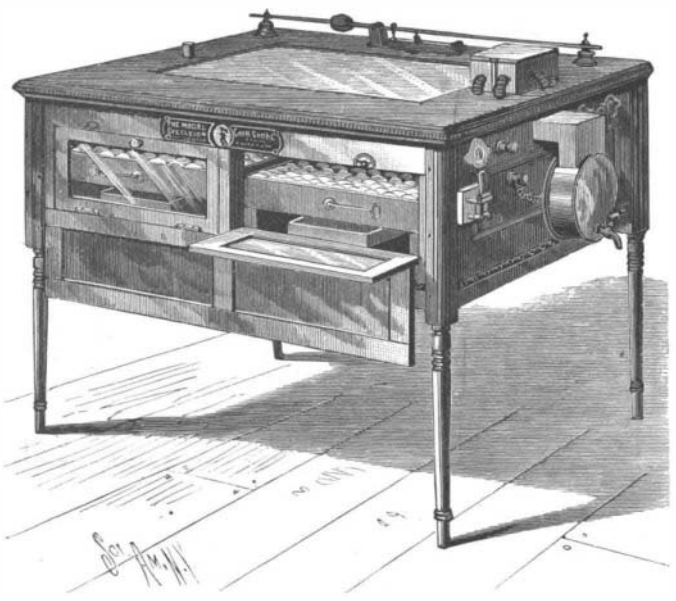
AN ELECTRIC INCUBATOR.

A successful manufacturer of incubators, Mr. George H. Stahl, of Quincy, Illinois, has recently placed on the market an incubator which is heated and regulated by electricity. In this incubator, which is shown in the accompanying illustration, it is said that the temperature can be adjusted to be held for weeks within a fraction of a degree of the desired point. The incubator casing has the usual double walls inclosing a filling of mineral wool, and the heat is supplied from the water tank at the top, the heating and setting up of a circulation in the water being effected through a small connected reservoir at one side. In the old style incubators the heating of the water was effected by a lamp, there being a lamp regulator controlling the flame, and a valve regulator acted upon by the heat of the water before entering the tank, while both regulators were actuated by an improved thermostat.

In the electric incubator, or "Electric Hen," as it is called, the water is heated by a resistance box, the current through which can be regulated with extreme nicety. The same manufacturer is now also building an incubator with a combination heater in which oil, gas or electricity may be used.



STAHL'S EXCELSIOR ELECTRIC INCUBATOR.

A New Car Fender.

The invention of Mr. Wm. B. Altick, of Lancaster, Pa., is so arranged that the instant the front padded bar strikes a person, an inside gum roller connected with the safety netting drops automatically on the track, thus rendering it impossible for the object struck to pass under the fender. If a person when struck should fail to fall into the netting, and fall in front, the additional pressure of the moving car against the body would cause the front cushioned bar to drop also, and would push the body along the track until the car was stopped. The person might be bruised or otherwise injured, but the danger of being crushed under the wheels would be obviated.

A POLE RAILWAY.

We give a picture, from Black and White, of a picnic party celebrating the opening of a pole railway in the province of Nova Scotia. It is a novel line, thirteen miles in length, and is the third of its kind in the province. For the most part it is utilized in bringing the deposits of silica found in the lakes down the mountains to shipping ports. The way is of spruce poles. The engine has sufficient power to draw four empty cars up the heavy grade of the railway. By taxing the motor to its utmost, and by a liberal use of sand on the rails, eighty excursionists were taken up the incline on the occasion represented.

The pole railway is probably the most economical form of steam roadway that has been produced. It is of American origin and has been in vogue in different parts of the country for the past quarter of a century.

It is especially adapted for use in forest regions, where lumbering is the principal industry.

A first class, substantial road built of poles will cost anywhere from seventy-five to two hundred and fifty dollars per mile, according to local circumstances. The expense, of course, is greater when the road has to be carried across ravines, as indicated in our engraving. The poles employed for rails should not be less than nine inches in diameter at the smaller end, and should consist as far as possible of the heart, or they will decay before they wear out.

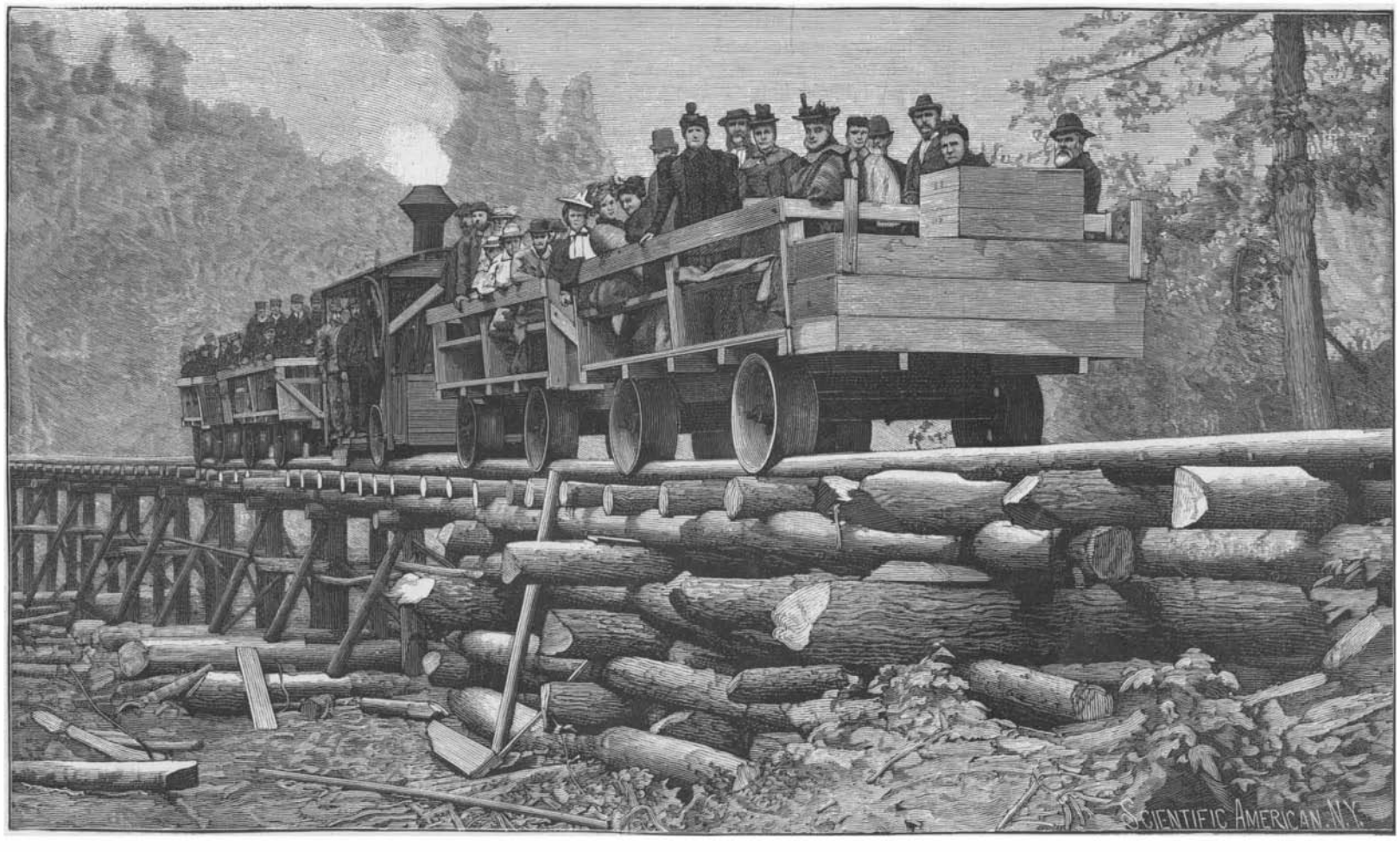
In the best roads, a bed is hollowed out in the butt end of the pole to receive the small end of the one adjoining, so as to make a secure junction. The bed is made about nine inches in length and deep enough to permit the smaller end to come up flush with the larger. The poles are simply laid on top of the ground, except when the surface is very uneven, dirt thrown on each side and trampled down to form a solid bed. After they are in place, they are slightly trimmed down with an adz. When a crook of any kind occurs in the poles, it is of course turned down in laying the track. No cross ties are necessary, as the locomotives and cars are so constructed that they exert no lateral pressure. After a few trains have passed over the road there is no fear of the poles becoming displaced. Curves are made up of a succession of short poles, care being taken that the joints come opposite to each other. The switching is readily accomplished in the ordinary way. Where heavy grades are encountered, it is the practice in some localities to place the locomotive in the middle of the train, and at the particularly steep grades to cut away half the train, push up the other half, uncouple, and return for the remaining cars. In this manner, trains of six loaded cars have been taken over grades of 700 feet to the mile with the use of only one locomotive. The wheels of the cars and locomotives have very broad treads deeply grooved, so as to fit the curvature of the poles.

The Invisible Spectrum.

It is known to all students of science that the band of colored light produced by a prism, through which sunlight is passing, appears to stop with dark red rays one way and with deep violet rays in the opposite direction. Much interest has been awakened by attempted study of this color band thought of as going below the visible red end and above the ultra violet. In a recent lecture before the Royal Institution, Dr. William Huggins spoke of these points and the methods of study of them now in use, as follows:

"Beyond the violet end of the spectrum there is a whole gamut of invisible rays, which only reveal themselves by their effect in promoting chemical action. Similarly, beyond the other end of the visible scale—the deep red—there is a gamut of invisible or dark rays, which are only perceived by their heating effects. Some idea of the importance of the 'ultra red' may be gathered from the fact that it has been traced to a distance nearly ten times as long as the whole range of the visible or light-giving region of the spectrum. To learn the character of these mysterious dark rays, then, it is clearly necessary for science to fit itself with some new sort of eyes that can see what ordinary eyes cannot—namely, heat rays and chemical rays. The photographic plate has answered admirably as an eye for the chemical rays, and brought out some wonderful facts. But with the invisible heat rays the problem was more difficult. Something in the nature of an extremely delicate thermometer is here required, which will pick out all the fine absorption lines as colder spots in the spectrum. The beautiful instrument known as the bolometer has recently been used by Professor Langley in feeling for these absorption lines, which, being regions from which the rays are stopped out, are, of course, colder than the remainder of the spectrum. The bolometer, like all the finest applications of science, is an extremely simple thing. It is a strip of fine wire, through which a feeble current of electricity is always flowing. This wire is slowly passed along the invisible gamut of the spectrum, and as soon as it comes to one of the absorption lines the spot is shown by a minute fall of temperature in the wire. This has an instantaneous effect on the flow of the electrical current. More current will pass through a cool wire than a warmer one, and the alteration is promptly shown by a delicate mirror galvanometer, which flashes its mimic signals onto a slowly revolving photographic ribbon. In this way Professor Langley has been able to pick out and locate hundreds of dark absorption lines in the great invisible spectrum which lies beyond the red. Not only is the absorption of rays by the solar atmosphere shown by this method, but the absorption lines of the earth's atmosphere are equally apparent. Dr. Huggins anticipates that the meteorologist will soon be applying the system to weather forecasts."

NEARLY all the glass eyes used in the world are made in Thuringia, Germany.



OPENING OF A POLE RAILWAY IN NOVA SCOTIA.

The Rewards of Philosophy.

Herbert Spencer's first important work, "Social Statics," was published in 1850, when he was just thirty. The great work of his life—the "System of Synthetic Philosophy"—was taken up in earnest ten years later.

The sacrifices involved in the preparation and production of the gigantic work thus heralded to the world were little short of heroic. Those who know Mr. Spencer by his books alone may have thought of him merely as devoting himself to philosophy out of the abundance of his material wealth and comfort. The truth is far otherwise. No man ever lived a more ascetic life or denied himself more for the sake of the task he had undertaken for humanity. In his evidence given before the Commission on Copyright he tells us in plain words, though in the most severely impersonal and abstract manner, the story of his hard and noble fight during the unrecognized days of his early manhood. Not a fight for bread, not a fight for fame, remember, but a fight for truth. For his first book, "Social Statics," in 1850, he could not find a publisher willing to take any risk; so he was obliged to print it at his own cost and sell it on commission. The edition consisted of only seven hundred and fifty copies; and it took no less than fourteen years to sell. Such are the rewards of serious thought in our generation! Five years later he printed the original form of the "Principles of Psychology." Again no publisher would undertake the risk, and he published on commission. Once more 750 copies were printed and the sale was very slow. "I gave away a considerable number," says Mr. Spencer pathetically, "and the remainder sold in twelve and a half years." During all that time, we may conclude from the sequel, he not only made nothing out of those two important and valuable books, but was actually kept out of pocket for his capital sunk in them.

"Before the initial volume, 'First Principles,' was finished," he observes, "I found myself still losing. During the issue of the second volume, the 'Principles of Biology,' I was still losing. In the middle of the third volume I was losing so much that I found I was frittering away all I possessed. I went back upon my accounts, and discovered that in the course of fifteen years I had lost nearly £1,200—adding interest, more than £1,200. As I was evidently going on ruining myself, I issued to the subscribers a notice of cessation."

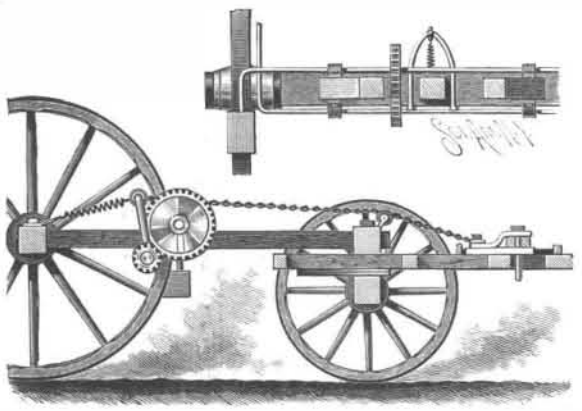
He had been living, meanwhile, in "the most economical way possible;" in spite of which he found he had trenched to that large extent on his very small capital. Spartan fare had not sufficed to make his experiment successful. Nevertheless, he continued to publish, as he himself bravely phrases it, "I may say by accident." Twice before in the course of those fifteen weary years he had been able to persevere, in spite of losses, by bequests of money. On this third occasion, just as he was on the very point of discontinuing the production of his great work, property which he inherited came to him in the nick of time to prevent such a catastrophe. Any other man in the world would have invested his money and fought shy in future of the siren of philosophy. Not so Mr. Spencer. To him life is thought. He went courageously on with his forlorn hope in publishing, and it is some consolation to know that he was repaid in the end, though late and ill, for his single-minded devotion. In twenty-four years after he had begun to publish he had retrieved his position, and was abreast of his losses. Think of that, you men of business. Twenty-four years of hard mental work for no pay at all, and at the end of it to find yourself just where you started! Since that time, it is true, Mr. Spencer's works have brought him in, by degrees, a satisfactory revenue; but consider the pluck and determination of the man who could fight so long, in spite of poverty, against such terrible experiences.—Review of Reviews.

No Water Vapor in Mars.

As the result of observations made at the observatory on Mount Hamilton, W. W. Campbell came to the conclusion last year that no aqueous vapor is contained in the atmosphere of Mars. This, says Knowledge, is quite a different opinion from that to which Janssen was led by his observations, published in 1867, which have been recently republished in the Comptes Rendus. In 1862, Janssen discovered the spectroscopic bands caused by aqueous vapor in our earth's atmosphere, these having been previously observed by Brewster in 1833. From the 12th to the 15th of May, 1867, after having first of all made himself familiar with the bands due to aqueous vapor, he made observations on the summit of Etna. On the 13th the cold was excessive, and the quantity of vapor in the earth's atmosphere was very small—not enough to make visible the lines in the solar spectrum called group C, and still less group D. When Mars was examined, groups C and D, although feeble, were distinctly visible. It was in consequence of this observation, confirmed later at Palermo and Marseilles, that Janssen announced the presence of the vapor of water in the atmosphere of Mars.

AN AUTOMATIC VEHICLE BRAKE.

The brake shown in the illustration applied to the running gear of a wagon is automatically removed from the wheels when the vehicle is moving foward, the brake being applied when the vehicle is backed or is standing at rest. The improvement has been patented by Henry N. Davis, of Dow City, Iowa. The shaft carrying the brake shoes is journaled in bearings on the rear hounds, shown in transverse section in the small figure, and centrally on the shaft is a gear wheel meshing with a pinion journaled in bearings on the under face of the hounds, the latter shaft having a handle for use when desired, and having also a central arched portion connected by a spring with the rear axle. The tension of the spring normally turns the



DAVIS' VEHICLE BRAKE.

shaft to cause the pinion to act on the gear on the brake shaft to apply the brakes, which are taken off when the vehicle is started by the counteracting tension of a chain carried forward over suitable guideways to attachment to a clevis pivotally connected with the doubletree, the bracket or clevis being secured to a block sliding in the tongue of the vehicle or on the forward end of the reach. When the horses draw forward, causing a limited forward movement of the chain, the pinion and gear are rotated to remove the brake shoes from the wheels.

Suicidal Wasps.

M. Henry, a Frenchman, being curious to see the effect of benzine on a wasp, put some of it under a glass in which a wasp was imprisoned. The wasp immediately showed signs of great annoyance and anger, darting at a piece of paper which had introduced the benzine into his cell. By and by he seems to have given up the unequal contest in despair, for he lay down on his back, and bending up his abdomen, planted his sting thrice into his body, and then died. M. Henry allowed his scientific interest to overcome his humanity so far as to repeat the experiment with three wasps, only to find that the other two did likewise. He is, therefore, of opinion that wasps, under desperate circumstances, commit suicide.

"AIR CUSHION" RUBBER PRINTING STAMPS.

The very low cost of rubber stamps, and their great convenience, have made them, of late years, almost as common about a business office as pens, ink and paper. The illustrations herewith represent an improvement lately introduced whereby the rubber stamp is made more valuable by being better adapted to print plainly on uneven surfaces. It is a patented device of the R. H. Smith Manufacturing Company, of Springfield, Mass., rubber type founders and stamp manufacturers, and consists of the interposition of an air cushion, as shown in the illustration, the cushion being just elastic enough to insure, with ordinary usage, a good impression on any surface, either uneven or yielding. The cushions will not lose shape or resiliency, as they are formed by minute cells which do not

connect with one another, and the cushion is mounted on handsomely nickeled metal plates. There are no pores to fill up with ink and dirt, or compartments to puncture.

Remedy for Insect Stings.

It is well known that liquid ammonia relieves the effects of the stings of bees. A correspondent informs us that a much more effectual antidote is the mixture known as ammoniated tincture of quinine. On several occasions, when stung by bees, he found that the quinine mixture would give much quicker and greater relief than ammonia alone.

Dentistry in Japan.

In a recent letter from Japan to the New York Herald, Colonel Cockerill has this to say about the profession of dentistry in Japan:

A practicing dentist in New York City writes me to inquire whether it be true that the Japanese government is about to establish a school of practical dentistry, and is in need of American talent in the professorships. Not at all. Japan is full of dentistry, and the native dentists are flourishing. There is a dental department connected with the medical branch of the Tokyo Imperial University. There are fifty-six practicing dentists in Tokyo, and each office has from four to twelve students. These young men assist at all operations. One works the drill, another handles the syringe, another passes up the gold foil, and the division of labor is quite scientific. Many of the Japanese dentists are graduates of first-class American colleges. They are quite skillful. The Japanese are quite fond of having their front teeth filled with gold. They frequently have holes bored in good teeth in order to have them plugged and polished. They think that the exhibit of gold fillings in front teeth suggests advanced civilization. San Francisco turns out about one hundred young Japanese dentists a year (?) There is a factory in Tokyo which turns out all manner of dental instruments and dental goods, including engines and porcelain teeth. There are four American dentists in Japan, but their business has been much shorn by the rapidly multiplying native artists.

Asafetida.

This is a bad-smelling substance, oozing as a milky, opaque, fetid juice from the root of Ferula fetida. From the root stock, which in full-grown plants is sometimes six inches in diameter and more than a foot long, somewhat resembling a beet, grow numerous spreading triparted leaves of a leathery appearance and light green color. Out of their midst rises a stem of a luxuriant, herbaceous nature, sometimes as high as ten feet, carrying at the top a numerously branched compound umbel of yellow flowers, which betrays the natural order of the plant—Umbelliferae. Although the odor is so offensive to us, we are told that the people of Bokhara use the small plant as a green vegetable as we do lettuce, and relish it. The root stock, which always protrudes several inches out of the ground, is freed from small rootlets and leaves in the month of June, selecting the plants that have not yet borne flowers, and a slice of it is cut off. The wound is then covered loosely with twigs and leaves, to exclude the sunlight, which retards the process; and it is left this way for a few weeks, at which time a thick reddish or brownish gummy substance is found on the exposed part. This exudation, a hardened suppuration of a vegetable wound, is removed, put into leather bags and taken to Herat, the commercial center of Afghanistan. It is stated, on good authority, that hardly any asafetida leaves that city in a pure state, a red clay being used as an adulterant, which the pharmacists of Europe and America have to filter out when making the tincture. From Herat the asafetida goes to India, and is thence brought by the Parsee and British traders into the markets of the world.

The rose of Kashmir grows in the same ground with the Ferula fetida; they drink the same dew, feed on the same soil, and the same golden sun ripens their fruits. But while the one fills the air with fragrance and enchants the eye, the other, like an evil spirit, destroys our rapture, and calls a chilly halt to our enchantment. Thus the good and the bad live close together, not only among the plants, but also among men; and this close proximity of contrasts directs the differing thoughts of the thinker.—Merck's Report.

A Word to Mail Subscribers.

At the end of every year a great many subscriptions to the various SCIENTIFIC AMERICAN publications expire.

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