

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW, NEW YORK.

O. D. MUNN.

A. E. BEACH.

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NEW YORK, SATURDAY, APRIL 16, 1881.

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THE UTILIZATION OF KNOWLEDGE.

It is a suggestive circumstance—suggestive to young inventors at least, and encouraging withal—that the very first manifestation of electric action observed by men, namely, the attraction which an electrified body has for light objects, is the last to be signally utilized in the arts; and that, too, not in some new or original art by some learned investigator in electrical science, but by a couple of boys, and in an industry which is as old as civilization.

The development of what is called frictional electricity by lightly rubbing a poor conductor, like amber, wax, glass, or hard rubber, by another like silk or fur, is and long has been an initial experiment in all courses of electrical instruction. It is the earliest experiment made by or for the student; and one of the substances commonly mentioned as well suited to exhibit the phenomena of electrical attraction and repulsion is bran.

The desirability of some more effective means of separating bran from flour has been recognized by millers, doubtless, from time immemorial. Latterly the desire has been very strongly felt. As shown in last week's issue of this paper, frictional electricity satisfies the requirements of the case absolutely and with singular economy and simplicity of apparatus. That its availability should have waited so long for recognition is little less than marvelous, since multitudes of millers have been as familiar with the property of electricity now utilized as with the needs of the flour mill.

Why was the electrical bran separator never invented before?

While it may not be possible to give a specific answer to this question, it is still possible to discover causes which must have contributed materially to keep the now so obvious application of electricity from being made earlier. Chief of these, it is safe to say, is the non-suggestiveness of familiar knowledge. Men are apt always to overlook the means which lie nearest at hand and seek assistance from afar. When a new discovery is made in science scores of practical men stand ready to consider whether it can be put to useful purpose.

The possibilities of any old truth they are apt to assume to have been already explored, forgetting that it is but a little while since the utilization of knowledge became the occupation of any considerable class of men, and that new developments in the arts are now constantly opening up opportunities for applying old knowledge—often knowledge which previously gave no promise of utility.

Thus, while the newly discovered phases of electrical action—electro-magnetism, thermic electricity, galvanic action, dynamo-electric energy, and the rest—have become influential factors in the arts, frictional electricity has lain neglected, every one tacitly assuming that its possible utilizations must already have been worked out.

The moral to the young investigator, who would like to be an inventor, is plain. Do not wait to acquire a large store of knowledge before you begin to seek original applications for it. As each new fact or invention comes within the range of your investigation be sure to consider its possible utilization. Think how it may be practically applied. Use it as a factor of invention, and follow it, if you can, through the range of its present applications. You will find again and again that your inventions have been anticipated by others; but that should not be a source of discouragement. Invention is the best school for the inventor. The ability to invent grows with the practice. Great inventions are never the first fruits of a mind unpracticed in the art, and our greatest inventors have achieved their most valuable results only after years of more or less successful effort. The young man who invented the electric purifier is no exception to this rule. The habit of inventing is a long-established one with him, early developed and urged on by an inherited tendency to invent, his family being gifted in that direction.

His knowledge of electricity was limited, but he had been in the habit of applying his learning as he got it, and that habit brought him the opportunity to make the invention referred to. One of the great mistakes of students, fostered unfortunately by the conventional methods of instruction, lies in making education acquisitive mainly. The idea is to get knowledge, much knowledge, and then, if possible, apply it, forgetting that the mental habit acquired by the search for knowledge for its own sake is rather calculated to make the man an intellectual miser, a hoarder of information, than a practical user of knowledge. Much less information, coupled with a habit of turning information to use, is worth infinitely more to the possessor and to society.

Knowledge acquired as an end in itself is a delusion, a source of weakness rather than power. It is apt, also, to be of a shadow elusive sort, in no way to be compared with the real knowledge which remains after each fact or idea has been worked over, tested, weighed, and measured by practical application.

And the student who aims to become something more than a learner, namely, a doer, possibly a creator, must never allow himself to think that the possibilities of any fact or phenomenon have been exhausted, so far, we mean, as its utilization is concerned. The habit of inventing in other words, seeking novel and useful applications for the knowledge gained, should go hand in hand with acquisition. The apparent progress will not be so rapid, may be, as by the method of cramming, but it will be real and not liable to backslidings, while the possible profit of it will be incomparably greater.

THE AMERICAN FISH CULTURISTS' CONVENTION.

The tenth annual meeting of the American Fish Culturists' Association was held in this city during the last days of March. A large number of the representative students of the finny tribes, fish breeders, and dealers, were present, and several valuable papers were read.

The first communication was from the vice-president of the association, Mr. George Shepard Page, now in England, with special reference to the possible introduction of American shad in English waters. The present head of the British Fish Commission, Professor Huxley, is much interested in the project.

A practical paper on fish culture in this State, by the Superintendent of the New York State Hatchery, Mr. Seth Green, discussed at some length the question of hybridization. An account was given of experiments in that direction made at Caledonia, particularly with brook trout and California salmon, the results being very encouraging.

A paper by Mr. H. D. McGovern, of Brooklyn, recounted experiments on carp in New York waters, dwelling at some length upon the capacity of these fish to endure cold weather in shallow water. Professor Goode stated in the subsequent discussion that carp are best adapted to Southern waters.

A valuable paper, by Dr. T. H. Bean, was entitled "A Contribution to the Biography of the Commercial Cod of Alaska." The true cod, tomcod, polar cod, pollock, and halibut, are found in profusion, and of good size, near many parts of the Alaska shores, and are sure to become of great commercial value.

In "Epochs in the History of Fish Culture," Professor Goode gave a chronological record of the changes and discoveries in fish culture from its beginning in Germany in 1741. Fish culture began in France in 1820; in England in 1832; in the United States in 1853.

Thursday's work comprised the reading and discussion of several important papers and the election of officers, as follows: President, Robert B. Roosevelt; Vice-president, George Shepard Page; Treasurer, Eugene G. Blackford; Corresponding Secretary, Barnet Phillips; Recording Secretary, James Annin, Jr.; Executive Committee: Frederick Mather, of Newark; Professor G. Browne Goode, of Washington; Samuel Wilmot, of Ottawa, Ont.; Benjamin West, of New York; Thomas B. Ferguson, of Baltimore; James Benckard, of New York; and John B. Morgan, of Brooklyn.

A statement, compiled by G. M. Lamphare, gave the amount of the various kinds of fish received in the wholesale markets of New York from March 1, 1880, to January 1, 1881. The value of last year's supply of fish in this city was given at \$3,339,827.

Papers were read by Mr. Frederick Mather on "Fish Living in both Fresh and Salt Water," and by James Annin, Jr., giving his experience with "Poachers," at the Caledonia trout ponds, the most mischievous being kingfishers, herons, bitterns, muskrats, and minks. A paper by Professor Goode, entitled "Light in Europe on the Eel Question," led to a considerable discussion of the spawning habits of European and American eels, which appear to differ materially. The last paper was an elaborate one by Professor W. O. Atwater, on "Food Properties of Fish," the more important facts of which will be given elsewhere.

PIGS AND BABIES.

It is a pity that babies have no market value.

For some years the Agricultural Department has been trying to impress upon the western hog raisers the need of more carefully guarding against contagious diseases among swine, and to prove the need of such care, the department has taken pains to gather much statistical information with regard to the losses entailed by hog cholera and other swinish diseases.

For some reasons unexplained certain foreign commercial agents in this country have become greatly exercised over the untimely death of so many pigs, and have misused the information furnished by our statistical authorities to create something like a panic among pork dealers abroad, the ostensible fear being that public health may be grievously endangered by the use of American pork, the real fear obviously being the loss of trade and profit through American competition.

The result is that pigs have risen to the dignity of being the subject of international diplomatic correspondence.

The annual loss of from six to sixteen per cent of the swine of a great State like Illinois is unquestionably a sad thing to contemplate, especially as the average weight of the dead animal appears, from the official tables, to be about 100 pounds, showing that the most of the untimely dead are pigs, and too small for the pork barrel.

Doubtless this swinish death rate might be, and ought to be, materially reduced. Doubtless, too, it will be reduced; for pigs have a market value and will grow to be salable hogs if kept in health, on the average, a year or so longer.

When we think how much the pigs of the future will have cause to be thankful for the present flurry in pork, and among pork dealers and statesmen, tracing thereto the greater care taken of their health and comfort, we can not but wish that it were possible to raise a corresponding excitement about the physical wellbeing of babies.

Last year there died in this city nearly 15,000 children under five years of age—human pigs, so to speak. To make the comparison strictly fair it would be necessary to take the deaths of children under twelve or fifteen years of age. The percentage, however, is excessive enough when we take

five years as the limit; and the fact that no one except the bereaved parent pays much attention to these unreasonable losses shows how unfortunate it is for the babies that they have no commercial value.

We do not pitch upon the infant mortality of New York for illustration because the figures are relatively excessive here, but simply because they are handy. In some years thirty per cent of the deaths in this city are of children in their first year, and ten per cent more die in their second year. If the life of pigs, or lambs, or colts, or calves, was anything like as precarious, the newspapers would be full of discussions of causes and of means of prevention. When half the babies die before reaching maturity we talk of reconciling ourselves to the dispensations of a mysterious Providence!

The terrible and needless loss of life among children is not confined to our cities. The mortality is excessive throughout the country. The ignorance of people with regard to the proper care and feeding of children is simply appalling; and the indifference commonly manifested with respect to the spread of infectious diseases among children, especially in rural districts, is not unfrequently murderous. A man living in a healthy country will take no discredit to himself—will rather think himself a proper subject for sympathetic commiseration, when he confesses that he has buried five out of six children or eight out of ten. If he were to have no better "luck" with his colts and calves, his neighbors would probably organize, for the benefit of his stock, a local society for the prevention of cruelty to animals.

Ignorance is criminal when it is associated with an assumption of duty requiring knowledge and leads to loss of life; for example, when a man, who lacks the knowledge essential to the right management of an engine, pretends to be an engineer, and through incompetence brings on an explosion in which some one is killed.

The assumption of parental duties without an effort to discover the proper care of infancy, now the usual custom among us, is as likely to be fatal as to undertake ignorantly the care of a steam engine; and we trust the time will come when it will be popularly recognized as quite as criminal. That good time for babies would not have been delayed until now if they had been, like pigs, a factor of commerce.

If there are so many children that half of them require to be killed to give opportunity to the rest, the killing ought, at least, to be done with discretion, picking out the least desirable specimens for that fate, as we do with kittens. To lose half, and that at haphazard, is as uneconomical as it is morally intolerable.

CHARGES FOR HANDLING GRAIN IN NEW YORK HARBOR.

The investigation by the Assembly Canal Committee of the method and cost of handling grain for shipment in this city brings out some facts of general interest. The great elevator business is the growth of recent years. In 1860 there were no floating elevators and but two or three warehouse elevators, which charged 10c. a hundred for trimming, their storage business furnishing their profits. In 1861 the warehouse elevators charged one-quarter cent a bushel, the floaters three-eighths cent. The next change was three-eighths cent for the former and one-half cent for the latter; then one-half cent and five-eighths cent respectively; then five-eighths cent and three-quarters cent. Then the charge was made three-quarters cent for both for the sake of uniformity. In 1875, in consequence of the reduction of canal tolls, the rates were reduced to one-half cent a bushel, where they remain with occasional rebates. Another half cent per bushel is charged for weighing. If the grain is blown and screened for preservation, the charge is one-quarter cent additional, but last year only a small quantity of grain was blown. The charge for stowing the grain is from \$7 to \$8 per 1,000 bushels. The grain storage capacity of Brooklyn is 16,500,000, and in New York at the New York Central Elevator 2,500,000. The great elevators at Jersey City add several millions to the storage capacity of this port. The charge for elevating includes ten days' free storage. About 3,000 bushels can be elevated in an hour.

The charges in New York are less than in Chicago, St. Louis, Detroit, Buffalo, Toledo, Baltimore, Boston, and Philadelphia. There is no practice of charging shortage on our canal boats. Our weighers are accurate, and weigh closer than in any other city. They do not charge a shortage whether there is shortage or not. Experience shows that there is always a shortage of about half a bushel to every 1,000. The average shortage at a Brooklyn warehouse last year was about four bushels to 8,000.

The charge for storage after ten days is a quarter cent per bushel. In Baltimore, Boston, and Philadelphia it is three-eighths cent. There are about nineteen storage elevators in New York and Brooklyn, and about forty floaters. During a large portion of the year, one-half of these could do the business. The stationary elevators in 1880 elevated about 48,000,000 bushels.

Another witness who had been in the storage and elevator business for thirty years estimated that from eight to twelve million dollars is invested in storage elevators and about five millions in floating elevators. That is exclusive of the railroad elevators. One-half the grain goes through the railroad elevators. His stores and elevators are valued at from five to six million dollars. He elevated 5,300,000 bushels last year, about one-third of which was blown. He has a double elevator which can discharge from 6,000 to 8,000 bushels an hour.

A witness in the lighterage business testified that the lighterage charge is one and a quarter cent per bushel for all points in the harbor. Out of this the lighter must pay one-half cent for unloading. It is estimated that 8,000 bushels pay \$100 for lighterage. After paying expenses the lighter has left \$20, less shortage, which is the cheapest terminal charge in the world.

THE INTERNATIONAL EXHIBITION OF ELECTRICITY AT PARIS, 1881.

An important circular relative to the Exhibition has been issued from the Department of State at Washington, under date of March 31.

It will be remembered that the late Congress failed to make any provision for the representation of the United States there, notwithstanding the public interest which must attach to such an Exhibition and the importance of having this country properly represented, to say nothing of questions of international courtesy.

Accordingly the President has appointed an Honorary United States Commission to serve as the official channel of communication between American exhibitors and the French General Commission at Paris.

The commission thus appointed will consist of the Assistant Secretary of State, as Acting Commissioner General; George Walker, Honorary Executive Commissioner; George E. Gouraud and Charles R. Goodwin, Honorary Commissioners. All communications in regard to the admission of applications and requests for forms, and generally all correspondence in relation to the preparation and exhibition of articles, should be addressed (postage paid) to the Acting U. S. Commissioner-General. Correspondence for the American Commission in Paris should be addressed to Mr. George Walker, Executive Commissioner of the United States, U. S. Consulate-General, Paris, France.

Exhibitors will have to bear all expenses of packing, shipping, and transportation of exhibits, delivering them at the Palace of the Champs-Élysées between July 1 and August 1, the latter date being set for the opening of the Exhibition, which will continue till November 15.

There will be no charge for space or flooring, and but a limited charge will be made for motive power. Exhibitors will have to defray all expenses of installation and immediate care of their exhibits. Favorable provision is made for the protection from piracy of all inventions or designs capable of being patented.

The time for receiving applications has been extended to May 15, and to insure seasonable transmission applications should be sent to the Department of State, at Washington, not later than April 20.

An International Congress of Electricians will be held in connection with the Exhibition, commencing Sept. 15, in the Trocadero Palace.

The Congress and the Exhibition cannot fail to draw to Paris the representative investigators and inventors in electrical science and art the world over, as well as their most important and instructive inventions and apparatus.

It is to be hoped that the United States, which have contributed so much to the recent progress of the telegraph, the telephone, the perfection and utilization of the electric light, and other practical applications of electricity will be adequately represented.

AN INVENTION WANTED FOR UTILIZING FLAX REFUSE.

The rapid increase of flax raising in the west, particularly in Minnesota, has made the disposition of the residue of the plant, after the separation of the fiber, a matter of considerable interest. The bulk of this rough woody matter is very large; and in a country where fuel is scarce it would be of great benefit to the cultivators of flax if the flax brakings could, by pressure or otherwise, be made into a substitute for firewood. We are informed that the stoves mostly in use among the Minnesota cultivators of flax are made of Dutch tiles. The question is whether the flax refuse can be economically compressed for use in such stoves. The problem would seem to be worth considering by inventors, as we are assured that a simple machine for the purpose would find a ready sale among the flax growers, and it could probably be profitably adapted also to the utilization of other waste fibrous materials.

If any of our readers has such a machine to sell or feels disposed to invent one he may find it worth while to communicate with our informant, the editor of the *Mennonitische Rundschau*, Elkhart, Indiana.

Another International Exhibition.

An International Exhibition of power and work machinery for trades and dairy purposes is to be held in Altona, near Hamburg, North Germany, from August 18 to October 17, 1881. The object of the exhibition is chiefly the improvement and development of the smaller trades and the dairy. It will consist of four groups: I. Power machines for trades; II. Work machines and tools for trades; III. Products of trades manufactured by the machines and tools of I. and II.; and IV. Machines and implements for dairies. The awards will be medals of silver and bronze and honorable mention. The chairman of the local committee is H. C. Notbnagel, town deputy of Altona. Foras of application may be had at the offices of the committee, Königsstrass 116. Ground and wall rent for exhibits range from two to ten marks a square meter. Though

specially designed to revive the now depressed "smaller trades" of North Germany, this exhibition may offer some attractions for American manufacturers of trade tools, implements, and machinery.

The Jeannette Search Expedition.

Lieutenant R. M. Berry has been ordered to command the steamer *Mary and Helen* on the proposed Arctic expedition in search of the *Jeannette*. He has been furnished with a list of the naval officers who have volunteered for this service, and he will have a choice in the selection of the officers and crew. Lieutenant Berry commanded the *Tigress* in search of the missing members of the *Polaris* crew. He is a native of Kentucky, and is thirty-five years old. Among the appliances that will be added to the ship will be an observatory balloon, from which it is expected a view of thirty miles can be had if it reaches the altitude of balloons sent up in this climate. Bombs will be used in the progress of the search to give sign of their presence in the Arctic. The vessel is not to winter in the Arctic except to promote the search for which she is sent out, nor then except in a secure harbor; nor is she to remain more than one winter away from home.

Sabino Berthelot.

This eminent naturalist died November 22, 1880, at Santa Cruz de Teneriffe, at the advanced age of 86½ years. He retained in his old age the enjoyment of his intellectual faculties, and only a few weeks before his decease had contributed to the *Revista de Canarias* an extensive, learned, and interesting paper upon the "Trees and Woods of the Canaries." Many of his researches related to the advancement of the Fortunate Isles, where he lived for about sixty years. In the early part of his life he was the director of the celebrated Botanical Garden of Orotava. In 1828, in conjunction with the celebrated naturalist, Phillip Barker Webb, and others, he was engaged in the production of that splendid series of works, the "Natural History of the Canary Islands." Not least among the treasures of the Astor Library, in this city, are the six large quarto volumes, under the title just named, full of beautiful drawings, many of them colored. These books give some idea of the vast amount of careful labor which M. Berthelot and his admirable coadjutor, Webb, expended upon that remarkable task. Our limited space prevents a notice of the many other important scientific labors in which M. Berthelot was engaged.

He was Consul of France, Member of the Legion of Honor, an officer of the French Academy, Member of the Society of Natural Sciences and Geology, and of all the principal scientific societies of the Canaries and of Europe. He was a clear, accurate, and able writer. His life was a most useful one. In his adopted home, Teneriffe, he was greatly beloved. His memory will long be cherished as a benefactor.

The Earl of Caithness.

James Sinclair, F.R.S., Earl of Caithness, who died suddenly in this city, March 28, was a man of considerable scientific ability and withal an inventor who had reason to be proud of his attainments. His principal invention was the ship's compass which bears his name. The Caithness gravitating compass is one of the steadiest known to navigators, and is widely used. He perfected a steam motor for macadamized roads, acting as his own engine-driver when testing it. He also invented and patented a tape loom by which the weaver was enabled to stop any one of the shuttles without stopping the loom. This invention was pronounced unpractical at first, but after a short trial in a Lancashire factory, it was found to answer the purpose better than the old device, and has since been universally adopted in the manufacturing centers of North England.

Of late years the Earl has traveled largely in this country and Europe, has written somewhat, and delivered many scientific lectures.

Colonel E. A. Roberts.

Colonel E. A. Roberts, the inventor and patentee of the successful torpedo for oil wells, died after a brief illness, in Titusville, Pennsylvania. Colonel Roberts was a man of great enterprise as well as ingenuity, and had much to do with the development of the Pennsylvania oil region.

Carl Weyprecht.

Carl Weyprecht, the Austrian Arctic explorer, died at Vienna, March 29. Weyprecht and Julius Payer were joint commanders of the Austro-Hungarian Expedition in the "Tegetthoff," which discovered Franz Josef Land after months of drifting with an ice floe, in which the Tegetthoff was abandoned in August, 1874.

THE fire which occurred in the works of J. A. Fay & Co., of Cincinnati, on the morning of the 6th ult., proved to be less disastrous than at first supposed. The large Corliss engine and boiler, the new four story brick shop, over one hundred and fifty feet long, and portions of another large building were saved. In order to meet the emergency occasioned by the fire additional factory facilities have been secured which give a capacity to work four hundred men. We are informed that, should it be found necessary in order to keep up with orders, a set of night and day workmen will be employed. This company has commenced the erection of extensive buildings, which will be completed, equipped, and in operation within the next ninety days.