the instruments, because insulation is not now so well attended to as some years since. Mr. Culley says this is a mistake, the effect of the earth-current being in many cases the greatest in the best insulated lines. The Atlantic cables, for example, whose insulation is absolutely perfect, have been more disturbed than any land line.

Ancedote of Thomas Brassey, the Great English Railroad Contractor.

The patient sagacity and calm resolution to abide by the rules he had laid down for his own conduct, which enabled Mr. Brassey to perform, at the same time, an amount of work equal to that of three or four Ministers of Public Works put together, may be illustrated by an anecdote never until now put forth.

In the year 1862 Mr. Brassey was in Turin. Some Italian notables of that day called upon him at the Hotel Trombetta, in order to obtain his support for one of the great enterprises by which it was then sought to enrich the Peninsula. Mr. Brassey was conversing with an English engineer (who had himself been served by an Italian Government much as a captive kite is served by the game-keeper, who suspends him as a terror to other predatory birds), when the deputation arrived,—a lawyer of eminence, a member of the administration, more than one deputy of the Chamber. Ensconcing his companion in the inmost chamber of the suite, where every word that passed was distinctly heard, and where he was asked to wait for half an hour, Mr. Brassey received his visitors. Nothing could be more apparently satisfactory than the commencement of the interview. The advantage of the project was set forth by the projectors, and admitted by Mr. Brassey, whose brief occasional remarks showed that he had thoroughly mastered the subject. When the whole matter had been presented in its fairest light, by one and another of its advocates, Mr. Brassey remarked that it might save time if he explained the invariable principles on which he conducted business. He was willing to afford a large measure of support to any enterprise of which he undertook the works. He was prepared, in such case, to subscribe to the capital, and to hold, without forcing on the market, a certain proportion of shares, or bonds, or both. But such financial arrangements must be entirely distinct from those made for the execution of the works. For that he must receive monthly payment in cash, according to regular monthly certificates by the engineer, of from 80 to 90 per cent. of the value of work done. If the directors were prepared to deal on these terms, he should be ready to enter at once into the details of prices.

The deputation were delighted. Nothing could be more to the point, or more in accordance with their ideas of business and habits of action. Then they commenced a review of the features of the scheme, and travelled, a second time, over the ground already covered, rising, however, in enthusiasm as they dwelt on the unrivalled advantages which the shareholders would enjoy. They considered the contract as settled with Mr. Brassey. The terms were fully acceptable to both sides, and they would send their engineer to meet Mr. Brassey's engineer, and settle the details of the schedule, as to which no difficulty could arise, as there were ample precedents to follow. They would take their leave of their honored friend with the utmost content. The little noise which accompanied the rising of half a dozen persons succeeded. The door opened, and, just in backing out, "Of course," said the first speaker, "Mr. Brassey had no objection to accept, as cash, the shares of the Company for which he had promised to subscribe!"

"Stop, gentlemen," said Mr. Brassey. "I am sorry that I have failed to explain my meaning. You must not go away under a mistake. I told you, that, if we agreed to the details, I would subscribe for a certain proportion of shares. But I told you that this must be kept quite distinct from the monthly payments. They must be regularly made in cash, to my bankers; on no other consideration will I look at the business. I have large sums to pay every month, and I cannot allow any uncertainty to subsist as to the regularity of my receipts. Pray understand that. It is a *sine qua non*."

"Of course, if Mr. Brassey put it in that way, the directors would be delighted to meet his views. They had merely intended to avoid trouble, by proposing one transaction instead of two. But it was for Mr. Brassey to decide." Then followed a second repetition of the entire argument, to which Mr. Brassey listened with great patience. Again the leave taking process was gone through; and, again, as if a mere casual remark —"The directors understood that the company's obligations were equivalent to cash, as, in point of fact, they were at 3 per cent. premium, and therefore worth more than bank notes."

"In that case," Mr. Brassey rejoined, "it would be easy for the company to convert them, and to pay him in money. He did not wish for more than his price. The advantage to be be derived from the premium on the obligations might be very large. So much the better for the company, but he had explained his own invariable system."

It would be intolerably tedious to attempt a more detailed account of the entire conversation. In a word, the half hour for which Mr. Brassey had imprisoned his countryman, lasted from to six till nearly ten p. m., when the deputation at length retired, making arrangements for a second interview. The Italians were thoroughly beaten and tired out with their own efforts. They had not made an inch of way. The regular payment, insisted on by the Englishman, they had never dreamed of really making. They brought their fullest experience of legal and Parliamentary tactics to bear on the unaided common sense of the great contractor, whom they endeavored to use; and they came to grief against his clearsighted honesty. He never undertook their contract.—*The Builder*.

Dr. Sheridan Muspratt.

We regret to record the death of this eminent chemist, which occurred on February 4th, at Liverpool. Dr. Muspratt's name has been so long and so prominently associated with the progress of chemistry, that it is with some surprise that we learn that his age was only fifty. The following sketch of his career appears in "Men of the Time:"

James Sheridan Muspratt, M. D., F. R. S. E., M. R. I. A., etc., chemist, born in Dublin, March 8, 1821, was, on account of his father's removal to Liverpool, educated by the Rev. Mr. Hind, and afterwards by Dr. Cowan. At this early period he evinced a taste for chemistry; and, having travelled through France and part of Germany, he entered the Andersonian University of Glasgow, where he studied in the laboratory of Professor Graham, whom he followed to London. Before he was seventeen, he was intrusted with the chemical department at the works of Peel Thompson, in Manchester, and published a paper upon "Chloride of Lime," which attracted considerable attention. Proceeding to the United States, he entered into a trading partnership, which proved unsuccessful; and after visiting the various States, he, in 1843, repaired to Giessen, and studied under the great Liebig. Having remained two years in Giessen, he resolved to test his strength, and published a paper upon the sulphites, which appeared in Liebig and Wöhler's *Annalen*, was copied into all the scientific annals, and won him his degree of Doctor of Philosophy, a title never before granted to a man so young. It was followed by a paper on the "Pretended Formation of Valerianic Acid from Indigo," read before the British Association at York.

At this period, in conjunction with Professor Hofmann, he discovered toluidine and nitraniline, two organic bases of the utmost importance; in 1845 he left Giessen, having, while there, edited Plattner's "Treatise on the Blowpipe," which reached a fourth edition, with emendations, bearing the title "Muspratt and Plattner on the Blowpipe." Dr. Muspratt, who visited various parts of Germany in order to become personally acquainted with her distinguished men, in 1847 returned to Giessen, and spent four months in its laboratory, discovering several remarkable bodies produced from the sulphocyanides of ethyle and methyle. A paper on this subject was printed in Liebig's *Annalen*, as well as in the "Chemical Society's Transactions." In 1848, he gave a paper on the Selenites; in 1849 he published some very interesting remarks in Liebig's *Annalen*, on "The Blowpipe Reactions of Strontia and Baryta." His paper on "Carmufellic Acid, a new Acid from Clove," was published in 1851, in the "Proceedings of the Royal Society," and in the *Philosophical Magazine*. He founded a college of chemistry in Liverpool, students from which occupy prominent posts in in various parts of the globe.

In 1854, a Glasgow publisher engaged Dr. Muspratt to write a Dictionary of Chemistry, which has commanded a large sale in England, America, Germany, and France. He was elected a Fellow of the Royal Societies of Edinburgh and Dublin, and a member of the Société d'Encouragement in France; and the oldest university in the United States conferred upon him the honorary degree of M. D., the only one held by a British subject. In 1863, he published a reply to a critique in *Blackwood*, condemnatory of the "Dramatic Writings of Sheridan Knowles," his godfather; and in 1848 married Miss Susan Cushman, a popular actress (sister of the celebrated actress, Miss Charlotte Saunders Cushman), who died in 1859.

Wanted, the following Inventions.

A TRUE VELOCIPEDE, consisting of one or more wheels, of suitable diameters, with vulcanized rubber tires, attached by a frame-work to each foot, the whole being a modification and improvement of the parlor skate, the rubber tires adapt it to the inequalities of the ground. If a locomotive can, by this means, be made to drag a load up a hill, as in Scotland, why may not a man with wheels of similar construction placed under his feet propel himself along the streets at a rapid rate of speed?

A SUBSTITUTE FOR GAS in the illumination of cities; electric lights, with vertical reflectors, placed at such elevations above buildings, and at such distances apart as will illuminate the different areas of a city. A few strong electric, or calcium lights, with good reflectors, suspended, say 100 feet from the ground, would, like so many miniature suns and moons, shed a steady uniform and satisfying light upon all the buildings, alleys, and streets, embraced within a given city area. The ordinary street lamp of the gas company is placed so near the pedestrian's eye as to produce a glare and blindness instead of illumination. It is alternate glare and darkness. Unprovided with reflectors, much of the light is dissipated. An improvement on streets gas lights might be made, by suspending the lamps in the center of the street at an elevation of 20 or 30 feet, this would protect the eyes of the passers-by, and the reflectors placed above them would send their rays where most needed. The saving in lamp-posts would offset the expense of connecting and suspending rods and pipes. The whole chain of lamps in a city could be ignited by elecricity, as is now done in the dome at Washington. By means of these central lights, the streets of a city would be more uniformly and effectually lighted.

A CHEAP IRON OR STEEL RAIL, adapted to farmers' freight railways, whether worked by horses or steam; a rail which, while fitted to receive the wheel of ordinary wagons, will not collect snow and ice so as to impede travel. The importance of these horse railways as substitutes for the ordinary earth or plank road, is not yet appreciated as it deserves to be. They are destined to accomplish much as lateral feeders to long lines, and as connections of small places with large ones. Were farmers to co-operate, and, with some aid from the townships on the route, build these cheap freight railways, with single or double tracks, millions of dollars might be saved in farm outfits for transportation, and untold sums added to the productive industry of the country.

A SHIP RAILROAD, by means of which to transport large and small vessels across necks of land, such as Cape Cod and and the Isthmuses of Tehuantepec and Darien. Required a firm, wide track, with rails of great strength, and an adjustable frame-work to receive and hold the vessel in position on the track; the whole resting on trucks, to be drawn at moderate speed from bay to bay, from ocean to ocean. A steam elevator or lock at each terminus of the isthmus would place the vessel in position on the truck, or remove it therefrom. Such a railway would solve the problem of uninterrupted navigation.

SCIENTIFIC INTELLIGENCE.

PRODUCTION OF THE PRECIOUS METALS.

Up to the year 1846, the value of silver produced exceeded that of gold. In 1800, it amounted to 72·2 per cent of the entire yield, as opposed to 27·8 per cent of gold. Since 1846, the gold production has taken the lead. It reached its maximum in 1853, when it rose to 80·6 per cent, and declined to 67·2 in 1868. For the year 1800, the entire production of the precious metals was estimated at 44,800 pounds of gold, valued at $3,640,000, and 1,800,000 pounds of silver, valued at $40,500,000.

For the year 1868, the estimate was 410,000 pounds of gold, valued at $143,000,000; and 3,100,000 pounds of silver, valued at $70,000,000. According to these statistics, the gold production had increased from the year 1800 to 1868, 730 per cent, while the increase in silver was 172 per cent; in value, the increase in gold was 950 per cent, and in silver, 136 per cent. In the year 1500, 10½ pounds of silver were paid for 1 pound of gold; 100 years later, 11·6 pounds; in 1650, 13 pounds; 50 years later, 14·9 pounds; in 1750, 14·93 pounds; 1800, 15·42 pounds; 1850, 15·8 pounds; and 1869, 15·61 pounds.

ARTIFICIAL PRODUCTION OF CONIINE.

It is said that Socrates terminated his life by drinking coniine, extracted from the poisonous hemlock, *Conium maculatum*. The oily liquid is highly poisonous, and closely resembles the nicotin obtained from tobacco. The artificial preparation of this body has more than ordinary interest, as it suggests the possibility of our being able to make other alkaloids, such as quinine, morphine, and the like; and if we can succeed in this, why not prepare the less complex compounds, sugar, starch, etc.? The coniine was prepared by Hugo Schiff, by heating alcohol and ammonia at 210°, together with butyraldehyd, precipitating with a platinum salt, and distilling the product. The artificial alkaloid exhibits the same properties as the native. It is a violent poison, and in other respects is analogous to the extract from hemlock. As the first step in the synthesis of vegetable alkaloids, the discovery of Professor Schiff is one of the most important in modern chemistry.

DETECTION OF BLOOD STAINS.

Iodide of potassium dissolves traces of blood, even from clothing which has been thoroughly washed, but hæmin crystals cannot be obtained from the solution.

Gunning has discovered, in the acetate of zinc, a reagent that precipitates the slightest traces of the coloring matter of blood from solutions, even where the liquids are so dilute as to be colorless. Blood, washed from the hands in a pail of water, can readily be detected in this way. The flocculent precipitate, thrown down by the acetate of zinc, must be washed by decantation, and finally collected on a watch glass, and allowed to dry, when the microscope will readily reveal hæmin crystals, if any blood be present. This test has been repeatedly tried, with entire success.

USE OF SOLUTION OF SILK IN PHOTOGRAPHY.

Pure silk is soluble in hydrochloric acid, and if the solution be neutralized by ammonia, and evaporated, an organic chloride of ammonium results, which is capable of use in photography, particularly for salting paper. Paper thus prepared is said to be more sensitive than that salted in the usual way, and in printing, gives a warmer tone. It is thought that this salt could also be used in the preparation of collodio-chloride of silver, if it were sufficiently soluble in alcohol.

Imitation of Human Hair.

In a recent article upon the trade in human hair, it is stated that a patent has recently been taken out for converting goat's hair into hair for ladies' use; and that the experiment is so successful as to render it almost impossible to distinguish the real article from the imitation. This will be good news, not only to the dealers in hair, who might apprehend the exhaustion of their source of supply, but also to the ladies who depend upon art to compensate the deficiencies of nature. The same article states that in 1868 over 22,000 pounds of hair were imported into Great Britain, representing the clip of about 45,000 women. Much of this is obtained from the large communities of sisterhoods scattered throughout France and Belgium.

THE ICE HARVEST of 1871, on the Hudson river, is unusually large. During the winter, a vast and nearly unbroken field of ice, ten inches thick, has extended from Troy down as far as West Point, and has been crossed by the heaviest teams, and by persons in great numbers. For many weeks, the work of cutting, floating, elevating, and packing the ice has been going on along the Hudson, and all the ice houses on its banks, holding over 1,000,000 tuns, have been filled.

Improved Steam Road Roller.

In France, in 1859, the first steam road roller was patented, by M. Louis Lemoine. This roller, which was constantly used by the municipality of Bordeaux, with excellent results, on broken stone roadways, gave rise to the Paris Steam Road Rolling Company, organized in 1862, and which adopted a steam roller patented by M. Ballaison. A modification of this roller is that at present adopted in Paris. In 1863 a roller, patented by Messrs. Clarke & Batho, was the first steam road roller ever tried in Great Britain. The chief feature of this machine is the use of three sets of rollers, two in front acting as drivers, while the third is set up in a turn-table, being adjustable so as to steer the engine, at the same time overlapping the space between the two outside drivers. One of these machines was, in 1864, sent to Calcutta, and so favorable were the official reports relative to the economy and value of steam rolling that other rollers were ordered by the Indian Government. It was in 1867 that arrangements were made whereby Messrs. Aveling & Porter determined to adapt their form of road locomotive, and its driving gear, to the arrangement of rollers and turn-table patented by Clarke & Batho. The result is the form of steam roller which illustrates this article.

If we examine mechanically the state of a rolled and an unrolled roadway, it will not be difficult to find causes for the economy in using the heavy steam roller. In the first case, there is a solid stone table, consisting of a mass of interlocked stones; in the second, a heap of loose stones, without any mutual cohesion From experiments made, it has resulted that an uncompressed heap of broken stone metalling contains 53 per cent of mass and 47 per cent of empty space. So that an unrolled road, on being given over to the traffic, only consists of, at the most, 30 to 45 per cent of stone; while, on the other hand, a well-rolled road covering contains at least from 70 to 80 per cent of broken stone, the interstices between which have been filled, especially at the top, with clean sand. An unrolled road, therefore, contains nearly three times more empty space than a well-rolled roadway. It is evident that it cannot be hard and strong until these spaces are filled up. Without rolling this can only be done by the particles ground by the traffic off the edges of the stones, by dirt and refuse. This last condition has been the objection always raised to macadam roadways constructed without the roller; its use removes this annoyance in a great degree, and moreover materially affects the durability of the pavement.

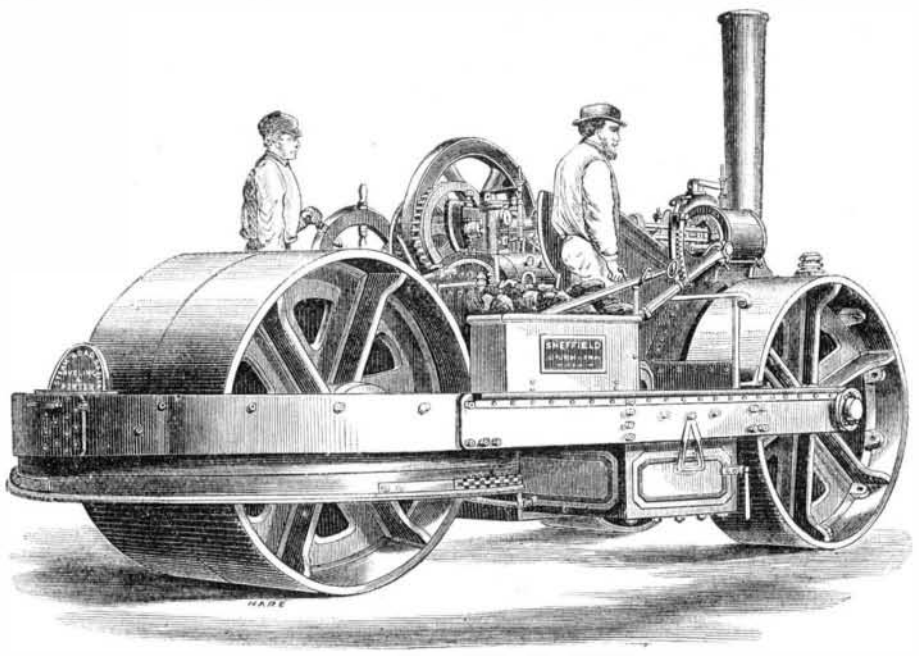
The testimony of the London authorities and others who have adopted steam road rolling is, that the duration of the roadway is increased two-fold by the application of the roller, and not only is this advantage gained by steam rolling, but by its means "the road is at once and immediately a pleasure to ride on, whereas, when not rolled, the roads are for many weeks (sometimes months) disagreeable to the rider, agonizing to the horse, and very costly to the owner of the horse."

By at once compacting the newly made roadway, and delivering it in a clean, smooth, and consolidated state ready for the traffic, the necessity for breaking the stone into very small fragments, is avoided, the use of larger stones being to give greater durability to the roadway by reason of their decreased liability to get loose in their bed, or to have the corners knocked or worn off by repeated hammering of horses' hoofs and carriages as they pass over. The fewer angles there are in a given space of stone, the less wear and tear is there, and consequently there is decreased cost in maintenance of road.

There are at the present time five of these steam rollers in use in the United States, and one is now building by Messrs. Aveling & Porter for the city authorities of New Haven, Conn.

The testimony of the authorities of the Central Park, New York, and of the Prospect Park, Brooklyn, is very favorable as to the advantage and economy of the steam roller in the construction of roads, and Mr. Culyer, the engineer of the Brooklyn Park, in a late report on their Aveling & Porter's fifteen-tun roller, says: "Running both systems—horse and steam power—under careful surveillance, we find the result to be largely in favor of steam and your roller. This result is $13·50, the cost of the effective service per day of ten horses of the road-rolling machine, as compared with $30, the cost of producing similar results by horse-power. . . . . Inasmuch as we are groping along in this matter of road construction in a way somewhat more determined than heretofore, I do not doubt that in a few years we shall conclude to make use of the immense store of stones supplied to us, at first hand, by nature, and so work up a system of ways which shall be more in accordance with the spirit of the age, serve our convenience better, and, in the long run, our pockets too. Ultimately I do not despair of seeing every town, of any note, owning its own stone breaker and an Aveling & Porter steam roller, very much to its own pleasure and profit."

Mr. W. Churchill Oastler, of 43 Exchange Place, New York, is Messrs. Aveling & Porter's agent in this country.



AVELING AND PORTER'S STEAM ROAD ROLLER.

Size of the Sun.

Let the reader consider a terrestrial globe three inches in diameter, and search out, on that globe, the tiny triangular speck which represents Great Britain. Then let him endeavor to picture the town in which he lives as represented by the minutest pin-mark that could possibly be made upon this speck. He will then have formed some conception, though but an inadequate one, of the enormous dimensions of the earth's globe, compared with the scene in which his daily life is cast. Now, on the same scale, the sun would be represented by a globe about twice the hight of an ordinary sitting room. A room about twenty-six feet in length, and hight, and breadth, would be required to contain the representation of the sun's globe on this scale, while the globe representing the earth could be placed in a moderately large goblet.

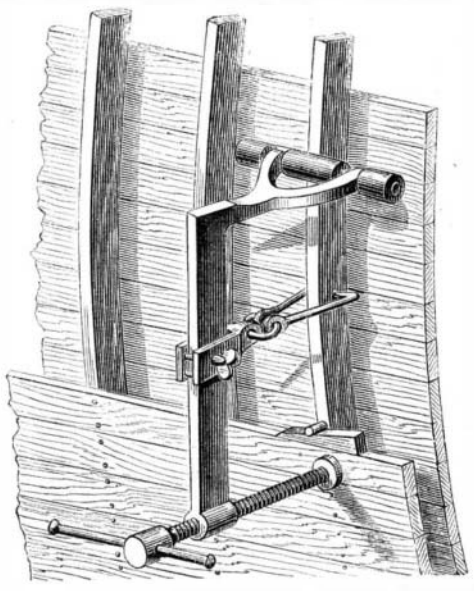
Such is the body which sways the motions of the solar system. The largest of his family, the giant Jupiter, though of dimensions which dwarf those of the earth or Venus almost to nothingness, would yet only be represented by a thirty-two-inch globe, on the scale which gives to the sun the enormous volume I have spoken of. Saturn would have a diameter of about twenty-eight inches, his ring measuring about five feet in its extreme span. Uranus and Neptune would be little more than a foot in diameter, and all the minor planets would be less than the three-inch earth. It will thus be seen that the sun is a worthy center of the great scheme he sways, even when we merely regard his dimensions.

The sun outweighs fully seven hundred and forty times the combined mass of all the planets which circle around him; so that when we regard the energy of his attraction, we still find him a worthy ruler of the planetary scheme.—*Proctor's Other Worlds than Ours.*

PLANKING SCREW.

Our engraving shows an improved form of planking screw, invented and patented by George Savage, Jr., of Bangor, Me., and designed for shipbuilder's use.

It consists of a lever, with a clamping screw at one extremity, and a bifurcated leg at the other, with roller foot bearings, which rest upon the timbers of the vessel to be



planked, as shown. An adjustable link, with grappling hooks, is also provided, which seizes the timber in the manner shown, and forms a fulcrum for the lever. By means of this instrument, planks may be bent and held to place till spiked' all of which is sufficiently indicated in the engraving, to obviate the necessity of further description.

Spontaneous Combustion.

A contributor to the Boston *Journal of Chemistry* says: Any light that can be obtained on spontaneous combustion adds not a little to the value of real estate. We believe a large percentage of the fires charged to incendiarism are really owing to spontaneous combustion, so called. We purpose giving three cases, two of which have come under our own experience.

1. Within a year, twenty-eight rolls of cotton cloth in one of our large dyeing establishments were dyed black, and were delayed a few days before they could be starched and finished. Two of these rolls were discovered to be on fire—not in flames, but in a smoldering condition, or charred into tinder; a third roll was so hot that hands could not handle the cloth and the wooden roller upon which the cloth was wound was heated almost to the point of ignition.

The rolls of cloth destroyed were the first dyed, and consequently had been longer exposed than the others, which in a measure explains why all the rolls were not in the same condition.

In the dyeing, the first rolls were dyed without washing, by an oversight of the dyer. This is the point of importance, as the chemical salts were left in the cloth. Logwood, potash, sulphate of copper, and sulphate of iron constituted the dye, and we suggest this explanation as the probable cause of the fire. The potash and sulphate of iron change to sulphate of potash and hydrate of iron, by the absorption of oxygen from the atmosphere or from moisture in the cloth, and the heat thus developed reaches the point of ignition. Cloth in drying is very liable to contain heated moisture.

2. Within a year a fire was discovered in a silk-mercer's shop in London. The fire originated in a lot of black-dyed silk, and was discovered, as in the first instance, before flame had burst out. The conclusion reached was that it was not safe to have black-dyed silk in large masses, and that each piece ought to be so placed as to allow a free circulation of air. We think it quite probable that the explanation of the combustion is the same as in the preceding case.

3. In trying to get rid of rats in a dwelling house, the floors were taken up, in order to cut off their ingress, if possible. The box that held the hot-water pipes was found to be a favorite resort for the vermin, and had actually been on fire. The sides were charred, but there had not been sufficient air to sustain combustion. Upon investigation as to the cause of the incipient fire, we are not left long in doubt, for a store of remnants of greasy cloths used in washing dishes was found, which had been brought by the rats from the kitchen. Some of these were charred, and the others were well saturated with grease and oils. This fire was quite a distance from the kitchen range, forty feet at the least.

It would be very natural in all these cases, if the real causes had not been so apparent, to attribute the origin of the fire to incendiarism.

We have a very firm impression that the introduction of coal oils for lubrication of machinery has very materially reduced the number of fires from spontaneous combustion, owing to the fact that the coal oils do not absorb oxygen; and that for this reason, if for no other, insurance companies can afford to insure mill property for less rates than they charge at present.

How a Stink Bug Utilizes Turpentine.

Mr. Thomas Meehan recently contributed to the Academy of Natural Sciences, in Philadelphia, an account of a singular habit in the common "Stink Bug" of gardens, (*Reduvius novenarius*, Say), which might lead to some important physiological discoveries by those more closely devoted to entomological studies. Wondering what made some abrasion on the bark of a *Pinus cembra* on his grounds, he was attracted by a female insect of this species near it; and noticed, that on the thigh of the middle leg, the usual grey color was of a polished black. Supposing that possibly the insect may have had something to do with the injury to the bark, through which the turpentine was oozing, he waited a few minutes to re-assure the insect—usually timid under observation—that there was no danger. It then went to work to take the turpentine with the heel of the tarsus of the fore leg, and place it on the thigh of the second leg. It took several dozen "heelsful," winding it round the gathering ball on the leg, as one would wind a ball of string. After it had collected together a ball of turpentine about the size of a pin's head, it gently wiped it off with the femora of the hind leg, and applied it to the anus, where it was very rapidly absorbed. It then walked very leisurely to the top of the nearest branch, when it flew away. This was in the end of September. He saw no more of these insects till a week afterwards, when he cut off a small branch on which was another female and carried it to the pine tree, applying the branch to the stem, so that the insect could walk on to it without much suspicion of human agency in the matter. As soon as it got to the turpentine, it went through the same operation as the other one, taking two doses of it before it walked away; which it did leisurely, and with much apparent satisfaction. Up to this time he had not been able to find a male, so as to ascertain if it also had any similar use for turpentine.

COAL PIT FIRE.—The Bank colliery, near Rotherham, on the property of Earl Fitzwilliam, England, had been on fire for a century past, when the superintendent, Mr. T. Cooper, conceived the idea of building a wall to shut the fire into one of the workings. The plan was carried out, although the wall had to be commenced by workmen creeping on their hands and knees through dense, stifling smoke. The wall, nearly 1,000 yards long, and, in places, five feet thick, is complete, being tapped at intervals with metal pipes, through which the state of the fire can be inspected. The heat from the fire has been so great that the surface of the earth, over the workings, has produced two or three crops every year.