### Galileo.

(*Continued.*)

On the 7th of January, 1610, he discovered three of Jupiter's satellites. When he first observed them, two were on the east side, and one on the west side of the planet, all in a straight line parallel to the ecliptic, and much brighter than fixed stars of their magnitude. He regarded them at first as fixed stars; but on chancing to direct his attention to them again on the 8th of January, he found all the three to be on the west side of Jupiter, and nearer each other. Disregarding the circumstance of these stars having approached each other, he considered how Jupiter could be to the east of them, when the day before he had been to the west of two of them; and the conclusion he came to was, "that the motion of Jupiter was *direct* contrary to astronomical calculation, and that he had got before these two stars by his own motion." On the 10th, however, another observation showed him only two stars, and both on the *east* side of Jupiter. It was evident that the planet could not have moved from west to east on the 8th of January, and two days after have moved from east to west. Under these circumstances he came to the conclusion, that the different appearances arose from the motion of the stars themselves. On the 11th there were two stars on the east side of Jupiter, but the one was twice the size of the other. This fact threw a new light upon Galileo's difficulties, and he immediately drew the conclusion which he considered to be indubitable, that there were in the heavens three stars, which revolved round Jupiter in the same manner as Venus and Mercury revolve round the sun. On the 13th, Galileo discovered the fourth satellite of Jupiter. Having made this discoveries, he named them the Medicean Stars, in honor of his patron, Cosmo de Medici, grand duke of Tuscany, and published an account of them in a work entitled the "Sidereal Messenger."

These discoveries, the fruits of the newly discovered telescope, astonished the scientific world. The ideas, however, which Galileo enunciated in his "Sidereal Messenger," were attacked on all hands by the Aristotelians.—They even denied the existence of the four satellites which Galileo had discovered: some affirming that he had been deceived by reflected rays; and others, that it was a ruse to afford himself a subject for discussion. Their existence having been at last indisputably established, others began to claim the priority of discovery, and to pretend that they had discovered additional satellites of Jupiter. Some gave the planet as many as twelve moons; but they were gradually found out to be fixed stars, and Galileo remained the original discoverer of the four secondary planets.

Before the close of 1610, Galileo discovered Saturn's ring, although not conscious of its true nature, or the appearance when highly magnified. He described Saturn as a triple star, each retaining its relative position.—Shortly after, he discovered that Venus presented phases like the moon, when at different parts of her orbit. He likewise discovered spots on the sun's surface, from which he calculated that that luminary had a motion on its axis, completed in about twenty eight days In 1612, he published a treatise on floating bodies, displaying a knowledge of many true principles in hydrostatics. It was violently attacked; but the master mind of Galileo refuted his opponents as soon almost as they appeared.

The great objection raised by the priesthood and followers of Aristotle, against the doctrines advocated by Galileo was, that they were contrary to Scripture, and ran counter to the doctrine of the church. In refuting these and other objections, Galileo added to the calm arguments of reason the bitterness of sarcasm. In 1613 he published a letter to prove that the Scriptures ought not to be taken as guides in philosophy, and that the language found in the Bible was wrong interpreted, and might with equal propriety have been urged against the doctrines of Ptolemy. The storm which had been gathering over the devoted head of the philosopher at last broke forth. He was denounced from the pulpit by one Caccini, a friar. The general of the order to which this friar belonged apologized for this attack; and, stimulated by a strong love of truth, and to silence his antagonists, Galileo published another letter defending his views of Scripture, as applied to his own and the system of Ptolemy.

These letters were denounced to the inquisition, and steps taken to bring Galileo before the bar of that sanguinary tribunal. It is a disputed point whether Galileo, on hearing of the steps taken against him, went to Rome of his own accord, or whether he was cited there He appeared at Rome at the latter end of 1615, and was shortly after summoned before the Inquisition, to answer the charges of having heretically maintained the motion of the earth and the stability of the sun, and with having taught it to others. The Inquisitors met, and after considering the charges, decreed, that Galileo should be enjoined to renounce these opinions, and to pledge himself neither to teach, defend, nor publish them; and that in the event of refusal, he should be thrown into prison. To these Galileo agreed, and was dismissed.

Philip III. king of Spain, a country at that time extensively engaged in maritime enterprise, had offered a reward for the discovery of an improved mode of finding the longitude at sea. To this problem Galileo turned his attention, and proposed to make the satellites of Jupiter subservient to effecting this purpose. Communications were made to the Spanish Court, and so great was Galileo's desire to carry out his project, that he offered to go to Spain and reside there till he had communicated a knowledge af his method. Nothing satisfactory came out of these negotiations, which were occasionally revived during the period of ten or twelve years.

In 1618, three comets visited our system, and engaged the attention of the learned men of the time. Galileo was prevented by illness from making any observations on these erratic bodies; but he became deeply involved in controversy respecting them, and it is asserted, maintained the opinion that they were meteors.

Cardinal Maffeo Barberini, a sincere friend of Galileo's, was raised to the papal throne; and, although in ill health at the time, Galileo set out for Rome, to congratulate the new pope on his elevation, and secure a continuation of his friendship. He was kindly received; and after repeated audiences, the receipt of several presents, and the promise of a pension to his son, he was dismissed by the pope with every expression of friendship and regard.

(*To be continued.*)

### Gas for Illumination.

The moderns possess a remarkable superiority over the ancients in their better acquaintance with the phenomenon of natural science. No comet now disturbs the peace of men and no spirits ride upon the wind and cloud. Our better acquaintance with gas, shows how elevated the knowledge of the *present* is, in comparison with that of the *past*.

A remarkable instance of the application of a limited knowledge possessed by the ancients of the explosive nature of a natural gas, is related by Justin, when the Gauls under Brennus, about 388 years before Christ, had overrun a great part of Greece, and cut off the supplies of the Temple of Apollo at Delphi; the priests succeeded in dispersing the besiegers by setting fire to the gas issuing from the hill under the Temple, which blowing off a fragment of the rock, killed a great many, and terrified and dispersed the remainder.—This gas is described by Justin as a "cold spirit" issuing from a fissure from the depth of the earth, near the Altar, and exciting the mind of the priestess, induced her to give the replies of the god. Now this gas or cold spirits, as it was called, being described as having an explosive quality, and capable of parting the rock, we can easily identify as the same or at least similar in its effects to our present illuminating gas, which is well known to all to be highly explosive when combined with a certain quantity of atmospheric air; and from its exciting the mind of the priestess, it might probably contain some portion of nitrous oxide, or the laughing gas of the present day.

In 1739 appeared the first account of attempts to distill coals in close vessels or retorts, and collect the products of gas in bladders for experiments, and which experiments were frequently made and continued up to 1792, a period of upward of 50 years, during which time, although the practicability of easily procuring a cheap and beautiful artificial light by the distillation of coals, had been so repeatedly manifested, still the tardy nature of men's minds, and the total absence of a disposition for improvements, prevented any steps being taken for the introduction of such a valuable discovery.

In 1792, Mr. Murdock, a talented engineer of the time, residing at Redruth in Cornwall, where he was employed in introducing the then newly-invented steam-engine of the celebrated James Watt, for draining the deep and valuable tin and copper mines of that county, constructed an experimental coal gas apparatus, and lighted his dwelling. After this he removed it to Soho, near Birmingham, to the steam-engine factory of Boulton and Watt, where he lighted their manufactory, also other factories and places in a similar manner. The plan adopted at this period was of the most primitive kind, being merely a close cast-iron vessel fixed in a furnace, in which, on its being partially filled with coal, and made red hot, the gas was generated, and conveyed away in pipes, in its crude and impure state, to the burners; no method, at that time, having been contrived to free it from the impurities with which it was combined, the most obnoxious of which are sulphur in a gaseous state, and carbonic acid gas.

### Barren Soils.

This term is often used, and is supposed by many to mean a soil incapable of being rendered fertile. No such soil exists. Barren then, is only applicable when intended to convey the idea of soil which, in its present state will not repay the cultivator.

The unproductiveness may arise from many causes, but none of them are without remedy. If from a deficiency of some of the earth, let them be added; if from an excess or deficiency of either animal or vegetable matters, the fault is easily corrected; if from stagnant water either under-drain or subsoil, as may be required; if sand, clay or chalk be deficient, add them; if either be in excess, add the other two. Peaty soils are generally reclaimed by draining alone; sometimes paring and burning are necessary to induce decomposition of organic matter in excess. The same result can be obtained in most of all cases, by the addition of the salt and lime preparation which we have recommended for composts.—When the soils are found to be imcompetent to produce any special crops required, the farmer should have them analyzed, and then compare their integrants with those of such soils as produce the required crop readily.—The difference will point out the means which must naturally be resorted to, for the purpose of restoring their fertility.

### How to Make a Horse Sure-footed.

A singular account of the manners of the ancients in the matter of breaking in their horses and rendering them sure-footed when galloping over the most irregular and dangerous grounds, is related by Vegetius. The Parthian horses were lighter and hardier than those of the Cappadocians or Medes, and were the best war horses. A spot of dry level ground was selected, on which various troughs or boxes, filled with chalk or clay, were placed at irregular distances, and with much irregularity of surface and of height.—Here the horses were taken for exercise, and they had many a fall as they galloped this strangely uneven course; but they gradually learned to lift their feet higher and to bend their knees better, and to step sometimes shorter and sometimes longer, as the ground required, until they could carry their riders with ease and safety over the most irregular and dangerous places. Then it was that the Parthians could fully put into practice their favorite manœuvre, and turn upon and destroy their unsuspecting foes. They were as formidable in flight as in attack, and would often turn on the back of the animal and pour on their pursuers a cloud of arrows that at once changed the fortune of the day.

The letters now sent about Paris by the daily post amount to 260,000, or fifty per cent more than during the emeutes.

### The Cotton Gin.

The following extract from De Bow's Commercial Review, will be read with a great deal of interest. The pecuniary advantage of this invention to the Uuited States is by no means fully presented by an exposition of the value of the exports of cotton (amounting to more than $1,400,000,000 in the last forty-three years,) nor by the immense proportion of the means which it has furnished this country to meet the enormous debts continually incurred for imports from Britain and the European continent—cotton having for many years constituted one-half, three-fifths or seven-tenths of the value of the exports of the Union. But it was the introduction of the cotton-gin which first gave a high value and permanent market to the public lands in the South-west. The rapid settlement and improvement of almost the entire State of Alabama, Mississippi, Louisiana, Florida, and Texas, is mainly due to the large production of cotton, consequent upon the invention of Whitney. The States of Georgia and Tennessee have also been largely benefitted by the same means, in the disposal of their domain, a vast portion of which must have remained unoccupied and valueless but for the immense increase of facilities for the preparation of cotton for the market. In the three States of Alabama, Mississippi and Louisiana, the sales of the public lands of the general government amounted to 18,099,505 acres, during the eleven years ending on the 30th of June 1844—yielding to the National Treasury more than $30,000,000. The sales of upland cotton lands by the United States land-officers, have amounted to many tens of millions of acres; and none have been sold at a lower rate than $1 25 an acre—a large proportion at a higher rate.

It is to be remarked, finally, that the cotton gins now in use throughout the whole South, are truly the original invention of Whitney—that no improvement or successful variation of the essential parts has yet been effected. The actual characteristics of the machine (the cylinder and brush,) the sole real instruments by which the seed is removed and the cotton cleared, remain, in cotton-gins of even the most recent manufacture, precisely as Whitney left them. The principle has not been altered since the first cotton-gin was put in motion by the inventor, though great improvements have been made in the application and direction of the moving forces in the employment of steam power, in the running-gear, and other incidentals. Every one of the various cotton-gins in use, under the names of different makers, contains the essentials of Whitney's patent, without material change or addition. The brush and the cylinder remain, like Fulton's paddle-wheel, unchanged in form and necessity, however vast the improvements in the machinery that causes the motion.

[We must tell our countrymen, that but for our inventors there would be a great deal of dry whistling among our cotton lords and cotton manufacturing baronets. Yet how have our inventors been treated, as a general thing. Why most all the inventions that have proved to be of real benefit and which have yielded the greatest profits, are just the very inventions for which the inventors were poorest remunerated. Many inventions have made their projectors rich, but it is to be regretted that so many good inventors, have sunk into the grave amid poverty and suffering.

### Printer's Proverb.

Never inquire thou of the editor for the news, for behold it is his duty at the appointed time to give it unto thee without asking. When thou dost write for his paper, never say unto him, "what thinkest thou of my piece?"—for it may be that the truth may offend thee. It is not fit that thou shouldst ask him who is the author of an article, for his duty requires to keep such things to himself. When thou dost enter into his office, have a care unto thyself that thou dost not look at what may be lying open, for that is not meet in the sight of good-breeding. Neither examine thou the proof-sheet, for until ready to meet thine eye, thou mayest not understand it. Prefer the best conducted paper to any other, and subscribe immediately for it and pay in advance, and it shall be well with thee and thy little ones.