

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW, NEW YORK.

O. D. MUNN.

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

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One copy, six months, postage included. 1 60

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The Scientific American Supplement

is a distinct paper from THE SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly; every number contains 16 octavo pages, with handsome cover, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, postage paid, to subscribers. Single copies 10 cents. Sold by all news dealers throughout the country.

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VOL. XXXVI, No. 24. [NEW SERIES.] Thirty-second Year.

NEW YORK, SATURDAY, JUNE 16, 1877.

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PROGRESS OF ELECTRIC ILLUMINATION.

In describing the Jablochhoff electric candle, recently, we noted the fact that the inventor was engaged on further experiments, and that new discoveries would doubtless soon be forthcoming. M. Jablochhoff now announces that he has succeeded in dispensing with the carbons of his candle altogether, and derives the light from the insulating material alone—a proceeding somewhat analogous to throwing aside the candle and igniting the candlestick. In fact, we cannot see that the inventor has left anything of the original electric lamp at all. He began, a few months ago, by abolishing all the elaborate regulating mechanism, and produced simply a pair of carbon rods, placed parallel, separated by an insulating partition of clay and held in a metal casing. This was made the subject of experiments by a War Office Committee of Royal Engineers, at Chatham, England, where the apparatus was demonstrated to give 50 per cent greater power of light than had ever before been obtained from any electric light.

Not contented, however, with this showing, M. Jablochhoff proceeded to denude his candle of its outer casing, leaving merely a double carbon wick with a strip of the insulating compound between the carbon points, which terminated at the bottom in metallic tubes as before. It was this form which we recently illustrated; and with this, M. Jablochhoff succeeded in arranging means for dividing the current, so that, instead of one very powerful light, he had eight from one and the same circuit. Six of these lights illuminated Marengo Hall in the Louvre, Paris, with a brilliancy equal to that of 100 argand gas burners of the largest size. The East and West India Dock Company, of London, recognizing the value of the invention, began at once to make arrangements to use it for illuminating one of their docks; and hardly have these arrangements been completed, when M. Jablochhoff now discovers that he can dispense with the carbon points altogether, and obtain the required light by passing the electric current through the insulating material itself, which is simply kaolin clay. It seems that, while experimenting with sparks from a current of great tension, the inventor passed them through a plate of kaolin, placed between the two ends of the wires from a couple of coils in which the current was induced by a magneto-electric machine. He then found that, although the current was unable to fuse the kaolin, it did heat it to incandescence. By priming the kaolin plate with a better conductor, he then succeeded in obtaining a very brilliant light with a very small consumption of kaolin, so small, indeed, that a kaolin plate barely half an inch in length is sufficient for a small light burning ten hours. A band of kaolin may be made to give a magnificent light; and as, practically, any desired number of coils can be placed on the circuit of the magneto-electric machine, and each coil can be made to produce an electric light, the divisibility of the light appears to be all that can be desired. In fact, the inventors—for M. Denayrouze is associated with M. Jablochhoff—have produced a series of electric lights of intensities varying from the equivalent of two gas jets to as many as fifteen. What is more, any one of these lights may be turned out, or the whole illuminating power of the current diverted into one burner.

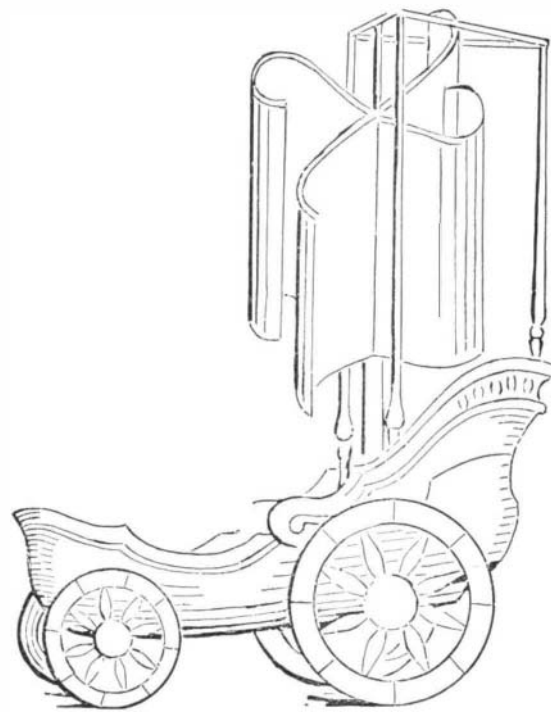
The inventors state that they have used bands of kaolin longer than the induction spark which the coil is capable of making, and that the intensity of the light, which is soft and uniform, depends on the number of spirals and diameter of the wires used in the coil. By using fifty coils, M. Jablochhoff says, it is easy to obtain as many lights of variable intensity. He has arranged coils so as to give a series of gradually increasing lights, ranging, as before noted, from two to fifteen gas burners in power. By using alternating currents the interrupter and condenser of the induction coils are dispensed with. The total system of distribution of currents is then reduced to a central artery represented by the series of interior wires of the coil, branching from which are as many distinct conductors as coils are placed in the circuit. It is proposed to employ the carbons arranged as previously described where an intense light is desired, and to adapt the kaolin light to the ordinary illumination of streets and buildings.

This is electric illumination minus voltaic arc, regulators and carbons, in fact, minus everything except the electrical generator, wires, and kaolin. M. Jablochhoff is still at work, and promises even further improvements.

SAILING AGAINST THE WIND.

Wendell Phillips, in his famous lecture on the "Lost Arts," used to delight in trying to convince his hearers that the ancients were more ingenious than the inventors of the present day; and it is well known that rude copies of some of our most noted devices have been discovered among the relics of past ages. Hence, without denying the possibility of there being anything new under the sun, we may naturally hesitate to believe that every so-called new invention had no counterpart in former times. An instance of a singular coincidence in the views of two inventors, at an interval of nearly two centuries, may be of interest. John Wilkins, Lord Bishop of Chester, and Member of the Royal Society, was equally celebrated as a philosopher and as a divine; and his writings on scientific subjects contain much interesting and valuable information. His treatise on "Mathematical Magick," first published in 1648, has a chapter entitled: "Of a Sailing Chariot, that may without Horses be driven on the Land by the Wind, as ships are on the Sea." In this, the writer speaks of the sailing chariots which were used by the ancients, and after describing their

construction, goes on to say: "I have often thought that it would be worth the experiment to enquire whether or no such a Sailing Chariot might not be more conveniently framed with movable Sails, whose Force may be imprest from their Motion, equivalent to those in a Wind-mill. Their foremost Wheels (as in other Chariots) for the greater Facility, being somewhat lower than the other, answerable to this Figure, in which the Sails are so Contrived, that the



Wind from any Coast will have a Force upon them to turn them about; and the Motion of these Sails must needs turn the Wheels, and consequently carry on the Chariot itself to any Place (though fully against the Wind) whither it shall be directed. The chief doubt will be, whether in such a Contrivance, every little Ruggedness or Unevenness of the Ground, will not cause such a jolting of the Chariot, as to hinder the Motion of its Sails. But this perhaps (if it should prove so) is capable of several Remedies. I have often wondered, why none of our Gentry who live near great Plains, and smooth Champions, have attempted anything to this Purpose. The Experiments of this kind being very pleasant, and not costly: What could be more delightful, or better Husbandry, than to make use of the Wind (which costs nothing, and eats nothing,) instead of Horses? This being very easie to be effected by those, the Convenience of whose Habitations doth accommodate them for such Experiments."

Now comes the proprietor of the "Universal Wind Power," with a patent granted last year, for a carriage propelled by a windmill, which, he says, "runs readily against the wind as well as in any other direction." He has gone further than Bishop Wilkins, for he has built a machine which has satisfactorily demonstrated its ability to do what is claimed for it; and now the inventor offers it for use in localities where there is plenty of surplus wind. On prairies and the sea coast, it is not improbable that this machine would prove very useful. Doubtless the proprietor of the "Universal Wind Power" believes that he is the original inventor of the device; but it may well be doubted whether he can hold the patent right to the use of the invention as a whole—that is, to the application of a windmill to a vehicle.

PASSAGE OF THE NEW GERMAN PATENT LAW.

We announce with much pleasure the promulgation of the new patent law for the German Empire, to take effect on and after July 1 next. This new law, although it is not quite up to the progressive ideas of our countrymen, is nevertheless a great improvement on the previous system, and opens to American inventors an additional market, of large extent, for their new ideas.

Heretofore it has been necessary in order to patent an invention in Germany to take separate patents in each separate State, of which there are twenty-one. Thus twenty-one sets of drawings and specifications were necessary, for each of which an agent must be employed and special fees paid. The total expense was so great that few patents were ever taken; the applications being confined to the larger States, foremost among which was Prussia. But here, unfortunately, was in vogue a stringent and narrow-minded system of official preliminary examination, resembling that which prevailed in this country twenty or thirty years ago. Under this Prussian system, patents for the most valuable improvements were rejected. Thus a patent for the Howe sewing machine could not be allowed in Prussia because it was not considered by the Prussian patent office examiners to be an original invention, but merely an improvement on some former attempt to sew by mechanism. A patent for the celebrated American invention of Broadwell, for gas-check rings for breechloading cannons, was refused in Prussia on similar grounds; but the Prussian Government copied Broadwell's plan and introduced the invention into its army and naval service, without allowing him any compensation. The celebrated German guns of Krupp are provided with Broadwell's invention, without payment to the inventor; although, with-

out the invention, Krupp's guns could not be successfully used. All of these objections are removed by the new law, which permits the patenting of improvements of all kinds except medicines and foods, as articles; but the processes of producing such articles can be patented.

The duration of the new patent is 15 years. It extends over the entire German Empire, comprising twenty-one States, and embracing an aggregate population of about fifty millions more or less.

Every patent is to be granted subject to the payment of an annual tax: subject also to a commencement of the working of the invention within the limits of the empire, within three years from the date of the patent.

These are some of the principal provisions of the new German patent law, concerning which we shall from time to time give our readers additional information.

In the meantime we would give notice to the many patrons of the Scientific American Patent Agency that Messrs. Munn & Co. have already completed their arrangements for taking patents in the German Empire under the new law, and are now ready to receive and give prompt attention to all applications. The proceedings are simple, and the costs light; the expenses, including the first year's taxes, amount only to one hundred dollars. Circulars of information, with particulars about the new German law and the patent laws of other foreign countries, England, France, Belgium, Austria, Italy, Spain, Russia, etc., may be had gratis at this office.

TAXING POWER OF THE LEGISLATURE.

In our issue of July 18, 1874 (page 32, volume XXXI), an article appeared quoting a portion of a then recent opinion of the court of last resort of the State of New Jersey, in the suit of "The Mayor, etc., of Newark vs. Agens et al.," which held in substance that the power of the legislature to tax or assess property, along the line of and for local street improvements, was limited to the special benefit which the property derived from such improvements. This position was contrasted with the nearly opposite view of the Court of Appeals of the State of New York, whose decisions have gone further perhaps than those of any other State in the Union, in holding that the power of the legislature was supreme in all matters of taxation, or, in other words, that "man was made for the State and not the State for man." The practical operation of this rule has been that, in many of our large cities, streets and boulevards have been built through pastures and swamps, under these legislative acts, without the wish or consent of a majority of owners; and the vast cost, with high prices and great frauds added thereto, has in many cases confiscated the property and ruined the owners; and the latter, under the decisions of our courts, have been without remedy.

That such a state of affairs should exist under a government not omnipotent, but where the people are supposed to rule, has led to much serious thought and discussion. It seems to have been considered by our courts quite fully, in the suit of Weisner vs. Village of Douglas—just reported in 64 N. Y. Reports, page 91—opinion by Judge Folger.

While this case turns upon the question of the constitutionality of the legislative act which authorized the village to issue bonds, to raise money, to pay for stock subscribed for, and collect by taxation to pay the bonds, yet the court, in its able opinion, holding the act unconstitutional, lays down a broad doctrine of equity, which, if applied, will relieve the people from many wrongs and much legalized robbery, even if it does not check reckless legislation. Honest taxpayers have long suffered from oppressive legislative acts; and whatever the future may disclose, they have seemed in the past to have no proper remedy in the courts.

ZINC-LINED WATER COOLERS.

Several correspondents have lately written to us concerning zinc-lined water coolers, complaining of the disagreeable flavor which the zinc imparts to water from melted ice. Several weeks ago, we had occasion to note the deleterious effects of water that had passed through zinc-coated or galvanized iron pipes. It is obvious that what was there said equally applies to zinc or galvanized iron-lined water reservoirs of any kind, although we admit that the corrosive action of any fluid is greatly diminished by a reduction in temperature. We think there can be no manner of doubt that the use of zinc or galvanized iron for such purposes is highly objectionable. The general action of zinc salts on the animal system is to cause persistent diarrhœa; and in conjunction with the enervating effects of hot weather and other causes tending in the same direction, this may result in very serious consequences—more especially with young children and persons suffering under the infirmities of age. During the next few months, these ice water fountains will receive marked attention, so also will cholera mixtures. If our readers would avoid headache and nausea, let them banish these "crystallized" coolers. The best lining for such vessels is, perhaps, porcelain enameled iron; but, unfortunately, there is always a doubt as to the amount of soluble lead the enamel may contain. We have seen some of these enamel-lined coolers in the market; but as they cost nearly twice as much as an ordinary cooler, their sale is very limited, while the handsome galvanized iron ones are round nearly everywhere. Tinned plate has been found unsuitable as a lining material, as the tin soon wears off and exposes the iron. Iron discolors and imparts a disagreeable styptic taste to the water. Glass, porcelain in general, and stone-ware or pottery, if free from lead glaze, may be used.

Sawdust is often used in lining the walls of water coolers; but charcoal, in moderately fine powder, is much superior. Care should be taken, in filling the vessels with water, not to wet the lining, as when wet it becomes almost useless. Ice water—that is, water from melted ice—is not conducive to health; but it becomes more pernicious when its reservoir has been a zinc-lined vessel.

QUADRUPLIX TELEGRAPHY.

"We are not aware," says the editor of the London *Telegraphic Journal*, "that a quadruplex circuit exists in England at present, although we are assured that since 1874 quadruplex telegraphy has been an established fact in America, and that its employment there has been eminently successful. Statistics are nevertheless wanting to establish its practical value."

"* * * We seem to be still as much in the dark as ever to the real advantages of quadruplex telegraphy. Without entering at all minutely into the system, it is sufficient to state that the difficulties inherent to the adoption of quadruplex telegraphy are greater than at first sight would be imagined." * * * "Working a quadruplex system—that is, four circuits upon one wire—to meet the requirements of busy centers of commerce, looks very much like intrusting too many of the eggs to one basket, and in the event of interruptions could not fail to be attended with the most serious inconvenience."

For the information of our valued British cotemporary, we would state, by way of statistics, that the Western Union Telegraph Company is now regularly operating, daily, by the quadruplex system, about twenty thousand miles of its wires. The lines between New York and all the large cities, as Boston, Philadelphia, Pittsburgh, Chicago, St. Louis, Washington, New Orleans, are worked by the quadruplex plan.

For the illumination of our cotemporary, we would state that the real advantage of quadruplex telegraphy is that it permits the sending of four messages over one wire during the time heretofore required for sending one message by the old method. In other words, as much business may be done over one wire, by the quadruplex, as can be done over four wires by the common plan.

There are no inherent difficulties about the adoption of the new system in England. All that is needed is to send over to New York a postal money order and pay for as many instruments as are wanted, and then set them to work. They will work just as well in London as here.

To stand in the gallery of the great operating room of the Western Union Company, in this city, and gaze upon the multitude of operators there daily at work with the quadruplex instruments, does indeed seem like looking upon a good many eggs in one basket; but we hear of no inconvenience or interruptions therefrom resulting. On the contrary, so great is the regularity and necessity for the new system that the business of the Western Union could not now be transacted except for the quadruplex, the use of which is being rapidly extended. Finally, we suggest to our cotemporary that he make a summer excursion over here and learn something about modern telegraphy. The absence of the quadruplex in England shows conclusively that his countrymen are several telegraphic generations behind the age.

LOCUST PROSPECTS.

BY PROFESSOR C. V. RILEY.

Before spring opened, the most gloomy forebodings prevailed throughout the so-called Western States as to the prospective injury from the Rocky Mountain locust. Nor were those forebodings without foundation. Eggs were laid last fall over an immense stretch of country, from the 94th to the 98th meridian, and in some cases reaching into the mountains, and from near the British American line to the Gulf of Mexico. They remained for the most part sound throughout the winter; and notwithstanding that those which prematurely hatched, or were destroyed by the many different animals that feed upon them, more than sufficient remained as the ground thawed out to give birth to locusts enough to ruin most crops. The young insects began to hatch whenever the weather was favorable, often in such quantities as to daunt the most hopeful; they were graphically described as "boiling out of the ground," and they began to mow down the more succulent plants and to do great injury to young wheat. In some sections, the farmer was prepared and determined to make a fight; and wherever the war was waged with spirit, brains, and concerted action, the foe was vanquished. Yet in many, if not most, instances, he would have given up in despair, had not Dame Nature come to his aid with various most efficient allies. The insects soon began to disappear and to lose their voracious appetites, and at the present time there is, in most of the threatened country, no longer serious alarm, but, on the contrary, every prospect for more than average crops.

Having recently returned from an extended tour of investigation in Texas and Kansas, I take the liberty of quoting from a letter written on the 10th of May and addressed by me to the Governor of the latter State, that portion which bears more particularly on the disappearance of the young locusts:

"In every part of the State I have visited, and where I have examined carefully the condition of things, the young locusts have very largely—in some instances totally—disappeared; and I now have no doubt whatever that the reports of such disappearance that are so general throughout the entire portion of the State that was threatened have their foundation in fact. This disappearance is generally attributed to death and dissolution from the cold and wet weather that followed the principal hatching. That

this weather has been largely instrumental in causing death among the hopping pests I have no doubt, because there are always a certain portion just hatched or just molting, which are particularly tender and susceptible to the injurious effects of cold, drenching rains. But they have been yingd and are now dying fast during the present warm and sunny weather, and these dead insects are not parasited, but simply diseased—sick. In my last (9th) report made to the State of Missouri, in stating the causes that might diminish the prospective injury, I wrote:

"We may therefore expect that, as compared with 1875, a larger proportion of the young that will hatch in 1877 will be weakly and will soon perish. * * * There is a bare possibility that, after the bulk of the young have hatched, and before they have commenced to do serious harm, we may have such unseasonably cold and wet weather as to kill them by myriads, and effectually weaken their power for injury."

Both possibilities have become actualities.

It is a singular fact, however, that, notwithstanding the large numbers which hatched, no one has been able to discover the dead carcasses of these disappearing locusts in anything like the numbers necessary to account for the disappearance; and in most instances where dead insects have been reported to me, an examination at once showed that the parties had mistaken therefor the exuvie or empty skins of those which had molted; which skins are always abundant under straw or weeds, or at the base of a wheat stool, where the young insects congregate when undergoing their molts.

The young locusts possess remarkable tenacity of life; and the fact that the bulk of those remaining are in the third stage (that is, have molted twice) and must have hatched before the unfavorable weather set in, is in itself enough to show that other factors than those meteorological have entered largely into the problem of disappearance. The principal of these I will briefly enumerate, because, unlike meteorological or climatic influences, they may, most of them, be relied upon in future, are largely within man's control, and may even be rendered still more effective. They are, in short, elements of certainty in the problems of locust destruction:

First—The natural enemies of the locust. These consist in the present instance (the parasites not affecting it till it gets older) of the vertebrate animals which are known to feed upon it, such as snakes, gophers, field mice, etc., and birds. These last have been more efficient than most of us imagine, and I never saw blackbirds, plover, the Lapland longspur, etc., so numerous. The dung often whitens the fields where the locusts were once thick, and they have been the principal cause of the latter's disappearance. The prolonged cold and wet retarded the development of the insects, benefited the wheat, and gave our feathered friends an excellent opportunity to check them. We should employ all means to encourage the multiplication of the birds.

Second—The farmers. In most parts of the State I have traversed, the farmers had determined from the beginning to make war, and they did make war, and so successfully that the insects were pretty effectually destroyed before the cold and wet occurred. The means employed were mostly kerosene pans and burning—over 700 kerosene pans having been made at Salina alone.

Third—The weather. The continued cold, after the principal hatching, had the effect, as already stated, to kill many that were just hatching or molting. The heavy rains also washed many away into the streams; and in some instances, on soils which contain sand and lime, and which are liable to crack when dry, the rains doubtless covered up and killed such as were sheltering in such fissures.

Fourth—Climate. The fact that the insects, especially after the second and third moltings, are dying, is simply confirmatory of the views I have always held and advanced, that the species is out of its natural habitat, and can never permanently thrive here. These views I need not repeat at length here. While the number that have become sickly and died have not so far begun to compare with those which have perished in the other three ways mentioned, it will doubtless continue to increase as the insects get larger, for already they show a tendency to unnaturally group together during the heat of the day, and feed much less ravenously than when in perfect health."

It affords me pleasure to be able to state that the favorable condition of things reported in the above-quoted passage is not confined to Kansas, but is general. In parts of Minnesota, where the eggs were so thick that to dig the ground when at all moist was to make a paste, the little red mite (*trombidium sericeum*) has swarmed and destroyed them. In other places birds have pecked the ground full of holes in their search for eggs; and from Iowa, Nebraska, and Colorado, the reports are almost unanimous that the young insects that continue to hatch also continue to perish.

A survey of the field at this writing gives every assurance of good harvests throughout the threatened country. They are needed! With ruined crops this year, following so closely the injury of the past few years, many a farmer would have been bankrupt, and the whole country would have seriously suffered. The sickness of the locusts as compared with those of 1875 is a most encouraging sign. Comparatively few will live to get wings. Those that became fledged in Texas are passing northwest in scattering and insignificant flights. The Saskatchewan plains and the northwestern hatching grounds were pretty well depleted last year; and there is every reason to hope for freedom from any general and disastrous invasion for some years to come. St. Louis, Mo.

Sideraphthite.

Sideraphthite is the name given to a new alloy composed of 66 parts of iron, 23 of nickel, 4 of tungsten, 5 of aluminum, and 5 of copper. It is said to resist sulphuretted hydrogen and the vegetable acids, and to be but slightly attacked by mineral acids. It is really more useful than silver, and can be prepared at less cost than German silver.

In our notice of Mr. D. L. Holden's patent for an ice machine, published on page 330 of our issue dated May 26, we gave his address as "Carrington, Ky." It should be "Covington, Ky."