come from a distance are, for the most part, actuated by either commercial or scientific motives. It is not strange, therefore, that, despite the experience at most exhibitions, there should here be a maximum amount of serious attention to the exhibits and a minimum amount of studied inobservance. The good nature of the exhibitors and their employes seems to have no bounds, and rare are the occasions when they address themselves to the inappreciative or those wholly unfamiliar with applied science.

Of the multitude which daily pours through the doors, the majority appears to be more or less interested in comparing the various electric lighting systems. They seem to derive much pleasure though little profit from this, as the various companies, though unsparing of so-called statements of what their several apparatus are capable of, will not permit, save in a few exceptional cases, tests to be made on the premises.

Those desirous of buying an electric lighting plant with an idea of selling light are, naturally enough, as much interested in knowing the amount of current used and the cost of generating it, as they are in the intensity of the light and the arrangement of the apparatus. As to the arc light urban as well as suburban capitalists and projectors have learned ere this how elusive are its promises of profit, save when installed under peculiarly favorable conditions.

The services of the diplomat as well as those of the electrician seem to be required in disposing of arc light plant, and no little ingenuity is shown at the headquarters of the various arc light companies in explaining why, there being so much profit in selling the light, they should so strictly confine their efforts toward selling the plant.

It is something of a disappointment that the scheme of charging secondary batteries placed in dwellings and offices from the arc light wires running through the streets has not been practically illustrated, so that it could be seen in all its workings.

It is an ingenious project, and, if it could be publicly shown that the batteries can be economically charged by day by means of the same electric mains which at night furnish the current for the arc lights in the streets, it would prove a dangerous rival to those systems in which the lights are fed directly from a central station. For the steam engine is, at best, uncertain, and like all mechanisms subject to accidents; and though this may be foreseen and provided for through the agency of auxiliary engines, the provision does but add to the cost of the plant.

Many of the electricians gathered here at the Exposition take an absorbing interest in the so-called "underground problem." Opinion seems very equally divided as to the practicability of the scheme. To all appearance, for every electrician interested in an electrical company, who calls it impracticable, his fellow may be found holding the contrary opinion, and able to maintain it with equally convincing proofs. This does much to sustain a learned jurist, who has defined an expert as one who can testify on either side of a case with equal facility.

Among those who believe the wires may be efficiently and economically buried is Prof. Preece, the eminent English electrician. At a recent meeting of the telephone managers a paper was read by an employe of the American Bell Telephone Company, whose duty it is to keep the lines in running order. The object of the paper was to show that telephone lines, at least, could not be efficiently operated underground. At the conclusion of the reading Professor Preece took the writer of the paper severely to task for the incorrectness of his conclusions, and remarked that if that was "the result of his investigations he must have sadly neglected his business." In support of that part of Professor Preece's assertion regarding underground wires which attributes to them efficiency of working, there are some experiments making here in the Exposition building. This underground line extends from the Exposition building in West Philadelphia to the Pennsylvania Railway station in Kensington, a distance, when the route taken by the wire is considered, of more than eight miles.

It must be said that the results had with the telephone wires—the most sensitive to induction and retardation of all the wires that it is proposed to bury—are more than encouraging. Indeed, it is very doubtful—so say telephone experts who are watching the experiments—if an overhead telephone line could be operated more satisfactorily, even under the most favorable conditions.

Mr. Frempt, the superintendent of the underground company whose conduit and system is being used, is very anxious to have a comparative trial between his line and an overhead line. While officially inviting such a test, he begged the telephone people to appoint a day of trial when the conditions of weather should be most favorable to the overhead system.

This experimental underground line does something toward the solution of the important problem. But it should be remembered that it is an experimental line. Whether it would remain in the excellent condition it i