

Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

“The American News Company,” Agents, 121 Nassau street, New York.
“The New York News Company,” 8 Spruce street.
A. Asher & Co., 20 Unter den Linden, Berlin, are Agents for the German States.
Tubner & Co., 60 Paternoster Row, London, are also Agents to receive subscriptions.
Messrs. Sampson, Low, Son & Marston, Booksellers, Crown Building, 188 Fleet street, London, are the Agents to receive European subscriptions or advertisements for the SCIENTIFIC AMERICAN. Orders sent to them will be promptly attended to.

VOL. XX, No. 1...[NEW SERIES]...Twenty-fourth Year.

NEW YORK, JANUARY 1, 1869.

Contents:

(Illustrated articles are marked with an asterisk.)

*Improved Device for Measuring Power in Transmission.....	1
Supply of Food Water in Paris.....	1
Gift of Manu Scribes in the South.....	2
Propulsion and Dynamical Levers.....	2
Poisonous Drugs and Cosmetics.....	2
Practical Tanning.....	3
A Central Invention Bureau.....	3
Preservation of Wood from Decay.....	3
What Farmers Want—Inventors Take Notice.....	3
What a Mechanic Thinks.....	3
Dangerous Hair Washes.....	3
*Patent Wire Shears and Pliers Combined.....	3
The Pacific Railroad and the Proposed Darien Ship Canal.....	4
“The Wheel, the Axle, and the Rail”.....	4
*Pocket Sheet Metal Gage.....	4
The Origin of Porcelain.....	4
What it Costs to Go Around the World.....	4
A Better Umbrella Wanted.....	4
*Improvement in Plane Stocks and Tools.....	5
*The Barometer—Abstract of a Lecture by Prof. Guyot.....	5
Philosophy of the Teakettle—A Lecture by Prof. Silliman.....	6
Facts Concerning the Financial Condition of the South.....	7
The Great Floating Dock for Bermuda.....	7
Interesting Planetary Discoveries.....	7
Vesuvius on the Rampage.....	7
Printing in Colors—A Step in Advance.....	7
Obituary—Wm. E. Jillson.....	7
*Improvement in Engine Governors.....	8
Mechanical Practice at Home—The Foot Lathe.....	8
*Hand Tooling—The Button Tool.....	8
Condensation in Steam Pipes—Low Pressure.....	8
The Herring Fishery of 1868.....	8
The Destructive Fire of 1868.....	8
The Eventful Year of Our Lord 1868.....	9
Insurance—Duties of Companies and Insurers.....	9
Will Steam Ignite Combustible Substances?.....	9
Abolishing the Franking Privilege.....	9
Submarine Drilling and Blasting—The Shelbourne Submarine Drill.....	9
Conceptions of the Infinite.....	9
What is Science?.....	10
Reminiscences of Travel in Spain.....	10
American Institute Lectures.....	10
The Late King of Siam.....	10
Sensations in a Balloon.....	11
Exploration of Central Asia.....	11
Wooden Railways.....	11
Geographical and Archeological.....	11
Editorial Summary.....	11
Applications for Extensions.....	12
Manufacturing, Mining, and Railroad Items.....	12
New Publications.....	12
Inventions Patented in England by Americans.....	12
Recent American and Foreign Patents.....	12
Answers to Correspondents.....	13
Patent Claims.....	13

THE EVENTFUL YEAR OF OUR LORD 1868.

From whatever point of view we consider the year just passed into history, we are struck with the number of important events that have been crowded into its annals. With its political or religious aspects, although they present much food for profitable thought and study, it is not our province to deal. The progress of science, and the remarkable physical phenomena so numerous, and in some instances so appalling, during the twelve short months that have rushed past us, give ample scope for a brief and profitable retrospect.

The year 1868 will henceforth be known as the earthquake year. History has not on its records a period of such universal terrestrial convulsion as the one just left behind us, and scarcely one of greater disaster from this cause. The eruption of Vesuvius, and the excited state of many other volcanos throughout the world, indicate that the mighty forces which these phenomena are due, are still at work. Whether their energies are in such measure exhausted that no further immediate danger is to be apprehended, is yet undetermined. These terrible visitations are gradually changing the physical aspect of our globe; and from them we can gather some idea of the power of the immense volcanic disturbances, which, ages ago, threw up our vast mountain ranges and engulfed whole continents.

No less grand and impressive have been the celestial phenomena of the year. The great solar eclipse, possessing in some respects features of greater interest than any that has occurred for a long time past, or that will occur for a long time to come, has been not the least of these remarkable occurrences, both on account of its special peculiarities, and the results which have been obtained from organized observation. Add to this the splendid meteoric shower of November, and we may well say that the heaven above and the earth beneath have been prolific of wonders.

The progress in the most mighty undertakings which the world has ever witnessed is no less remarkable. The most gigantic railroad enterprise ever attempted has been pushed this year almost to completion. The Suez canal now almost joins the Mediterranean to the Red Sea, while during the year a movement has been initiated for the construction of a similar work across the Isthmus of Darien, which will unite the two great oceans. A new sub-Atlantic telegraph of greater length than any heretofore attempted, has been made and will soon connect the two continents, to be followed, no doubt, by others of greater magnitude. It has also been the subject of serious contemplation to lay a cable between the Pacific coast and China, and we would probably hazard little in predicting that some even now old men will live to see that work accomplished. Never has the earth seen a period of greater enterprises; never before has civilization made such triumphant advances.

The discoveries and improvements in the sciences and the arts have been numerous and important. To review them and specify them as they demand would fill a volume. A glance at the index of the volume we have just closed will show the great variety of subjects upon which scientific minds are now at work—not in mere speculation, but in actual and accurate experiment. Almost daily, nature responds to some bold inquiry of this kind, and a new truth is born to science.

As this article meets the eye of our numerous friends and

readers, the congratulations and kind wishes of friends will be mutually interchanged upon the advent of the new year. That the year 1869 will be as fruitful of progress and as promotive of the welfare of the entire human race as the eventful year that has passed, is our prayer, while we beg to unite with other friends in wishing each and all a “Happy New Year.”

INSURANCE—DUTIES OF COMPANIES AND INSURERS.

The occasional if not frequent litigations between insurance companies and policy holders are calculated to do great injury to both. That company which soonest and quietest adjusts its affairs with a holder of a policy after his loss is always the most popular. The fact of an early payment of the amount is heralded by the recipient, and given currency in the newspapers, making one of the best, although gratuitous, advertisements the company could have. But litigation before a jury or a suit before a referee does more damage to the company than can be offset by their success in that particular case, and injures the business of insurance generally.

Insurance is a perfectly legitimate business, and its institution has done much more to nurse and protect enterprise in building, manufactures, and commerce than is generally supposed. The *Chicago Insurance Chronicle* gives an idea of the history of insurance that may be of interest to our readers. It says that the earliest recorded application of the principle was in marine insurance, which was the invention of merchants and ship owners engaged in the commerce of the Mediterranean, somewhere about the twelfth century. Its object can scarcely be more clearly and fully set forth than it is in the language of the English statute of 1691, which declares that, by means of insurance, “it cometh to pass, upon the loss or perishing of any ship, there followeth not the undoing of any man, but the loss lighteth rather easily upon many than heavily upon few, and rather upon those that adventure not than upon those that adventure; whereby all merchants, especially of the younger sort, are allowed to venture more willingly and freely.” It was not long before the same principle was applied to the insurance of buildings, and so to the protection and encouragement of trade.

Further on the writer says; “It is vain to argue that insurance was designed for the use of business, and not business for the use of insurance. Insurance is governed by certain laws, which cannot be violated with impunity. The premium must be equal to the average risk, and exceed it by a sufficient margin to cover the necessary expenses of conducting the business, or bankruptcy is inevitable. This ideal may not be always attained with mathematical precision, but the departures from it will oscillate within ever narrowing limits. If the premiums are calculated too high, the business will decline; if too low, impending ruin will soon teach the insurers their error. It is folly to consider the interests of the insurers and of the insured as distinct. It is madness to regard them as inimical. Insurance is the friend of industry and thrift everywhere. Despite the crudities of its present classification of hazards, that classification is the result of long experience and careful observation, and is established as much in the interest of the insured as of the insurer. It cannot be materially changed without defeating the very objects of insurance. The practical question, therefore, in the case before us is this: If the present rates are prohibitive to the manufacturer, and yet unremunerative to the insurer, what is the remedy? What, in the name of common sense, but this—the co-operation of both in the search for some sufficient safeguard, some measure of protection, that shall reduce the hazard and so reduce the rate? In this search they have each an equal interest. The minimum rate, consistent with safety, is the result which the underwriter seeks, and it is better for the manufacturer to recognize this fact and do all in his power to diminish the hazard, than to seek to reduce the cost of indemnity by means which, if successful, must surely result in the destruction of the indemnity itself.”

We would suggest, in addition to the search for a safeguard, honesty in the insured and the insurer. So long as seekers for insurance prefer to overrate the value of their property and pay the additional premium, and the companies, for the sake of that additional premium, or increased amount, will issue a policy on property the real or market value of which they do not understand, or care to ascertain, so long will insurance be simply a contest of sharp practice between insured and insurers, and suits at law will follow losses and a demand for payment. Although both parties are to blame for this state of affairs, a little consideration will show that the *onus* of the blame rests upon the insurer. It is his business to ascertain the value of the property insured. Men generally believe, and honestly too, that what is theirs possesses some peculiar value, and they will estimate their possessions at a higher figure than similar property held by their neighbors. This is natural, and therefore in some measure, excusable. But the insurance agent should use his own judgment, aided by a personal inspection of the property to be insured and the opinions of disinterested but competent parties. And the agent should have a theoretical, if not practical, knowledge of the nature of the business carried on in the buildings for which an insurance is asked. An exhibition of this knowledge would serve as a restraint on the party who desired the insurance, and aid in correcting his mis-statements whether honestly or fraudulently made. Instead of employing as an agent or solicitor a person who has merely the gift of fluency of speech and personal presentability, our insurance companies would do well to have agents for each class of their risks who are experts by reason of their familiarity with the nature of the property on which they recommend risks to be taken. Improper representations on either side and consequent controversies in case of loss would thus be avoided.

WILL STEAM IGNITE COMBUSTIBLE SUBSTANCES?

The idea that heating buildings by means of steam pipes completely prevents all danger from fire, we do not believe is correct. When we know that the heat generated by a hydrocarbon in combination with a combustible fiber will produce combustion, as has been so often proved, and that a fibrous material saturated with oil will, if exposed to the sun's rays burst into a flame, it follows that a greater degree of heat, whether produced by steam or any other agency, may produce like results. Experience has proved that a long exposure of wood to a temperature not exceeding that of boiling water, or 212 deg., brings the wood into a condition very favorable to ignition; how much more should it be accepted as a truth that long exposure to pipes conveying steam at a temperature of from 350 deg. to 400 deg., should render the combustible substance liable to ignition. We have on our table specimens of boiler lagging, of pine wood, inclosing the steam space and defended by a sheet iron jacket, thus protecting them from the oxygen of the atmosphere, that are reduced to the condition of porous charcoal, lighting as readily as our old-fashioned tinder merely by the contact of a spark. Every engineer must have noticed in his experience the inflammable condition of the wood through which a steam pipe passed, or on which it rested, if they had remained in contact or contiguity for a period of a few weeks. Every engineer of lengthy experience and close observation also knows that it is possible to ignite combustible or inflammable substances by the direct impact of steam. Cases have been recorded where dry wood was ignited by escaping steam at a distance of not less than thirty yards from the boiler; and we know, personally, where, as an experiment, we lighted oil-saturated cotton waste and dry pine wood by the steam from a boiler at a distance of twelve feet, the boiler pressure being at the time only 95 lbs., temperature, by Regnault 335 deg. The materials burst into flame in a few minutes.

The ordinary way of conducting steam through buildings, factories, shops, etc., from the boiler, is to lead it through a series of parallel pipes, connected by bends or cross pipes at the ends and suspended on iron hooks or brackets attached to upright wooden cleats. These brackets hug the pipes closely to the wood, but they leave spaces between the pipes and wood for the lodgment of the dust from sweepings and the particles held in suspension by the atmosphere of the room. These particles are simply a form of tinder, calculated from their lightness and combustibility to readily ignite. When it is considered that the mere heating of a stick of pine wood, however much seasoned, will compel it to give out an inflammable vapor, it will readily be understood that dry wood and the “fluff” that settle from the atmosphere of a cotton factory or sawing and planing mill are in the best condition for ignition even at low temperatures.

ABOLISHING OF THE FRANKING PRIVILEGE.

We are happy to learn that Senator Ramsay has reported a bill from the Committee on Postoffices, and Post Roads, recommending the abolishing of the franking privilege, and we are glad to see that the senator personally recommends its adoption.

The abuse of the franking privilege has become so general that the revenue of this department is greatly impaired in consequence, and that, too, by our very lawmakers, who should be the most scrupulous in observing the spirit as well as the letter of the statute.

If congressmen would limit their franking operations to their own business there would be less cause of complaint, but some of them allow their friends the use of their signature to frank advertising circulars and pamphlets to a great extent. We have had frequent occasion to call attention to this flagrant abuse before.

If the abolishment of the franking privilege should be extended to the departments it would cost us thousands of dollars on what matter now passes free between us and the Patent Office. But we had rather pay the postage both ways, than have the Government deprived of the large revenue it now is, under the present franking system.

Let the various departments and all congressmen pay their own postage and each bureau charge the same to disbursement account, the same as if paid for stationary, clerk hire, fuel, etc. We hardly expect that our congressmen will pass any bill curtailing their own privileges, but that a reform is needed, no one knowing the abuse of the franking privilege can deny.

SUBMARINE DRILLING AND BLASTING—THE SHELBORNE SUBMARINE DRILL.

The difficulties of navigating the East River entrance of New York harbor, especially by vessels of considerable draft, occasioned by natural obstructions, have been recognized ever since the settlement of Manhattan Island. About sixteen years ago the height of the sunken rocks was considerably reduced by the Mailliefert process, which consisted of lowering cans of gunpowder on the rock and exploding them by the galvanic battery and connecting wires, the theory being that the superincumbent mass of water formed a resistant or fulcrum against which the explosion might react. But where the rock presented a smooth surface without salient points this method has not proved satisfactory. In consequence the attention of engineers has been directed to the provision of some more adequate means.

The United States Government, having appropriated \$85,000 toward the improvement of New York harbor, and General Newton, United States Engineer, having advertised for proposals, the contract for the removal of the Hell Gate obstructions has been awarded to Sidney F. Shelbourne, of New York

who, on the 16th of December last, gave an exhibition of his machine, its powers being exerted on blocks of the hard Quincy granite. The principal part of Mr. Shelbourne's machine is a cast iron casing, in form a depressed semi-spheroid, or shallow inverted bowl, seven feet in diameter. It has three solid steel feet or toes by which its stability on the rock is secured. Rising from the upper part of the casting is a conical wrought iron frame, supporting the upper end of the drill shaft by means of two parallel rods entering into sockets in a cast ring at the top of the frame. The drill bar passing up through the centre of the top is furnished at the bottom with a bit, one and a half inches diameter, and having imbedded in its face nineteen diamonds, and rotating at the rate of from 300 to 500 revolutions per minute, advancing at the rate of from one to one and a half inches in the same time.

The feed is caused by a differential gearing which steadily operates to advance the drill into the rock, the debris being washed away by the water forced into contact with the bit through a small rubber hose. The water-tight chamber of the machine contains a pair of engines working at right angles to each other, with a horizontal stroke. As soon as the hole is completely drilled, and also when the drill-shaft is withdrawn from the rock, information of this is given by a magnetic bell which is acted upon by a double wire cord insulated from the water and passing down one of the parallel rods or tubs upon which the crosshead is fixed.

This drill weighs nearly five tons. It will be worked from a wrecking tug with a derrick by means of steam supplied from the boiler of the tug. To prevent this steam being condensed in its passage through the water to the engine it is conveyed in a hose surrounded by another through which the exhausted steam passes.

The rock which will be drilled in the Hell Gate is that known as the bastard granite, and is much softer than either the Quincy or Maine granite, on which the drill has been satisfactorily tested. After a number of holes are drilled over a certain space, a diver will descend and charge them with cartridges of nitro-glycerin, which will be exploded in the usual manner. In connection with the drill another very ingenious and automatic machine will be used to grapple and raise the fragments.

CONCEPTIONS OF THE INFINITE.

Try all we may, we fail to get even the most dim conception of the absolutely infinite—that which has no bound, no measure of comparison. We will cease to make any effort to conceive it as soon as we realize the fact that all our ideas are comparative. Size, color, form, weight, all the qualities in which material things differ from each other, are all judged by comparison with something else. A unit of comparison which answers well as a measure of some object or distance, may be found to be inadequate for the measure of a larger object or distance. To estimate the distances of very remote objects, as the fixed stars, it becomes necessary to take a very large unit of comparison, say the distance light travels in a single second.

Thus it has been estimated that Sirius the "dogstar" is at such a distance from the earth that light requires fourteen years to travel from it to our earth. When we reflect that light travels at the rate of 190,000 miles in a second, we can form a conception of this distance which would be impossible if we made a mile the unit of measurement. But this distance, large as it is, is rapidly increasing. It has been recently computed that Sirius is moving away from the earth at the rate of 144,000 miles per hour. The method by which this motion has been determined leaves no room for doubt as to its reality although it may well be doubted that the rate of recession is anything more than a rough approximation.

These illustrations, although they do not disprove the statement that the human mind cannot conceive infinity, show that the nearest approach to such a conception is in the study of that sublime science, astronomy. No wonder that the devotees of astronomy are the most laborious of all the divisions of the grand army of science. No wonder that they who nightly gaze upon the mightiest of God's works, should have ever been the most unwilling to doubt the existence of a higher creative intelligence. No wonder that this grand study has attracted to itself and appropriated the best talent of every age, and that those who "nightly assault the heavens with the artillery of science," are humbled with the sense of their own weakness as they contemplate the stupendous machinery of the universe.

WHAT IS SCIENCE?

The primary signification of the word science is knowledge; but as generally accepted it means knowledge reduced to a system. All knowledge is comprised of facts and logical inferences from facts. The basis of all science then is fact, and the prime object to which all scientific research should be directed is the determination of facts. Facts, being the foundation upon which the logical superstructure must be reared, are of the most vital importance. They may not be assumed; all guesswork is to be strictly shunned.

People are too apt to forget that it is quite possible to reason correctly and ably upon totally false premises. The world is full of books that exemplify our proposition. Old libraries are filled with quaint and labored expositions of almost every subject upon which men can think, valueless now, because they have been found to conflict with facts. It is with feelings of admiration that we roam through a collection of these almost forgotten labors—admiration for the talents which in the light of the nineteenth century, would have made a brilliant display, and which, even in the darkness of medieval times, made a manly and brave struggle to reach truth.

We pride ourselves upon the progress of the times, and we

have good reason to do so; at the same time it is not by any means improbable, that many of our views upon subjects relating to the sciences will be discovered to be fallacious by a future generation, as those of a past age have been by us. It seems to us that there is too much inquiry as to *why* things are and too little as to *how* they are. What is of practical value is how things occur—what are the invariable laws that govern their occurrence. Had Newton set himself to speculating as to why gravitation takes place, rather than to the investigation of the laws which govern the attraction of masses to each other, his labors upon that subject would have been altogether vain and worthless. But his was a mind that applied itself to the investigation of facts. It is true he hazarded some hypotheses, but they were only entertained by him as being what might ultimately be demonstrated by experiment to be true, not made the basis of system. The world has had too much theorizing and is now getting down to the true foundation, the veritable hardpan of all science facts.

REMINISCENCES OF TRAVEL IN SPAIN.

NO. III.

DUICAL PALACES—THE ESCORIAL OF PHILIP THE SECOND. The public buildings of Madrid are unusually good, and there are many grand ducal palaces fitted and furnished in sumptuous style, the most interesting of which are those of the celebrated Duke of Alva, and Cardinal Ximenes, the latter in some respects the ablest man which Spain has ever produced. Ximenes began his career by entering a Franciscan monastery. During the reign of Ferdinand and Isabella, over whom he exercised a strong influence, his mind more than any other, controlled the policy of the kingdom, and to this day his memory is revered as a saint. The gloomy old palace is a fitting reflex of the rigorous habits of the Cardinal. The palace of the Duke of Medina Celi, facing the Prado, covers an area of 245,000 square feet, and is fitted up with all that taste, skill, and love of display which characterize the wealthy classes of Spain. The Marquis of Salamanca has two elegant palaces; and until recently his picture gallery was looked upon as containing one of the finest private collections in Europe. Some of our readers will remember the Marquis as having been an active promoter of the Atlantic and Great Western Railway; and the town of Salamanca, Pa., was named after him. It is reported that he lost heavily by his railway schemes, and that in order to repair the drain made upon his fortunes, he had sold at the recent Paris exhibition many of his valuable pictures, from which he realized upwards of three hundred thousand dollars.

Wealth in Spain, as in most monarchical countries, is very unequally distributed. The grandees are usually very rich in landed estates and other property, while the poor are very poor. In point of squalid poverty, the streets of Madrid are full of picturesque effects. Vice and immorality run through all classes of society, and yield their bitter fruits. The more common outward vice of the lower classes consists in their passion for bull-fights, cock-fights, and lotteries. It is a common thing to witness upon the streets, old men, women, and young children hawking about lottery tickets, from the sale of which they gain a miserable pittance.

Spanish history abounds in great mysterious characters, and we are obliged to confess that there was something strangely fascinating connected with our trip through that romantic country, which we can only explain by the fact that in early life we had read with interest "Don Quixote," Prescott's histories of "Ferdinand and Isabella," "Charles the Fifth," and "Philip the Second," also Irving's "Conquest of Grenada" and the "Tales of the Alhambra." The reader can therefore readily imagine with what eagerness we sought out the Audiencia where Ferdinand and Isabella were married; the old palace where Philip the Second was born; the little chapel at Seville, where Columbus met Isabella on his return from San Salvador; the house where he died, and the parochial church where his funeral obsequies were celebrated, also the many exquisite edifices left by the exiled Moors. Perhaps, however, there is no single pile of architecture remaining in Spain so interesting as the Escorial—about two hours' ride by railway from Madrid, and regarded by the Spaniards as the eighth marvel of the world. The Escorial was designed and built by Philip the Second, a cold, haughty, intellectual bigot, who, after burying one youthful queen, went over to England and married "Bloody Mary." Philip does not appear to have been greatly afflicted when Mary died, for history represents him so very anxious to obtain another queen that he could scarcely wait for the six months' official mourning to cease before he sent his ambassador to claim the hand of Elizabeth of Valois, daughter of Catherine de Medicis, then in her sixteenth year, and knowing all the while that his unfortunate son, Don Carlos, had a strong passion for the beautiful princess.

History says that Philip was induced to found the Escorial as an act of gratitude to God, and especially to his patron, St. Lawrence, who inspired the victory of St. Quintin, in 1557. The buildings, which comprise a palace, temple, and monastery, cover 500,000 feet, and cost upwards of four millions of dollars in those times, when it is said that the laborers received but six cents per day for their work. The situation of the Escorial, under the shadow of the Guadarama mountains, is desolate and melancholy in the extreme. The mountains are one mass of bare gray granite, and the wide sweep of country lying in front is a monotony of rocks and stunted trees. Philip was two years in hunting out this situation, and if he had searched for two years more he could scarcely have made a selection more desolate. St. Lawrence suffered martyrdom by being roasted upon a gridiron, and it is thought that Philip had the form of that instrument in his head when he drew the plan, which no doubt was supplemented by a granite boulder in his hat, if one may judge from the immense piles of stone blocks employed in its construction.

The architecture of the Escorial is severely simple, grand and gloomy. Philip built it not for a prince, but for a monk, and wanted for himself only a cell, where he could live and die, in the palace he had built to God; and certainly, we never before saw so much simplicity and solidity in any other similar structure. The palace was originally very plainly fitted up. Philip's cheerless cell, where he was accustomed to pass a good deal of his time, had four common-looking pictures hung upon the walls, a plain board table, a single chair, and a stool upon which he used to rest his gouty foot, the sacking still showing the stains from the remedies employed to kill the pain. These relics of the monarch are reverently shown, and attest the rigid austerities practiced by him after his retirement to the Escorial.

The treasures of the Escorial are very numerous. There are many fine paintings, statues, and tapestries, curious pieces of furniture, elegant and costly church vestments, beside several thousand saintly relics, highly venerated, among which are ten complete skeletons, more than a hundred heads, and several hundred bones. Philip had a passion for these things.

Just back of the choir of the temple, there is suspended a marble crucifix of life size, done by that famous man Benvenuto Cellini of Florence. He worked upon it, he says, "with the diligence, and love, that so precious an object deserves, and because I know myself to be the first who ever executed crucifixes in marble."

The library is a splendid room two hundred feet in length, and contains many rare and beautiful books, among which is a splendid Old Testament of the eleventh century in letters of gold with exquisite paintings; also, a tastefully decorated copy of the Koran which is very old. We asked the custodian, what value was put upon the Old Testament, and he replied that a million dollars would not buy it. The fine, sharp portrait of Philip, which hangs in this library, represents a pale, bloodless, careworn man of seventy-two, about to bid adieu to all his grandeur and renown. Such a picture, in such a place, makes it one of the most interesting portraits in existence.

The Monastery was shut to our observation, but we heard the solemn chanting of a few monks who are permitted to occupy its cells and cloisters. Upwards of seventeen hundred mass services are required to be performed every year in the Escorial, and following the custom of her predecessors, the late Queen, when she visited the place, was in the habit of hearing midnight mass at the altar of the pantheon under the temple.

The palace "is tenantless of its heroic dwellers," the courts are deserted, and the mind of the visitor is oppressed by the gloom which hangs heavily over a venerable pile that illustrates better than books, the character of the man who built it.

The palace is now very elegantly furnished—four of the apartments, afterward fitted up by a subsequent king, in marquetry, with gold and steel door and window trimmings, cost upward of one million dollars. The temple is an enormous structure of massive granite, and beneath the high altar is a gorgeous pantheon fitted up as a burial place for the Spanish kings and queens. Philip died upon a couch within a small side chapel, through the window of which he could survey the splendid follies which he had created; and his worn-out body was carried down and deposited within a recess of the pantheon. Twenty-one years were employed in the construction of the Escorial, and Philip was accustomed to ride from Madrid on horseback to superintend the work, perching himself on an elevation where he could overlook the situation and development of his costly gridiron.

We spent five hours' hard work in wandering about the vast buildings of the Escorial.

American Institute Lectures.

Dec. 30.—Mr. James Hall, State Geologist, Albany; "On the Evolution of the North American Continent."

Jan. 6, 1869.—Prof. Horsford, Cambridge, Mass.; "On the Philosophy of the Oven."

Jan. 13.—Dr. T. Sterry Hunt, Montreal, Canada; "On Primitive Chemistry."

Jan. 22.—Prof. Doremus, College of the City of New York; "On the Photometer."

Jan. 27.—Mr. Waterhouse Hawkins, of London; "On Comparative Zoology."

Feb. 3.—Prof. Cooke, Harvard College, Mass.; "On the Spectroscope."

Feb. 10.—Wm. J. McAlpine, Pres. Am. Soc. of U. S.; "On Modern Engineering."

The Late King of Siam.

The name of the late King of Siam was Phra-Bard Sam-detch-Phra-Pharamendr-Maha-Monkut. He was seventy years of age, and had some taste for civilization, having dug canals, built forts, railways, steamboats, founded a printing office at Bangkok, and paid some attention to education. These peculiarities probably came from reading the *Evening Post*, to which he was for many years a subscriber.

The king leaves an extensive family of widows, said to be two thousand in number, to mourn his loss. He spent the last years of his life chiefly in studying Siamese theology, and in photographing his wives.

We have a very high respect for the *Evening Post*, and it is therefore with some hesitation that we disturb its theory respecting the progress made in civilization by Phra-Bard Monkut, of Siam. His late highness was a regular reader of the *SCIENTIFIC AMERICAN*, and it seems to us very likely that he learned more from its columns about forts, steamboats, railways, canals, and photography, than from the *Post*; but so far as his knowledge of theology and social science is concerned, we have no doubt that he found the *Post* an able assistant, and we hope our cotemporary will forward a copy of the paper containing the notice to each of the two thousand bereaved widows.