on the left in the background is shown the fine building of the *Staats Zeitung* newspaper, which stands at the angle made by the junction of Chatham and Center streets. Around this building sweeps the elevated railroad, which as usual defaces the fine facade of the contiguous structure and aids in obstructing a street already too narrow for the traffic which passes through it.

The northern most of the two tall edifices in the middle of Fig. 2, previous page, is the *Daily News* office, the other is the iron structure formerly used by the *Staats Zeitung*. At a point about eighteen inches north of the north wall of the first mentioned building, and consequently in the small house adjacent thereto, falls the center line of the Great East River Bridge, and at this point is the junction of both this line and a line drawn, with a slope of 3¼ feet per 100, from the top of the New York anchorage. Here, then, is the starting place of the immense inclined plane of masonry which forms the approach to the bridge. On each side of the center line for a distance of 55 feet the buildings will be demolished, and in lieu thereof will appear the entrance to the grand aërial avenue. The change thus effected is represented in Fig. 3, and in Fig. 1 the reader is supposed to be looking up the magnificent perspective which will be visible from City Hall Park. The length of the approach from entrance to summit of the anchorage is 1,562½ feet. The latter, it will be remembered, is an immense pile of masonry, located on Water street, in which are imbedded the iron anchors and chains to which the cables are attached. From anchorage to pier the distance is 940 feet. Then comes the span of 1,595 feet crossing the river, another stretch of 940 feet from pier to anchorage, and lastly the Brooklyn approach, which will be but 836 feet long, or somewhat more than half the length of that on the New York side; so that the whole length of the bridge will be nearly 6,000 feet. The great piers rise to a height of 268 feet above high water, and at the water line measure 134 feet in length by 56 feet in breadth. The cables enter the anchorage walls at an elevation of nearly 80 feet above high water.

From our large illustration it will be seen that the width of the approach is not uniformly maintained. Beginning at 100 feet—the extra 10 feet of ground being taken for convenience in construction—it continues at this width for a distance of 600 feet; then it narrows to 85 feet, and this is the uniform width until the roadway is once more broadened on the Brooklyn approach. The space afforded at the 100 feet section is partitioned off into four carriage ways, three footways, and two railways for rapid transit. A pair of carriage roads are arranged at each side, the other thoroughfares being placed intermediately. The narrowing is effected by omitting two footpaths. The rapid transit roads will be provided with endless ropes connected with powerful engines at the termini. To these cables the cars will be attached by ingenious clutching devices, and in this manner they will be drawn over the bridge. The carriage ways may be used either for street cars or for carriages. Upon them are to be laid iron and steel trams, some fourteen inches in width, to accommodate wheels of any width apart. These are also so made that they will serve as tracks for the street cars.

The roadway of the approach rests upon a series of semi-circular arches, supported by piers of granite and brick. In these piers openings or cells are left in the masonry to economize material. On the north side the exterior of the approach will be closely contiguous to the adjacent buildings. On the south side there will be a street of varying width, in some places reaching 100 feet. It is possible that the three small buildings on the south side of the approach may also be removed, as indicated in Fig. 3, in which case there will be a fine broad thoroughfare running parallel with the approach. This subject is, however, still under consideration. The facade of the structure wherever visible is of dressed granite of two colors. The spaces within the arches will be devoted to warehouse purposes. In each will be two floors, the loftiest being from 30 to 37 feet above the ground. These will be rented for any business use not likely to prove injurious to the structure, and will doubtless prove a remunerative source of revenue.

The arch construction of the approach is varied where streets are to be crossed. At Franklin Square there is an iron truss skew bridge of 210 and 170 feet span. At Cliff street, there is a stone and brick structure of 51 feet 8 inches span, and at Vandewater street one of 40 feet. The other bridges are to be simple box girders.

The entire approach will be so ornamented as to present an imposing appearance. A pierced parapet will crown the edges; the girder bridges are of a unique design that is very tasteful; and at intervals along the roadway handsome gas lamps will be placed. In all probability this splendid structure will be completed within the next two years.

PROGRESS OF BRITISH TORPEDOES.—The laboratory torpedo is as far ahead of the Whitehead as the latter was in advance of its rivals. The new torpedo, it is said, can travel at a speed of thirty miles an hour, and can be adjusted with more certainty than its rival. The authorities at Woolwich now decline to show distinguished foreigners all that they are doing.

TESTING THE TAY BRIDGE.—The great Tay bridge was lately tested by running six engines (each weighing 72 tons), at first singly, and subsequently coupled together, over the whole of the spans. That weight is more than double the greatest possible working load, and the extreme deflection was found to be only 1¼ inch.

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.

One copy one year, postage included..... **$3 20**
One copy, six months, postage included **1 60**

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at $3.20 each; additional copies at same proportionate rate. Postage prepaid.

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.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, postage free, on receipt of *seven dollars*. Both papers to one address or different addresses, as desired.

The safest way to remit is by draft, postal order, or registered letter. Address MUNN & CO., 37 Park Row, N. Y.

☞ Subscriptions received and single copies of either paper sold by all the news agents.

The Postal Union.—Under the facilities of the Postal Union, the SCIENTIFIC AMERICAN is now sent by post direct from New York, with regularity, to subscribers in Great Britain, India, Australia, and all other British colonies; to France, Austria, Belgium, Germany, Russia, and all other European States; Japan, Brazil, Mexico, and all States of Central and South America. Terms, when sent to foreign countries, Canada excepted, $4 gold, for SCIENTIFIC AMERICAN 1 year; for both SCIENTIFIC AMERICAN and SUPPLEMENT, $9 gold for 1 year. This includes postage, which we pay. Remit by postal order or draft to order of Munn & Co., 37 Park Row, New York.

VOL. XXXVIII., No. 14. [NEW SERIES.] *Thirty-third Year.*

NEW YORK, SATURDAY, APRIL 6, 1878.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF
THE SCIENTIFIC AMERICAN SUPPLEMENT
No. 118,
For the Week ending April 6, 1878.

Price 10 cents. To be had at this office and of all newsdealers.

Remit by postal order. Address

MUNN & CO., 37 Park Row, New York.

CITY PARKS AS GARDEN SCHOOLS.

It is scarcely a reproach to be considered too philanthropic, but after carefully reading Dr. Edward Seguin's proposal for the conversion of our city parks into garden schools, we are inclined to think that his desire to benefit the people is in excess of the advantages possible under his scheme. His idea is to convert the parks into species of museums; to introduce plants so classified and arranged that whoever examines them will involuntarily absorb botanical knowledge; to exhibit the appliances for "artificial hatching, breeding, and fattening poultry, raising the silk worm, etc.; to make the ponds lively with the appliances of hydraulics . . miniatures of great American water falls . . . shells, fishes, and the wonders of fish culture; to render the rocks and caves geological specimens," and so on, the motive being to facilitate education, or, in other words, to enable children to become educated through the medium of play.

There is a wide gulf between Dr. Seguin's plan and the outrageous proposal on the part of the city politicians to grab one of our largest and finest parks for the benefit of the young men who find pleasure in tricking themselves out in gaudy clothes and playing at soldier; but it is only necessary to remember that the parks are meant to be places of recreation for all classes of people, to perceive that a project which adds to the restrictions which must be cast around their use is only in degree less objectionable than one which prevents their enjoyment altogether. The main difficulty in our American mode of life now is that we are constantly tending to obliterate the distinction between work and play, by crowding work into hours which ought to be devoted to perfect relaxation of mind and body. If work must be done unremittingly the practice should be confined to the strongest years of life, and the preparation for such an existence manifestly is not an anticipation of it in childhood. The acquirement of knowledge is work, depending upon the nature of the individual, easy or difficult as the mind is receptive or the reverse. As a rule school hours are intelligently adjusted with a view to taxing the young brain to a safe limit; and to put any more upon it, by compelling children, voluntarily or involuntarily, to absorb more knowledge of the kind which should be, if it is not, taught in school, and this during their play hours, is simply continuing work. Besides play that is of any value as play has in its very essence freedom. The parks even now are sufficiently restricted, and if to "Don't walk on the grass," "Don't pick flowers," "Don't break trees," we are to add, "Don't meddle with the machines," "Don't carry off the specimens," "Don't step on the beds," "Don't paddle in the fish pond," and a score of other "don'ts," we might as well close the ground to the children at once.

Again, this project of Dr. Seguin's (which by the way by no means lacks eminent support, for we find it indorsed by Professors Newberry and Eggleston, the late Dr. Peaslee, and other well known citizens and scientists) does not take into account the fact that the immense majority of those who enjoy our parks are the poorer classes, who, in the breathing spaces which have been niggardly enough dealt out, find a welcome relief from the cramped quarters of the tenement, and as affording such relief it can hardly be contended that converting the parks into schools will enhance their value.

DISRESPECT OF INVENTORS' RIGHTS.

English literary journals are not remarkable for their appreciation of inventors' rights. Indeed, it is only too common with them to side with the aristocratic element of society in regarding inventors as, for the most part, poor devils who put themselves and their betters to no end of trouble by interfering with vested rights and established interests; that is to say, inventors who have not inherited or achieved distinction or title. If Sir John or Sir William invents anything, it redounds immensely to his credit and the credit of the British name. But if the unknown mechanic Jack or Bill does the same, and expects to be paid for his invention, it is quite another affair.

Accordingly a little plain talk from a paper like the London *Examiner*, touching the honesty of respecting the rights of inventors, seems decidedly encouraging. Somebody writes to the *Times* that Mr. Graham Bell certainly deserves the highest honor for his wonderful invention, the telephone, and then proceeds to say that the price of the instrument need not prevent any one from possessing a pair. The materials for making them can be purchased for a few shillings, and it is an easy matter to put them together. He himself had made a pair of excellent quality, at a cost of only fifteen shillings; and he goes on to show how others may do the same, unconscious that he is confessing peculation to the amount of about £24 5*s.*, and that he is instructing the public how to deprive the author of "this latest and most wonderful invention" of the reward of his labors.

Whereupon the *Examiner* remarks that the principles of common honesty are not so well understood as they ought to be; at all events there is a sad indisposition to give inventors and patentees the benefit of them:

"We presume that this gentleman would scorn to take £24 5*s.* from the pocket of a person who had earned his money by gambling, or on the stock exchange—that would be stealing. But Mr. Graham Bell happens to ask to be rewarded for rare ingenuity, patience, and scientific knowledge, and he is therefore fair game. 'Those that have brains should have no money' is this gentleman's new reading of the claimant's celebrated apothegm. A few complimentary phrases should satisfy them."

The disposition to invade inventors' rights, and to reward their services with empty compliments, may be less prevalent here than in England; nevertheless it is well now and then to look at it from the standpoint of simple honesty. Stealing is stealing, whether the theft is of material property or non-material.

A WORKING MAN.

Genius has been defined as a capacity for hard, steady, and long-continued work; the ability to "toil terribly," as one man of genius has expressed it. The definition may be accepted as a reasonably fair one, with the single addition that genius implies also the gift of working wisely. It is the direction that genius gives to toil, not less than the amount of it, that makes that toil so beneficial to mankind. In whatever way a modern man achieves true eminence he must work for it; and the work done by many of our really great men is positively appalling to men of less power and capacity for endurance.

There are few living men who have made their personal influence for good more variedly felt than Sir John Lubbock. In each of half a dozen different departments of useful activity he has done enough (had he done nothing else) to give him an honorable rank as an original observer, a sterling contributor to the world's progress; and the fertility of his mind seems not more wonderful than its scope and well directed energy. All owing to favorable opportunity, do you say? To inherited position, wealth, schooling, and the like? Hardly, as the history of his life will show. He owes much to such advantages; yet thousands of men have all these and more, but, lacking the disposition and the capacity for hard work, they make no permanent mark.

In his education, Lubbock illustrates what is almost a law with respect to the evolution of men of genius; his early home influences were good and liberal, and he subsequently escaped having his natural force and originality ground out of him by a formal course of university teaching. Before he was fifteen years of age the death of two of the partners of his father's banking house compelled him to leap the gulf between Eaton College and Lombard Street. From that day to this the business of his life has been banking; the investigations which have made him so widely known as naturalist and man of science have been his recreations.

The duties of his desk necessarily occupied the business hours of his youthful years; yet he found opportunity to continue his interrupted studies, and to gratify a taste for natural history which had been early fostered by an intelligent father, and subsequently stimulated by the example of Darwin, who at this time was a near neighbor of the Lubbock family.

The results of his labors in this department began to show themselves in technical journals before he was of age. At twenty-three he contributed to the "Philosophical Transactions" of the Royal Society, and to the entomological and other scientific journals. Since then his yearly contributions show at least a habit of steady application to this sort of original investigation. His recent papers on the intelligence and life habits of bees, ants, and other insects, and their service in fertilizing flowers, are familiar to all readers of the SCIENTIFIC AMERICAN.

In 1865, on the death of his father, he succeeded to the baronetcy and became Sir John Lubbock. Soon after he was induced by the Liberals of West Kent to stand for Parliament, but was beaten. In 1868 he retired in favor of Mr. Lowe, after nomination for the representation of the University of London by a committee of men of the highest scientific eminence. After another unsuccessful attempt for West Kent, he was elected for the borough of Maidstone in 1870. In the meantime he had entered into the discussion of the primitive condition of man, publishing first his "Prehistoric Times," and subsequently a work on the "Origin of Civilization," ably defending his position throughout the controversy in numerous scientific and other periodicals.

As statesman, Sir John has been as hard and successful a worker as in the domain of nature and early man. He has been a conspicuous representative of many and important interests, and has had the honor of piloting through the House of Commons several bills of signal importance to industry, commerce, and science. As the head of a great banking house he has made his influence felt in many ways. One of his most important services to bankers was the organization of the London Clearing House, with the introduction of a system of clearing checks, which extended to country banks the system followed by the London bankers. He represents in Parliament the London Association of Bankers; was a member of the International Coinage Commission, and has contributed not a little to financial literature. As a political writer he has also attracted attention, notably in his paper on the "Imperial Policy of Great Britain," published about a year ago.

In addition to all this labor as banker, Member of Parliament, and scientist, he has found time to serve as Vice Chancellor of the University of London, as member of the Public Schools Commission, and of the Royal Commission for the Advancement of Science; he has lectured before the British Association, the Royal Institution, and many scientific societies in the chief towns of England. He has been Vice President of the British Association, of the Royal Society, and of the Linnæan Society; also President of the Ethnological Society and of the Entomological Society. He is a fellow of all the societies above named, and of the Geographical Society, the Geological Society, the Society of Antiquaries, and other scientific bodies at home and abroad. He is also a magistrate, and withal a clever hand at mechanical work. It is said that his daily manual work would entitle him to a fair return on the wages of an artisan.

Would-be representatives of the working man—like Citizen Swinton, or Schwab the beer seller, or Kearney the cab man—would probably call Sir John a pampered aristocrat, and dispute his right to the title of working man; but the real workers, whether manual or intellectual, or both combined, cannot but honor him as a real worker, a useful worker, an uncommonly hard worker.

THE TELEPHONE A SENSITIVE ELECTROSCOPE.

The law first discovered by Faraday more than 40 years ago, that intermittent electric currents will induce other currents in neighboring conductors, was applied to advantage in various forms of small machines with double and triple coils, mostly used for medical purposes, and culminated in that powerful modern apparatus now found in most all physical cabinets, the Ruhmkorff coil.

The experiments proving that such currents are also generated when the wires are not close together are well known to electricians. But when the wires are several feet distant it requires delicate galvanometers or other electroscopic appliances to demonstrate their presence.

As the telephone is an instrument adapted to be acted upon by very weak electric currents, and to manifest their audible effects, it may be anticipated that it is very well adapted to test the presence of currents incidentally induced by other currents passing through neighboring wires, and the observation of such phenomena has caused the most intense surprise among those not acquainted with the law of electric induction, making them wonder how the current passes from one wire to another through several feet of intervening air. From the first time the telephone was used many strange sounds were heard, which often interfered with the successful use of the instrument, especially when the return currents went through the ground; but even while using two wires extraneous sounds were noticed, and finally it was found that the click of the Morse telegraph was transmitted through the telephone when its conducting wires were suspended on the same poles as those conducting the telegraphic messages. Finally, when the separate wires of several telephones are carried together by the same poles, or only in proximity to each other even for a short distance, the sound of every telephone was found to be transmitted to the others. The latest instance we find recorded in a late number of the Rochester *Evening Express*. It mentions that a strange fact not on the programme was developed in recent experiments. While Professor Johnson was, during the afternoon, preparing the instruments so as to transmit the singing from Buffalo to Rochester, by means of the Western Union telegraph wire, the sound was also distinctly heard through a telephone in another locality (Mannel's store), which had no other connection with the Western Union wire than that. The wire connecting it with Buffalo ran parallel and near to the Western Union wire, but nowhere touched it. It is further reported that a similar state of things took place during the concert, when the cornet solo and singing in Buffalo were also heard in a third telephone in Amsden's office, the wire of which at no point approached nearer to the Western Union wire than a distance of ten feet.

It had before been noticed that sounds were heard in Amsden's office when the telephones of the Vacuum Oil Company were used, the wires of which were parallel, but did not approach each other at any point within several feet. The Rochester editor adds: "This we regard as one of the most wonderful developments yet of this mysterious force of electricity, but perhaps the electricians will be able to give some explanation of the fact, which is well attested."

It will be seen from what we said in the beginning of this article that not only is there an explanation, but that it is founded on one of the best known and established laws of electricity, and that even the whole phenomenon was anticipated; however, it must be confessed that no one did anticipate such a perfection of detail as practical experience shows to be attainable, and it proves the telephone to be one of the most sensitive electroscopes for detecting the presence of induced currents.

NICKEL PLATING.

The plant necessary to commence nickel plating consists of a battery, preferably of the Smee type, with carbon negative; a well bolted oblong wooden tank, of a size to suit the articles to be plated, coated on the inside with good asphalt, and nearly filled with the nickel solution; nickel plates for anodes, and brass rods to suspend the plates and work in the bath; suitable vessels for an alkali, an acid, and soft water for cleaning the work before placing it in the nickel bath; polishing and buffing lathes, rouge, crocus, etc. The bath may be composed either of the chloride of nickel and ammonia or the corresponding sulphate, dissolved in pure water. If the latter is used, the solution must be kept neutral and up to about six degrees of hydrometer. It is prepared by dissolving ¾ lb. of the salt in each gallon of water. This salt is generally considered the best for nickel plating, and costs only $1.30 per pound. From this bath the nickel can be profitably deposited at $2 a pound. The chloride bath requires about four ounces of the salt per gallon, and works better with a slight acid reaction, the tendency in working being toward alkalinity, even with great exposure of anode. The intensity of battery current must be proportioned to the bath, and remain constant. Large baths offer less resistance to the electric current than those of smaller dimensions, and can therefore be worked with a current of somewhat less tension. For a bath of 10 gallons or less, the tension of the current should be equal to that of from 2 to 3 Smee cells (carbon and zinc) in series. The exposed surface of the nickel anodes should in no case be less than the surface to be coated, but may with advantage be greater. The amount of battery power for a given amount of work should be in zinc surface equal to the surface to be coated, with care to preserve the normal tension of the current. If the current is too intense the coating will present a dull white or frosted appearance. The anodes must be in connection with the negative plate (carbon) of the battery. Damage is not infrequently done to the bath and work by misconnection.

The work should be scrupulously clean when entered to the bath, and should be carefully moved about after entering to free it from any adhering air bubbles. If the finished work is to have a smooth polishing surface it must present such a surface before entering the bath. Nickel is hard and cannot well be burnished. Traces of oil and grease are removed by a hot soda solution. After dipping in clean water the surface is freed from films of oxide by an acid bath. If the work is of iron the acid may be hydrochloric diluted with three or four volumes of water; if of copper or brass, of nitric acid diluted with about twenty parts of water. Brighten the work in the acid dip, then immerse momentarily in water; go over it with a clean stiff brush and very fine sand; again dip in the acid, then quickly in soft water, and place immediately in circuit. The hand must not come in contact with the surface of the work after removal from the alkali, as the slightest touch may spoil all. On removal of the work from the plating bath it should be immediately dipped in cold water and transferred to hot water, which will cause it when taken out to dry quickly and perfectly. The bath should be covered when not in use, to keep out dust and prevent as much as possible its evaporation.

By a little practice and proper attention to these simple rules the nickel bath may be worked continuously, month after month, and the metal deposited smoothly and with certainty. Magneto-electric machines, such as those of Gramme and Weston, are now gradually replacing galvanic batteries in large electro-plating establishments.

THE WORKING WOMEN'S HOTEL.

The fine building on Fourth Avenue, Thirty-second and Thirty-third Streets, designed by the late A. T. Stewart as a home for the working women of New York city, is being rapidly put in order for the reception of its guests. The exterior work was long since finished, but until recently much remained to be done to complete the interior arrangements. The plans of the building were made by Mr. John Kellum, and were evidently well considered. The result is far in advance of any similar enterprise of the kind, every detail being especially adapted to the purposes of the structure.

There are 502 sleeping rooms of various sizes, together with eight reception rooms and extensive parlors and dining rooms. A library of nearly 3,000 volumes is one of the best features, and it is furnished with suitable desks and conveniences for writing. The carpets, upholstery, etc., were designed and made for this especial purpose, and the general decorative effect is artistic, the tints and forms being harmonious. The mechanical arrangements of the house are excellent. There are five elevators, besides stairways. Water is supplied by steam pumps from an artesian well on the premises, and the gas burned will be made in the building. This independence with regard to water and gas will effect a considerable saving, and will allow of a more liberal use. Steam heat will be introduced.

Within the building is a large court containing a fountain; and this, as well as the imposing entrance, shows an intention to make the hotel something more than merely comfortable.

The *Tribune* states that the minimum charge for those living at the hotel will be $6 per week, and from that amount up to $10 per week. These rates will be too high for the great number of working girls in New York, who are paid from $3 to $7 per week. But it is expected that a large class of women will find a home at this place. The artists, writers, teachers, students, telegraph operators, actresses, and the majority of women engaged in the finer mechanical and commercial pursuits, are believed to be numerous enough to fill many such hotels.

Practical Utility of Lubricators.

Dr. Joule, of Manchester, England, one of the most distinguished chemists of the day, has made a thorough investigation of the subject of friction and heat; and it is now not only well known that the loss of heat is loss of power, but the value of the power lost can be estimated almost to a fraction. "We may gather from this knowledge," says Mr. W.H. Bailey, "when we apply it to workshop economy, that if a pedestal or bearing becomes so hot through friction as to cause one pound of water to be raised one degree Fahrenheit in temperature in one minute, heat has been lost equal to that which would be created by a weight of one pound falling through a space of 772 feet. We are told that if we apply this conversely, heat has been lost which would lift one pound weight 772 feet; and if we apply these illustrations still further, and imagine forty-two pedestals or bearings losing heat by friction in a similar manner, we may inform ourselves that we are losing nearly one horse power, because they represent 32,424 foot-pounds of force; and if we know from our books what our coal costs, it will take very little trouble to give us the exact cash value of this friction and destructive action."