

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.

Remit by postal order. Address

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

The Scientific American Supplement

Is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, 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.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, \$5.00 a year, sent prepaid to any part of the world. Single copies, 10 cents. Manufacturers and others who desire to secure foreign trade may have large and handsomely displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 37 Park Row, New York.

NEW YORK, SATURDAY, MARCH 5, 1881.

Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as Agricultural inventions, Lunar volcanoes, Amateur mechanics, etc., with corresponding page numbers.

TABLE OF CONTENTS OF THE SCIENTIFIC AMERICAN SUPPLEMENT No. 270.

For the Week ending March 5, 1881.

Price 10 cents. For sale by all newsdealers.

Table listing contents of the supplement by section: I. ENGINEERING AND MECHANICS, II. TECHNOLOGY AND CHEMISTRY, III. ELECTRICITY, LIGHT, ETC., IV. HYGIENE AND MEDICINE, V. METEOROLOGY, ETC., VI. ART, ARCHITECTURE, ETC., VII. MISCELLANEOUS.

TELEGRAPH WIRES IN CITIES.

The ice storm which so seriously interfered with electric communication in and around this city recently, exposed many defects in the usual method of supporting telegraph and telephone wires.

How to secure immunity from such interruptions in the future, without laying too great a burden upon the owners of wires, and without restricting the easy extension of electric communication, is a problem of no small importance.

The first demand, particularly from those who had no property interest in telegraph or telephone lines, was that the practice of setting up wires on poles and houses should be stopped, and that all electric wires should be put underground.

In response to this demand a bill was introduced in the New York State Legislature to secure such a placing of wires within city limits before July 1, 1882. The bill provided that after the date given it should not be lawful to use any wire above ground for telegraphic, telephone, or electric lighting purposes, except indoors.

Granting the feasibility of putting underground a large part of the wires—which is far from evident—the requirement that all wires shall be so placed would be little less than prohibitory in the case of private wires, since the cost of the work would outweigh any possible benefit.

The exigencies of modern business and social life require not only the widest extension and the cheapest maintenance of electric service attainable, but also its readiest extensibility. This, not by great corporations solely, but by individuals. It is a common thing nowadays for business houses to supplement the facilities offered by the telegraph companies and telephonic exchanges by maintaining from one to a dozen or more private lines.

The relatively low cost of aerial lines, and the ease with which they can be set up and repaired, make them in many instances of this nature the only available means of electric communication. As for lines which might go underground the question would arise, Which is the greater nuisance, the poles for the support of aerial lines, cabled or separate, or the frequent tearing up of the pavements for extension, alterations, and repairs, if the lines are buried?

It may be that legislation will be required to remedy these evils, but that should be had without difficulty, and without necessitating any sweeping change in the systems, or endangering in any way the freedom and economy of electric service.

There is ample room on the roofs of houses for such an orderly distribution of aerial wires as would meet the public requirements and avoid at the same time the unsightly tangle of wires now prevailing. There is no great objection to the supporting of wires on houses if the supports are properly placed and sufficiently strong.

ANOTHER IMPORTANT REISSUE DECISION BY THE SUPREME COURT.

The tendency of recent decisions of the Supreme Court of the United States, with regard to reissued patents, lately commented upon in this paper, received another illustration in the decision delivered by Mr. Justice Swain in the case of Denmore et al. vs. Scofield et al. (December 20, 1880), appealed from the United States Circuit Court for the Northern District of Ohio.

It would appear that the complainants had patented a method of attaching to ordinary flat cars over the trucks two large wooden tanks for holding petroleum while in transit on railways, so as to carry the oil in bulk instead of in barrels or other commercial vessels.

the method of attaching them to the car, but "their equivalent when constructed and operated in combination with an ordinary railway car"—that is to say, any form of tank car.

Suit being brought for infringement, the answer set up, among other defenses, that the reissued patent was too broad and was therefore void.

The court saw fit to disregard this plea, deeming it proper to dispose of the case upon a more radical and comprehensive objection. After citing the unimpeached and uncontradicted testimony of witnesses called by the appellees, to the effect that the complainants' wooden tanks had been discarded for reasons given, and that the use of return casks placed and fastened as described in the patent had been practiced for twenty years or more, the court said:

"This testimony leaves nothing of the substance of the plaintiffs' alleged invention. . . . But, irrespective of this testimony and of any testimony, upon looking this reissue in the face and examining its several claims by their own light, we find nothing that brings any of them within the sphere of what is patentable. There is no novelty and no utility." On this ground the Supreme Court pronounced the entirety and all the particulars of the claims "frivolous and nothing more."

"Patents rightfully issued," the court observed further on, "are property, and are surrounded by the same rights and sanctions which attend all other property. Patentees as a class are public benefactors, and their rights should be protected; but the public has rights also. The rights of both should be upheld and enforced by an equally firm hand, whenever they come under judicial consideration."

A few more decisions of this tenor should put an end to the practice which has wrought so much injustice to the public and brought so much discredit to the patent system, we mean the extension of obscure and often trivial patents so as to make them cover, on reissue, valuable processes or products not within the scope of the original.

PHYSICAL TRAINING AS A MEANS OF MENTAL HEALTH.

One of the serious problems which modern science encounters is how to deal with—more particularly, how to prevent—the excessive nervous development, and through that the frequent mental failure or derangement characteristic of modern life. The mad poet's sarcastic remark, that brains had brought him to the asylum—a fate his interrogator ran no risk of—was bitterly true; but it is not volume of brain so much as an unbalanced development of brain that leads to insanity or a liability to that distressing malady.

What are we to do? We cannot radically change our style of living to that of our slow-going ancestors; on the contrary, the indications are that our children's children will, by contrast with their more active life, look back upon our age as measurably serene. It is remotely possible that a new order of invention may reverse the tendency of the race and relieve the future of much of the mental and nervous strain which we have to endure; but it does not look that way now.

A generation ago the popular theory was that mental discipline, with the brain development which early and long-continued schooling gives, would furnish the capacity for mental work and mental endurance which would best fit the coming man for the work he would have to do.

The result has been to increase the work to be done, and the speed of doing it, without materially increasing man's capacity for toil. In many instances the course of education pursued seems rather to have lessened the endurance of our people, and to have hastened the mental collapse of many of our brain workers.

And the school children of to-day have more to do than their fathers and mothers had, and have to bear no inconsiderable portion of the evils of modern life besides; that is, if constant excitement, haste, and worry are to be accounted obstacles to healthy mental and nervous development. That they cannot fairly be considered beneficial is sufficiently evident.

Speaking of the nervous excitements and their results, due to our modern education and the rate and manner of our living, an eminent English physician (Dr. Browne, editor of the British Medical Journal) says: "The cerebral tissue becomes more and more highly organized, convolutions obtain secondary gyri, and with each differentiation in structure, new possibilities of disturbances are introduced; while the very differentiation in question produces in turn new mechanical devices, which again introduce a more complicated mode of life with which the nervous system must keep pace."

If there were no possible corrective to this tendency to increase the nervous strain of life more rapidly than the nervous organism can acquire power to endure it, the inevitable destiny of civilized men would be the madhouse or something near it. But there is promise of such a correc-

tive. The late Dr. Seguin demonstrated many years ago, that the undeveloped brains of the feeble minded could be stimulated to healthy growth by patient and systematic training of the muscles and the organs of sense. Dr. Browne looks to a corresponding physical culture of those of normal brain endowment to give them the increased brain capacity which will fit them for the severer needs of our increasingly active intellectual life, and at the same time make them better able to resist the inroads of mental disease.

"Muscular exercise," he says, "has been hitherto thought to expand the lungs, quicken the circulation, and brace the nerves; but to this must now be added the pregnant idea that it also contributes to the brain growth and mental evolution. As a large part of the brain is composed of motor centers, we may, in the nascent state of the organ, powerfully act on the brain, by putting into methodical exercise the muscles which we know to be directed by its various parts; and especially the centers governing the movements of the hand ought to be brought into training by careful drill of manual movements, so that, in due time, a cunning right hand may be the servant of every man to some mechanical art, and of every woman to some technical work."

And not only is it possible, as Dr. Browne suggests, to fortify the young against the inroads of mental and nervous disorders by the development of brain capacity, stability, and symmetry, through manual training, but there is gained also, by means of such training, the additional safeguards, which come from much dealing with realities, from having always at hand the means of healthful recreation, and from the conscious ability to do, if necessity compels, something that will win support.

Industrial education thus takes on an importance far greater than has hitherto been accorded it. It becomes a necessity, not merely to those who are likely to spend their lives as artisans, but even more to those who may never earn a day's wages at the bench—men of independent fortune, professional men, business men and women in all the walks of life, to whom physical training may mean not bread and butter, but mental health.

STEAM ENGINES FOR ELECTRIC LIGHT MACHINERY.

A field for the manufacture of steam engines specially adapted to the propulsion of dynamo electric machines has been opened by the recent extensive and rapid development of the electric light.

It is the aim of inventors and manufacturers of electric lamps to provide automatic adjustments which will secure the greatest possible uniformity in the light, and these adjusting devices are called upon not only to compensate for unequal combustion of the carbons, but also for the irregularities of the propelling power, every variation of which produces a corresponding variation in the strength of the electric current. This effect is more strikingly illustrated in electric lamps of the incandescent variety, by whose regular fluctuations the strokes of the engine may be sometimes counted. The highest measure of success in electric illumination demands the employment of high speed engines running with great uniformity.

It requires but little reflection to perceive that as the electric light is the continuous product of mechanical energy, it must be of primary importance to uniformity in the product that the supply of energy should be uniform.

Sir J. W. Bazalgette, in his report upon the electric lights which have proved so successful on the Thames Embankment in London, states that the success reached is in great measure due to the remarkable steadiness and regularity of movement in the 20 H. P. steam engine which supplies the lights, and which was built by the Messrs. Ransomes and fitted with their patent automatic expansion gear. This engine, during a period of twelve days, running at an average speed of 142 3/8 revolutions per minute, has been found to vary not more than one twelfth of a revolution under suddenly varying loads.

In view of the progress which this kind of illumination is making in this country, together with the great variety of automatic governing valve gear of great excellence in use, it would pay some of our best engine builders to give attention to this special class of work. The field is large and constantly growing, and offers rich promise to enterprise.

NEW THEORY IN REGARD TO LUNAR VOLCANOES.

M. Faye, according to the *Chronique Industrielle*, recently delivered a lecture at the Sorbonne, in which he criticised the prevalent belief that volcanoes exist on the moon, and offered a theory of his own to account for the objects that have been taken as craters due to volcanic action. Water, said he, is the sole cause of volcanic eruptions. Now, on the moon there is no atmosphere; this is a fact recognized by every one, and it is absolutely confirmed by observation of occultations. Since there is no atmosphere there, of course there can be no water, for the latter would instantly evaporate under such conditions, even did it exist. So, since there is no water in the moon, it follows that there can be no volcanic action and consequently no volcanoes. But there are circular cavities on the moon, nevertheless. What are they, then, and how have they been formed? To account for these, M. Faye asked his auditors to imagine a river frozen over from shore to shore. Such being the case, the tides will exert a pressure on the under surface of the ice, and if a hole exist in the latter the water will quickly issue up through it and congeal around its edges. And so each successive outflow will freeze over its predecessors until the successive layers form a marginal ring of some

height around the aperture. From this we may get an idea of the alleged lunar volcanoes, which are diametrically opposite of those that exist on the earth. The craters of our terrestrial volcanoes, that of Vesuvius particularly, are at the top of high mountains; the craters of the so-called lunar volcanoes are, on the contrary, in the center of low hills. The bottom of terrestrial volcanoes is greatly elevated above the mean level of the surrounding land; that of the alleged lunar ones is deep down beneath the surrounding ground. Terrestrial volcanoes are conical mountains thousands of feet in height, having at their summit a crater some hundreds of feet in depth, while the circular cavities on the moon are wells several thousands of feet deep and surrounded by a sort of curb some hundreds of feet in height. The circular hollow called *Copernicus*, for instance, is 11,000 feet deep, while its marginal hill is only about 2,600 feet in height. These circular cavities, then, are veritable wells, and they were formed, according to M. Faye, as follows:

At the epoch in which the moon, covered with a thin solid layer, took less than a month to accomplish its revolution around the earth, tides were created on its surface by the latter. The incandescent and liquid mass, covered by a thin coating that might be well compared to an eggshell, was attracted by our planet and thereby caused to dash up against this solid layer. Now, if we suppose that small orifices were accidentally created in various parts of the still thin crust, the waves formed by the tide would cause some of the molten mass to issue through these apertures, while the surrounding crust would everywhere else resist it. This liquid would flow over the edges of these well holes, and being unprotected against the cold of space would at once solidify. And, as we have just seen in the case of the frozen-over river, at every tide the margin would increase in height by the superposition of new outflows. Finally a moment would come in which the bottom would itself solidify. But this being situated at a great depth, and being protected against external influences, would remain for a short time in a pasty condition. If at such a moment a new flux should take place, the middle of the pasty bottom would be thrust up, and in solidifying would remain considerably elevated in comparison with the surrounding portions of the bottom. Thus may be explained the existence of the peaks which are observed in a large number of these lunar cavities.

Such is an outline of M. Faye's new theory. "If," says the author, "I am asked by what considerations I am led to make known the results of my observations and researches, I answer that I am seeking, first, to banish from science a gross error by proving that these lunar cavities are not volcanoes, for no explosion can take place where there is no explosive material. Then, again, from a geological point of view, I have wished to study in the formation of the moon those phases of the past which may give us an idea of the phases to come. Although the geology of the moon differs completely from that of the earth, this very opposite nature is a valuable element of discussion. It will serve to banish vain theories and to put in a clearer light the phenomena of which the earth has been the theater."

WHITE ANTS IN COURT.

An intimation of the mischief done in regions infested with white ants, by the wood destroying habits of these insects, is furnished by a recent law suit in New South Wales. The plaintiff, a contractor, had received from the defendant instructions to repair a house which had been damaged by white ants. As the work proceeded, the plaintiff found that the house was almost eaten away by the white ants, and that a considerably increased expenditure would be required to put the house into thorough repair, and he informed defendant of the fact. The bill for the work done was disputed as excessive.

A considerable amount of evidence was taken on both sides as to the work performed, and it was stated that an estimate could not be given of the contract price of work, as the white ants operate during darkness, and the extent of their ravages could only be seen as the work progressed. One witness described the house as being so seriously injured that new material would be required throughout, and the best way to have dealt with it would have been "to put a fire stick under it." The estimated cost of the repairs before the work was begun was about \$1,150. The defendant had paid \$2,000, and the court adjudged that he should pay \$230 more.

THE HUMANE ASSOCIATION'S CATTLE CAR COMPETITION.

The first result of the American Humane Association's offer of an award of \$5,000 for an improved stock car, capable of carrying live animals long distances without suffering or having to be unloaded to be fed and watered, appears to be an accumulation of business not at all anticipated by the officers of the association, and not altogether in harmony with objects for which the society was organized.

The judges' circular, No. 2, dated Feb. 1, acknowledges the receipt of 420 models and about 200 plans and sketches; and (since Jan. 1, the limit set to the receipt of plans and models) they have been overwhelmed with correspondence asking why the award is not made or the models, etc., returned. In other words, the office of the association has been turned into a sort of local patent office, for the work of which it was ill prepared. The judges suggest that, even if they neglect their own business and devote their entire time to the examination of the models, plans, etc., and the comparison of them with the 111 U. S. patents already granted

for stock cars, several months must elapse before a decision can be arrived at. Indeed it is likely that months will have to be devoted to clerical and expert work before the special competitive examination by the judges can begin. When made, the result will be announced to the association, as specified in the circular of July 12, 1880.

Obviously the competitors will have to be patient; and if any one feels himself slighted by the silence of the association he should first make sure that his model has been received or was intelligibly marked, since thirteen of the models received had no names or addresses on them, and it is probable that others are lying unclaimed in express offices for lack of prepayment of charges.

A TELEPHONE REISSUE.

The Patent Office, after careful hearing, has granted to Mr. E. Berliner, a reissue of his original telephone patent, of January 15, 1878, with several new claims, among which is one that virtually awards to the above author the priority of invention and use of the local battery in conjunction with telephone instruments.

Prior to the invention of Mr. Berliner it was necessary to yell very loud in order to make anybody hear at any considerable distance through the telephone, and even then the speaker's voice was heard quite faintly.

But now, with this improvement added, the telephone is rendered so sensitive that conversation in whispers may be readily carried on, and the ordinary tones of conversation are delivered by the instrument in the most perfect and admirable manner. Mr. Berliner is entitled to the highest honor for his remarkable invention, which is now used in all parts of the world. The patent is held by the National Bell Telephone Company, of Boston, Mass.

Spontaneous Combustion of Dyed Goods and Yarn.

The heaviest loss that has occurred in 1880, within the line of mutual insurance, has again been caused by the spontaneous combustion of dyed cotton yarn of various colors; and while this particular fire opens some entirely new questions that are now under investigation, it gives us reason, says Mr. Edward Atkinson, President of the Boston Manufacturers' Insurance Company, to renew our warning against a danger which has been the cause of thirty per cent of the losses that we have incurred since January 1, 1878, a period of two years and nine months.

Blacks, browns, slates, and Turkey red goods, dyed with cutch, gambier, aniline, iron liquor, and chromic acid, appear to be most liable to oxidation, if rolled hot or warm from the dry cans or piled hot from the dyeing kettles. In almost all the premises insured by us, complete arrangements have been made for thoroughly cooling cloth and yarn as it comes from the cans or kettles, or special fire-proof apartments have been provided for storing rolls of cloth from the dry cans over night. Yet, within the first month, hot rolls of cloth have been found by one of our inspectors in one of our risks.

This last fire discloses the fact that old yarn, some of it imported five years since, and some made two years since, that had been softened with a mixture or emulsion of olive oil and soda to prepare it for knitting, took fire spontaneously when stored in the attic of an old-fashioned mill, where the heat was doubtless excessive.

Whether the combustion ensued from the emulsion or from the dyestuffs is the point now under investigation, but it is evident that care should be taken not to expose some of these colors to excessive heat, whether the goods are freshly dyed or old.

The present indications are that the combustion in this case occurred from the oxidation of the dyes used in the black yarn, combined with the olive oil used in the emulsion, as we have succeeded in promoting spontaneous combustion with this color, but not with any other of those that have been prepared for our trial, precisely like those stored in the attic of the mill burned.

American and French Silks Contrasted.

Foreign correspondents complain very much of the miserable quality of the silks and satins from the Lyons looms; that, as they scarcely outlast half a dozen wearings, plush, brocade, and Sicilienne take their place. This emanates from France, but the English have for several years previously acknowledged the superiority of the American silks, brocades, damasses, and armures, as well as gros-grains, which are free from all injurious matter, and will neither crack nor fray, but outwear several French silks. Another great defect in black silk is "wearing shiny," which comes from the action of the soap and alkali developing a grease under friction. Cracking arises from the strain of the delicate silk to carry the heavy load of iron, potash, logwood, soda, oil, soap, and other chemicals used in foreign treatment. Raveling a thread from the silk, passing it through, and straining it over the fingers, is a good test. In heavily dyed silks the thread will feel rough and lumpy, and if a small quantity be burned it will simply smoulder, leaving a yellow, greasy look, while if pure it will immediately be consumed to a crisp, leaving only a pure charcoal. A new feature in silk trade has been the importation of raw silk from Asia through the Suez Canal and the Mediterranean direct to New York, though the greater part of the Asiatic importation of silk comes across the Pacific Ocean, and is brought here by rail.—*N. Y. Tribune*.