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ANNUAL REPORT OF THE COMMISSIONER OF PATENTS.

The annual report of the Commissioner of Patents to Congress, for 1872, has just been sent in, from which it appears that the affairs of the Patent Office are in good order and flourishing condition. 3,090 caveats were filed last year, being a slight decrease over the previous year. 18,246 applications for patents were made, of which 13,590 were granted. A slight increase in the number of patents granted is shown, and a considerable decrease in the number of applications made, which the Commissioner explains in a curious way. The decrease of applications and increase of the number of patents granted, is due, he says, to the circulation of the office publications, giving to inventors, manufacturers, and attorneys reliable information as to what inventions are already patented, thereby securing better applications but fewer in number.

Now, if this is so, if the effect of the office publications has been thus quickly and noticeably, during the first year, to reduce the number of applications, and yet to increase the number of patents granted, may we not expect similar results, in greater ratio, a few years hence, when the aforesaid publications are more extensively circulated? Let us look at the results for the next five years, allowing that the ratio remains only the same:—Number of applications made in 1871, 19,472; in 1872, 18,246; decrease, 1,226. Number of patents granted in 1871, 13,033; number granted in 1872, 13,590; increase, 557.—Allowing the same ratio each year for the next five years, we should have the following results for the year 1878:—Number of applications made, 12,160, and number of applications granted, 16,375. Evidently it will not do to carry forward the Commissioner's deductions.

A much more probable explanation for the discrepancies in the figures for 1871 and 1872 would be this:

In 1871 the Office was overcrowded with business and delays ensued, and the examiners doubtless rejected many cases for the first time which, on revision in 1872, they decided to allow. The falling off of 1,226 applications in 1872 is probably due to the discouraging effects upon inventors of the official delays during the year preceding.

The Commissioner informs us that the expenses of the Patent Office have been increased during 1872; but we are satisfied that the money has been well spent in providing room, and in reproducing copies of back patents.

The various official publications of diagrams, claims, bound volumes of reduced copies, and full size copies of patents have been admirably produced, and reflect the highest credit upon the Commissioner. This department of publication has become one of the most important branches of labor at the Patent Office, and is of inestimable value to the country. The publication of a general Index to the patents, and a Digest of the inventions, are highly important works which ought to be proceeded with, and we hope that Congress will give to the Commissioner the necessary authority. The Commissioner recommends that a law to authorize the extension of patents granted subsequent to 1861 should be enacted. We trust it may be.

In urging Congress to adopt his scheme for the "reorganization" of the Patent Office, the Commissioner makes the following statement:—"After careful and extended enquiry, I am convinced that considerably more than one half of the capital employed in manufacturing in the United States is thus invested because of the security to specialties obtained from patents." "*For this reason*," he says, "the demand for better examinations and more care as to the wording of specifications and claims before issuing patents or rejecting applications, is increasing every day. The business of the Office is being done under a plan of organization adopted *in its infancy*—a plan adequate to its wants at that time, but which has been outgrown by its enormous increase of business." The italics are ours.

The Commissioner's plan for "reorganization" is simply to place a set of nine bosses over the present examiners, to be called "chiefs of division," who are to supervise the work of the examiners and decide whether their decisions are to stand, and whether a patent shall be granted or refused. We deprecate the addition of any new forms and ceremonies, with their attendant delays, red tapeism and expenses, to the business of obtaining patents. We prefer the *infantile* system as it now exists, which works so well, gives such general satisfaction, and affords such ample securities that, according to the Commissioner's own showing, it now employs *one half of all the capital invested in manufacturing* in the United States.

It is a good old adage: "Let well enough alone." It would be hard to find a system that works better than the present, and we say, *let it alone*. The simpler the forms and the more prompt the official action in the grant of patents, the more will the inventive genius of the country be fostered and encouraged.

A BLOW TO THE TRADES' UNIONS.

The last volume of the Massachusetts Law Reports contains the ruling of Chief Justice Chapman, in a case which involves the question of whether trade organizations have any right to exact fines, or use other means of extortion to compel employers to accede to their demands. The plaintiff, Mr. John Carew, had contracted to supply a certain quantity of hewn stone; certain members of a society called the Journeyman Freestone Cutters' Association of Boston obtained from him the sum, or fine, as they called it, of $500, by threatening to deprive him of laborers necessary to him for the fulfilment of his contract, and by actually inducing some of his employees to leave. The action was brought to recover. The court ruled that the plaintiff might regain not only $500 but any damage to his business caused by the acts of the conspirators. Chief Justice Chapman says, in his opinion: "The acts alleged and proved in this case are peculiarly offensive to the principles which prevail in this country; and if such practices could enjoy impunity, they would tend to establish a tyranny of irresponsible persons over labor and mechanical business which would be extremely injurious to both."

There is not an employer or a right minded workman in the country who will not rejoice at the placing upon record of so clear, resolute and unequivocal a condemnation of the whole system of trades' unionism as it is now practiced. One or two such decisions in this State are greatly needed, and would do more to prevent such uprisings as that of last summer than years of discussion between the contending parties. We have plenty of laws on our statute books militating against conspiracy; and, if none of them cover such cases as that above cited, let some of the employers who suffered by the great strike see that the proper steps be taken to have suitable enactments framed by the Legislature, that will effectually remedy all existing evils.

THE VIENNA EXPOSITION.

The buildings of the Vienna Exposition are now completed and in readiness for the reception of the articles to be exhibited. Several changes have, we learn, been made in the general plan. The center space of the Palace of Industry, instead of being divided up, has been converted into one colossal rotunda, the largest roofed building in existence, measuring 426½ feet in diameter and 300 feet in hight. The iron work of the roof weighs 40,000 tuns, and it may be imagined that it required no small effort of engineering skill to raise this enormous load to a hight of nearly 300 feet. The work was accomplished by 240 men in three months. The central structure is iron, covered with an outer coating of masonry connected with the interior by girders. Some idea of the dimensions of the vast fabric may be gained from the fact that a regiment of infantry numbering 1,400 men could conveniently be paraded on the architectural cornice which runs round the inside where the roof joins the columns.

The materials of which the buildings are composed are mainly iron, wood and glass, but the walls, where not clear-storied, are filled in with brick. The outward decorations, which are very imposing and of a solidity apparently sufficient to last for ages, are made of canvas steeped in fluid plaster of Paris and hardened in molds. With admirable taste, a blue texture of jute spangled with golden ornaments has been selected as a wall covering, which contrasts agreeably with the dark red of the supporting columns.

The machinery hall is a simple brick building with no pretension to architectural display. The motive powers, cranes, boilers and engines are all themselves exhibits. All engines under seventy-five horse power and cranes lifting less than twelve tuns are excluded. Borsig's engine factory in Berlin, which turned out its two thousandth locomotive for the Paris Exposition, in 1867, will exhibit its three thousandth in Vienna.

The supplementary structures will consist of edifices for the accommodation of distinguished visitors, and annexes to hold the excess of exhibits not finding room in the great galleries. The Austrian Emperor is to have a magnificently fitted up pavilion, and it is stated that the French and German buildings will vie with it in grandeur. Krupp, of cast steel renown, will stock a special edifice with his own inventions, and the *New Free Press* boldly aspires to out-do the London *Times*, whose machinery was last year exhibited in London, by erecting a pavilion of its own. One space of 1,600 square meters is appointed to hold German educational apparatus and appliances.

Danger from fire is put almost beyond the reach of possibility. There is a large basin of water in the grounds, filled conveniently from the adjoining Danube, which might at any moment convert the whole area into a lake. The basin was constructed at a cost of $12,000, and in addition thereto, fire engines and hydrants are provided in sufficient numbers to inundate every gallery in the buildings.

THE SCIENCE RECORD FOR 1873.

In reply to various enquiries we would state that Science Record for 1873 is now almost through the press and will be issued either next week or the week after, when all to whom copies are due will be immediately supplied. A large edition has been ordered. It is a handsome octavo volume of six hundred pages, illustrated with many engravings. The Engineering department contains views of several of the most important railway bridges in this country, the great Suspension Bridge between New York and Brooklyn, Steam Street Cars, improvements in engines, injectors, mills, and machinery of all descriptions.

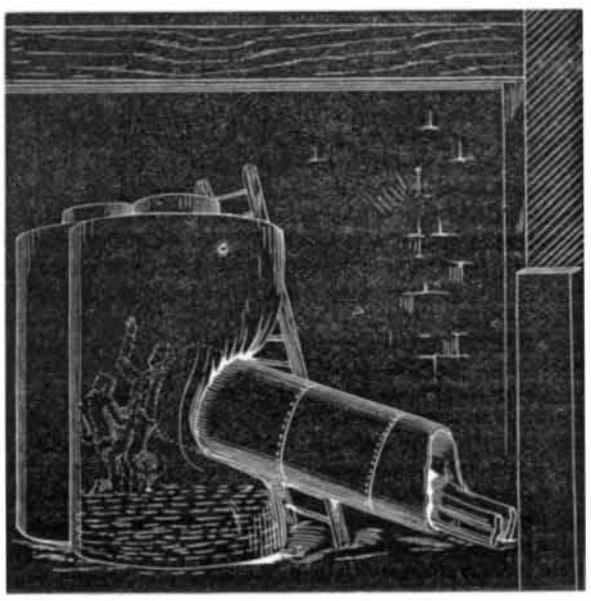
The department of Geography contains illustrations from the Yellowstone region, showing the wonderful pools, hot springs and other extraordinary formations, which are among the wonders of the world.

The department of Biography is rich in portraiture, containing steel and wood engravings of distinguished men of science, including Professor Joseph Henry, Professor Tyndall, Professor Dana, Professor Peirce, Professor Bunsen, Professor Kirchhoff and Professor Morse. The portrait of the latter is engraved from a painting from life taken some years ago, soon after Professor Morse had completed the first line of telegraph, between Baltimore and Washington, when he was in the vigor of his life.

The book is one of interest and value for lovers of progressive, practical science. The advertisement on another page shows the general scope of the contents.

THREE FEARFUL BOILER EXPLOSIONS IN ONE DAY.

Three terrible boiler explosions have recently occurred on the same day, February 3d, one resulting in the death of nineteen persons and the wounding of nearly two score more. One of these explosions took place at Pittsburgh, Pa., another at Syracuse, N. Y., and the third near Norristown, Pa. To an esteemed correspondent, Mr. W. B. Le Van, of Philadelphia, we are indebted for the accompanying diagrams and details of the casualty at the rolling mill of Messrs. J. Wood & Bro. at Conshohocken, near Norristown, Pa., which destroyed about one half of the establishment. The exploded boiler was 18 feet long and 4½ feet in diameter, and had been in constant use in the mill for twenty years. It had two flues, each 18 inches in diameter, which, with the shell, were originally of No. 4 iron, calculated to withstand 80 pounds working pressure to the square inch. At the ruptured point, the iron had become but three sixteenths of an inch in thickness, and was besides much crystalized. When the explosion took place a portion of the boiler was hurled, end first, across a canal and a railway track into a building known as the Albion Print Works. There it encountered a girder of an arched doorway, shattered it (with the adjacent wall) and finally lodged in a large iron kier, used for steaming pieces of muslin, in the manner shown in our diagram. Two boys were engaged within the kier, distributing the warp for bleaching, both of whom were instantly killed. The kier was 8 feet wide and 12 feet high.



Ten minutes before the accident the steam gage showed a pressure of 53 pounds. The close flattening together of the flues indicates that they collapsed from force externally applied. There is little doubt as to the cause of the disaster. The boiler was simply used up, and the thinness of the iron and the clean, smooth rupture show that it had become inadequate to withstand the required pressure. Eleven persons were killed outright and a similar number, more or less, badly wounded. The responsibility of this awful disaster appears to rest upon the proprietors, and forms another link in the long chain of similar horrors due to a negligence of reasonable precautions for the safety of human life.

The Pittsburgh explosion occurred in the extensive American Iron Works of Messrs. Jones & Laughlins. These works are among the largest in the country, covering fifteen acres of ground and employing three thousand workmen. It is here that the celebrated cold rolled shafting is made. The explosion involved a battery of four boilers located in the central part of the numerous workshops. The spike and nail

factories together with the sheet mill were demolished, at a loss of some $75,000 and seven persons killed and thirty wounded. The boilers had been five years in use. It is stated that the iron was good and that the gages showed plenty of water just before the accident. Portions of metal were thrown for distances of three blocks, crashing through the roofs of neighboring buildings.

Among the incidents of the disaster, it is mentioned that Mrs. Clarke, wife of one of the employees, hearing the noise of the explosion, fell upon her knees and commenced to pray; while in the attitude of supplication, a piece of the boiler weighing 700 pounds struck the house, and went crushing through the room on the line where her head would have been had she remained standing. Another mass of the boiler iron, weighing nearly eighty pounds, went lumbering through the air for a distance of 200 yards, and, descending upon a door of a bakery on Carson Street, crashed through it as it might through a house of straw, and fell upon the middle of the floor. Fortunately, however, though much destruction of property was occasioned, no loss of life here ensued. A blacksmith, named Jacob Broonsinger, who was working in a shop in the vicinity of the explosion, had been standing at a certain place fixing a horseshoe. He stepped over where the horse was, and had just begun to put the shoe on when an immense piece of iron, weighing fully 200 pounds, came crashing through the roof, and fell on the spot where he had been standing a moment before.

We trust that some of our engineering correspondents will send us diagrams and particulars of these boilers for publication.

The third explosion to which we have alluded took place at Geddes' rolling mill, in Syracuse, N. Y. In the latter case, one workman was killed and seven injured. The boiler was new and considered in prime condition. The buildings and machinery were damaged to the extent of $5,000.

MATTHEW F. MAURY.

Matthew Fontaine Maury, formerly an officer in the United States Navy, afterwards of the Confederate Navy, died recently at his residence at Lexington, Virginia, aged 67. He was formerly superintendent of the Government Hydrographic Office, where he elaborated investigations in regard to winds and ocean currents. The discovery of the telegraphic ocean plateau and the indication of good whaling ground is attributed to him. At the time of his death, he was Professor of Physics in the Virginia Military Institute.

AN OLD FRIEND GONE.

The London *Mechanics' Magazine*, after an existence of fifty years, has, as a distinctive publication, disappeared from public view. It has recently been incorporated with a new weekly periodical, of more pretentious form and larger dimensions, entitled IRON, THE JOURNAL OF SCIENCE, METALS AND MANUFACTURES.

We shall greatly miss the familiar face and the regular visits of our excellent cotemporary, which flourished for nearly a generation before the SCIENTIFIC AMERICAN was conceived. The assurances that the new comer, which is to stand in its place, will be more sprightly and occupy a wider field have, for us, no comfort. For over twenty-five years the *Mechanics' Magazine* has been to us a valued friend and counselor in things scientific, and we deeply regret the exigencies that have compelled its final suspension.

We have before us, as we write, the first number of the *Mechanics' Magazine*, which is graced by a prospectus commencing as follows:

"FELLOW COUNTRYMEN:—Almost every class of people in this enlightened country has now a journal or magazine, which attends to its peculiar interests," etc. It then goes on to say that no publication has yet appeared suited for mechanics and artisans. "But the publishers now undertake such a work under the title of the MECHANICS' MAGAZINE, which shall be so cheap that all may buy, and of such value that no one ought to be without it." The price was fixed at 3d. per copy. It was printed in book form, sixteen pages in each issue, and published weekly. The first number was issued on Saturday, August 30, 1823. How vast has been the progress of science and invention since that day!

The front page of the first number of our venerable cotemporary was adorned by a portrait of James Watt, who had then been buried four years. An excellent biographical sketch of the great inventor then follows. The diving bell is next described and illustrated. Then comes a picture of a man flying in the air, with mechanical wings. A list of the new patents granted during the preceding month is then given, six in number, one of which was issued to Steven Fairbanks, of the United States of America, for certain improvements in locks. How to boil potatoes, and choose a carpet, are explained; also an old wife's notions about tea and teapots. How to detect cotton mixed with wool; How to avoid the effects of foul air in wells, and How a philosopher was outwitted, are explained. The latter states that a little girl came to a learned doctor who was busy in his study, and asked for some fire. [This was before the day of matches.] She had nothing wherewith to carry the coals, and the doctor started to fetch something for that purpose. But the little girl, stooping down, scooped some ashes on one hand and placed thereon with the other some live embers and departed. The astonished doctor threw down his books, saying: "with all my learning I should never have found out that expedient."

Jacob Perkins, the American inventor, was at that time in London, and some of his inventions attracted great attention. Among others noticed in an early number of the *Mechanics' Magazine* was a steam engine and generator, worked at what was then considered an enormous, a fearful pressure, namely, 75 pounds to the inch. His assertions that such engines could be safely worked, and with greater economy, were scarcely credited by the scientific people, notwithstanding that he had a ten horse power engine in actual operation.

The successful removal of a brick house to a considerable distance back from the street, in Maiden Lane, forms the subject of a letter from New York. The job was done by a Mr. Brown by means of screws, and his mechanical genius is highly praised.

Brunel's device for tunneling under the Thames is also illustrated and described. and notice is made of the fact that Sir Humphrey Davy had just discovered the application to mechanism of a certain gas, fifteen times heavier than air, which will produce a power fully equal to that of steam. The great obstacle to the immediate use and introduction of the gas is stated to be the difficulty of confining it. But Sir Humphrey expected to be able to overcome the obstacle.

In the number for January 3, 1823, a correspondent, who is so far in advance of the age that he does not venture to give his name, but signs himself T. G., gives drawings and descriptions of a locomotive engine, cars and railway. His article is entitled "Proposition for a General Iron Railway, with Steam Engines, to Supersede the Necessity of Horses in all Public Vehicles." He says:—"The intention of the present scheme is to introduce a more economical and expeditious mode of conveyance than is now in use, for vehicles of every kind, whether employed in the transport of persons or merchandise. It is proposed to supersede entirely the necessity of horse power in all public wagons, stage and mail coaches, post chaises, etc., and to employ in its stead the more potent agency of steam. A careful examination of the drawings now presented to the public, as a plan of a general iron railway, will, it is hoped, clearly demonstrate the ease, safety, and celerity with which vehicles of every denomination, for the conveyance of goods and persons, may be propelled by mechanic power. The six parallel railways which extend the whole length of our inner plate, form a general iron railway, which might run in a direct line from London to Edinburgh, and from London to Falmouth." This proposed railway had three tracks with devices for the lateral transfer of the cars from one track to the other. Each rail was provided with cogs, set below the face of the rail, and cogged wheels on the locomotive were made to mesh with the rail cogs; the engine and train were thus propelled. It had not then been ascertained that the adhesion of the wheels on the smooth faces of the rails would be sufficient, without the use of cog teeth.

DEPARTURE OF PROFESSOR TYNDALL.

We have before us Professor Tyndall's parting words to his many friends in the United States, delivered at a dinner recently given in his honor by many prominent citizens of New York. Through all the lightness characteristic of a post-prandial speech, we recognize the same earnest efforts in behalf of original research, the same powerful appeal to all classes of educated men to aid in the cultivation of science, that were so eloquently maintained in the able discourses now familiar to us all.

It is difficult to take exception to arguments emanating from so distinguished a source, but, while concurring in the belief that men who are willing to devote their lives to the advancement of our scientific knowledge should be supported, free from other cares, we do not fully acquiesce in the opinion that original research would be very materially forwarded by the establishment of an institute on the same basis as the Royal Institution of Great Britain. Records of the past point to the fact that successful discoverers in the great field of science have toiled, not with costly accessories or assisted by abundant means, but have carried out their labors after struggling against the most adverse of circumstances and with the humblest aids.

We are led to infer from the remarks of the learned author that he regards with a shadow of dissatisfaction the position he has taken upon the lyceum stage. He says "look jealously upon the man who is fond of wandering from his true vocation to appear on public platforms. Now and then the discoverer, when he has anything important to tell, may appear with benefit to himself and the world, but as a general rule he must leave the work of public lecturing to others. If our premise be correct, Professor Tyndall, with characteristic modesty, underrates the magnitude of the service he has rendered to science by his public lectures. Great as he is as an investigator, and valuable as the discoveries attained through his instrumentality are, we consider that as a teacher, as an apostle of science sent to awaken a new interest in its truths, in the minds of others, he fulfils his true mission; and that, had he secluded himself as he suggests the inquirer into Nature should do, the value of his contributions to our knowledge published by other means would fall far short of the benefits he has already conferred by his matchless elucidation of truths already known.

Did our space permit, we should be glad to present the whole of Professor Tyndall's admirable speech. As it is, we cannot refrain from quoting the following lines, addressed to those who apply themselves to science as a vocation. After alluding to his mode of life and study in Germany, he says:

'For a good portion of the time I rose an hour and a half earlier, working by lamplight at the differential calculus when the world was slumbering round me. And I risked this breach in my pursuits and this expenditure of time and money, not because I had any definite prospect of material profit in view, but because I thought the cultivation of the intellect important—because, moreover, I loved my work, and entertained the sure and certain hope that, armed with knowledge, one can successfully fight one's way through the world. It is with the view of giving others the chance that I then enjoyed that I propose to devote the surplus of the money which you have so generously poured in upon me, to the education of young philosophers in Germany. I ought not, for their sake, to omit one additional motive by which I was upheld at the time here referred to—that was a sense of duty. Every young man of high aims must, I think, have a spice of this principle within him. There are sure to be hours in his life when his outlook will be dark, his work difficult, and his intellectual future uncertain. Over such periods, when the stimulus of success is absent, he must be carried by his sense of duty. It may not be so quick an incentive as glory, but it is a nobler one, and gives a tone to character which glory cannot impart. That unflinching devotion to work, without which no real eminence in science is now attainable, implies the writing at certain certain times of the stern resolve upon the student's character: 'I work not because I like to work, but because I ought to work.' In science, however, love and duty are sure to be rendered identical in the end."

We feel assured that the regrets expressed by our parting guest at the circumstances which necessitate his early farewell will be shared by all. That he has succeeded in arousing a new interest in science among us is unmistakable; and that by his personal presence he has, if such be possible, increased the respect and admiration we had formed for him through his writings, is equally true. He carries away with him the expression of our cordial goodwill, coupled with the sincere hope that his return to our shores will be delayed to no distant day.

AN ELECTRICAL TOWER.

Mr. William H. Ward, of Auburn, N. Y., has suggested an electrical tower for accumulating natural electricity for telegraphic purposes. The structure which is to be placed on high mountain peaks or other elevated stations is to be made in three sections. The lower portion is a mere shell containing a door. Above this and insulated from it by a diaphragm is the middle part in which are openings or windows having slats pivoted in them, so that, by means of raising or lowering rods suitably connected to such shutters, the openings may be shut or opened. A projecting roof extends over the windows, serving to protect them from the weather and also for receiving the aerial electricity which may be drawn from it by wires for land line purposes. Above this roof is another insulating diaphragm. The highest portion of the tower is surmounted by a bent ventilating tube and vane, so arranged and connected with the rods acting upon the shutters that the revolution of the vane by the wind will open the windward and close the leeward slats. The wind therefores assists in driving an aerial current of electricity into the insulated middle portion of the tower, which current passes upwardly through the upper portion of the tower and out through the ventilator, thus forming a draft by means of which the electrical current is forced out at the vane. Insulated wires leading from the top portion of the tower allow a supply of electricity to be drawn therefrom.

By the use of the aerial electricity which surrounds the earth in the upper strata of the atmosphere, the inventor considers that artificial batteries may be entirely dispensed with, and a circuit formed merely by connecting the aerial current with the earth current. For instance, to bring Buenos Ayres, in South America, in direct connection with New York the following plan would be pursued: one electrical tower is erected on Pike's Peak or any other suitable high mountain in North America, and another similar tower on some suitable peak of the Andes in South America. The former would, by means of land lines, be connected directly with Denver, which place is again connected with all the prominent cities of the States. In a similar manner the southern tower is connected by land lines with prominent cities *vid* Quito. New York telegraphs to the tower on Pike's Peak, and, the operator having connected the land line with the aerial current, the signals are transmitted through the aerial current to the town in South America, and thence—the land lines being suitably connected—to Quito and Buenos Ayres.

A Velocipede Race.

A fifty mile race on bicycle velocipedes recently took place at Wolverhampton, Eng., between two experienced riders, Moore and Johnson. Moore, the smaller man of the two, agreed to allow his opponent an advantage of two miles in the fifty. The first fourteen miles were run in 59 minutes and 23 seconds, the advantage being in favor of Moore. At the end of the twentieth mile the race seemed to be over, as Johnson was evidently suffering from having repeatedly to force his high wheel with short crank up hill against the wind. Moore, on the other hand, with small wheel and long crank, had no difficulty in making the ascent. On the twenty-seventh mile, Moore passed Johnson for the sixth time, who could now scarcely move his vehicle up the short hill, and, on the twenty-eighth mile, Johnson gave up the race. Moore finished the remainder alone, making the fifty miles in three hours 56 minutes and 40 seconds, and running the last mile quite as quickly as the first. At starting, in view of the odds given to Johnson, bets of three to one were offered that he would come off victor.

THE Leyden jar was discovered by Von Kleist in 1745. Chemical decomposition by voltaic electricity, was discovered by Nicholson and Carlisle, London, in 1800.

THE hight of thunder clouds from the earth has been observed, in India, to be from three to five miles.