### Xerotine Siccative and Gas in Coal Bunkers.

The report of the committee appointed by the Lords of the Admiralty to inquire, in connection with the loss of Her Majesty's ship Doterel, into the subject of explosions of gas in coal bunkers, and as to the explosive power of xerotine siccative, has been published in the form of a Blue-book. The committee report that the solvent which has been employed in the liquid driers known as xerotine siccative consists of the more volatile products of the distillation of petroleum, commonly known as petroleum spirit, or kerosene. This liquid product is composed of a mixture of light petroleum oils, the most volatile of which evaporate freely at temperatures varying between 50° and 80° (Fahrenheit). If, therefore, this liquid be exposed to air at ordinary temperatures, inflammable vapor will escape readily and rapidly from its surface, and if it be thus exposed in a confined space, the air which the latter incloses will become impregnated by the inflammable vapor with a rapidity proportionate to the prevailing temperature, and to an extent sufficient to produce in a more or less brief period a rapidly inflammable mixture or an explosive mixture, if the quantity of liquid which evaporates bears the necessary relation to the volume of oxygen contained in the inclosed atmospheric air. The explosive mixture produced is, in fact, quite analogous in its nature and behavior to a mixture of coal gas or of fire-damp and air, and is capable of producing similarly violent and destructive explosions. The experiments which the committee made led them to the conclusion that the explosion which resulted in the loss of the Doterel had been brought about by the production of such a large body of flame as had ignited the powder in the magazine of the ship.

### Egyptian Mechanical Methods.

Petrie, who is the author of a treatise on ancient metrology, has lately turned his attention to ancient Egyptian processes. Though much labor has been bestowed on the literary remains of Egypt and the description of monuments, little attention has been given to finding out the tools and methods by which their results were reached. The first conclusion to which Mr. Petrie comes is that the stone cutting was performed by means of graving points far harder than the material to be cut. These points were bedded in a basis of bronze; and in boring, the cutting action was not by grinding with a powder, as in a lapidary's wheel, but by graving with a fixed point, as in a planing machine. From discovering spiral grooves in diorite and granite, at least $\frac{1}{100}$ of an inch in depth, the author supposes that an instrument was used of sufficient hardness to penetrate the material that far at a single turn. In this, however, he was corrected by Mr. Evans. The simplest tool used was a straight bronze saw set with jewels: but there is proof of one circular saw which must have been 6½ inches in diameter. For hollowing the insides of stone objects, the inventive genius of the fourth dynasty exactly anticipated modern devices by adopting tubular drills varying from $\frac{24}{100}$ of an inch in diameter and $\frac{2}{100}$ of an inch in thickness to 18 inches in diameter. Other drills, not tubular, were used for small holes, one measuring $1\frac{2}{10}$ inches long and $\frac{8}{100}$ of an inch in diameter. But this is surpassed by the Uaupes of South America, who drill holes in rock crystal by the rotation of a pointed leaf shoot of plantain, worked with sand and water. The writer of this note has seen, in Porto Rico, stone beads of the hardest material, 2 inches long, bored longitudinally with an orifice $\frac{1}{16}$ of an inch in diameter. The Egyptians understood rotating both the tool and the work. For the finishing of vases, a hook tool must have been used; but the early Egyptians were familiar not only with lathes and jewel turning tools, but with mechanical tool rests, and sweeping regular arcs in cutting. In addition to the tools mentioned, are to be noticed those for dressing out drilled cores, stone hammering and smoothing, saws with curved blades, mallets, chisels, adzes, and bow drills. For marking and indicating the plane of the stone, red ocher paint was used in a variety of ways, well studied out by Mr. Petrie. Rock excavation, both for saving the stone and for the creation of vaults and chambers, was altogether an affair of drilling. Granite bowlders were utilized in the pyramids, but the best stones were taken from quarries. The method of handling these immense masses is not known. Mr. Petrie concludes with a sensible remark upon the oft alleged inhumanity of the pyramid and temple builders. To require a man every six years to serve upon the public works, during the season when he could do nothing else, would certainly not be a great hardship.—*Science, from Journ. Anthrop. Inst.*, xiii., 88.

### THE MAGNETIC STATION AT THE SAINT MAUR PARK OBSERVATORY.

*Mascart's Registering Magnetometer.*—It is well known that terrestrial and magnetic force frequently undergoes irregular and sudden variations in its direction and intensity, so that observation, even repeated, of the direct reading apparatus is not all-sufficient in times of disturbance. For the continuous registering of magnetic phenomena, Mr. Mascart has called in the aid of photography, the extreme sensitiveness of gelatino-bromide of silver allowing such a result to be obtained in a manner that is at once sure and economical.

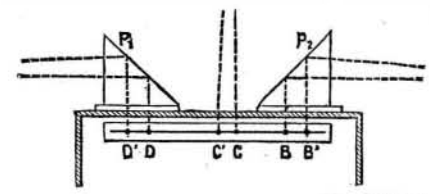
Fig. 3.—THROWING THE IMAGE ON THE SENSITIVE PAPER.

The most widely used registering apparatus is the one known by the name of the "Kew magnetometer," and this, up to recent years, has been almost exclusively employed in those few observatories in which the study of terrestrial magnetism is organized in a complete way.

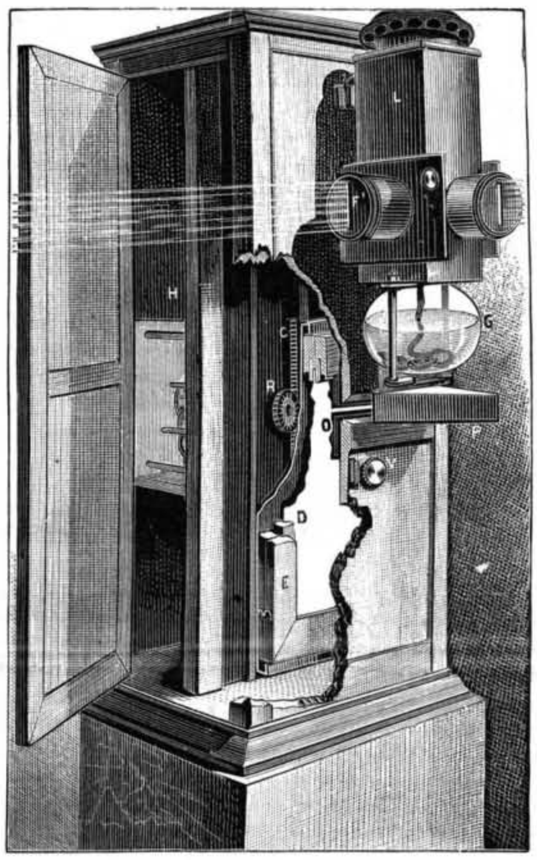
Fig. 2.—THE MAGNETIC REGISTER.

Mr. Mascart, without sacrificing anything to accuracy, which is an absolute condition in so delicate observations, has devised a registering magnetometer in which the cost of the apparatus is considerably reduced, and which permits of a reduction of the magnetic vaults to the least dimensions, of the use of one source of light for the three compasses, and of a registration of all the elements upon the same sheet of paper, thus facilitating a comparison of the different results.

The Mascart registering magnetometer, set up at the Saint Maur Park Observatory, is placed in the easterly vault of the Magnetic Cottage. This vault is rectangular in shape, and is ventilated by three air vents of a structure such as is shown in Fig. 1. As the registering must necessarily be done in darkness, there is arranged vertically before each air vent, outside of the cottage and at about 8 centimeters from the wall, a shutter which, while it allows of the necessary ventilation, proves an obstacle to the entrance of the light. Besides this, black curtains hang freely in the interior, in front of each aperture, and render the darkness of the vault complete.

The general arrangement is shown in Fig. 1. The variation apparatus were constructed by Mr. Carpentier. They are the same as those that serve for direct observation, and which we have already described, and are, like them, fixed on masonry pillars. We shall advert to the fact that these compasses are three in number: the *declinometer*, D, for declination; the *bifilar*, B, for the horizontal component; and the *balance*, C, for the vertical component. Each apparatus is provided with a fixed mirror and with a movable one which follows the deviations of the magnetized bar. In the declinometer and bifilar the front aperture of the case contains a converging lens of a focal length of about 1·10 m. In the balance, this lens is replaced by a suitable curvature of the side of the prism that serves to right the images.

The registering apparatus (H, Fig. 1), properly so called, is represented in detail in Fig. 2. It was constructed by Mr. Duboscq. In order to allow its internal arrangement to be seen, a portion of the front of the clockwork case is removed in the cut. This case is divided lengthwise into two parts by a wooden partition. In the back part there is a clockwork movement, H, with pendulum and weights, and the front part forms a camera obscura for holding the photographic frame, E. This latter slides into a grooved holder, which, through the intermedium of a rack, C, and a ratchet wheel, R, actuated by the clock, is capable of descending its whole length during an interval of twenty-four hours.

The luminous source consists simply of a small gasogen lamp, G. When the combustible liquid is of good quality, and the wick is properly regulated, this lamp will burn with a sufficiently constant intensity for about thirty-six hours, and care being taken to fill it every day at a certain hour, regularity in the light is secured. The flame is situated in the center of a lantern, L, affixed to the side of the case, and provided on each of its three external sides with a metallic mounting carrying a field lens and a vertical slit, F[1], whose width may be modified at will. These mountings may be moved vertically or horizontally for facilitating regulation.

The clock is fixed in such a position that its pendulum swings in a plane parallel with the magnetic meridian. One of the slits allows a luminous ray to reach the declinometer, the second allows one to pass to the bifilar, and the third to the balance.

The system as a whole is so arranged that the luminous images of the slits, after being reflected from the mirrors, are sent to the sensitized paper.

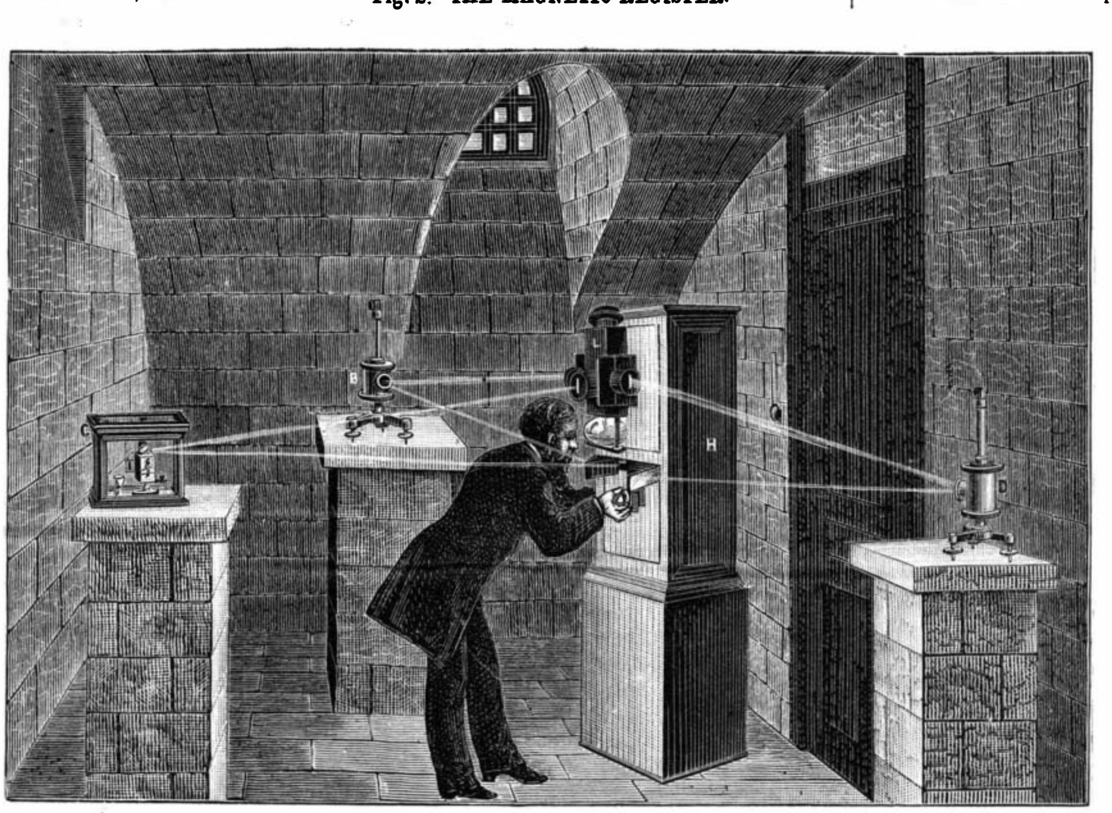
Fig. 1.—INSTRUMENTS FOR REGISTERING TERRESTRIAL MAGNETIC VARIATIONS.

Fig. 3 will give an idea of the arrangement. The reflected rays that proceed from one of the side instruments, the declinometer, for example, fall upon a right angled prism, $P^1$, which sends them to a narrow window (in the front side of the photographic frame) that may be closed at will by a shutter, O, actuated by an external screw, V (Fig. 2). By a proper regulation of the slit, the two images, D and $D^1$ Fig. 3), reflected by the fixed and movable mirrors, are made to form sharply upon the sensitized paper. The bifilar gives in the same way, through the prism, $P^2$, two images, B and $B^1$, of the corresponding slit. The prisms, $P^1$ and $P^2$, each covers a third of the width of the paper. The intermediate third remains free and receives the images, C an $C^1$, directly from the slit corresponding to the balance—these images having beforehand been refracted by the prism adapted to the apparatus. There are thus obtained on the paper six traces, three of which are datum lines of each of these elements, and the three others so many curves which gives their variations. The distance from one curve to the line that serves as a datum point to it is proportional to the angle that the two mirrors make with each other.

The hour is likewise registered upon the paper. The clockwork movement is so arranged that the paper holder shall descend exactly 1 centimeter per hour, so that the total length of the curves is 24 centimeters. The paper is held in the frame between two plates of glass, one of which (that against which the sensitized surface rests) is transparent, and carries 25 horizontal dashes, separated 1 centimeter apart. These present themselves by turns before the window, intercept the light for a few instants, and produce on the lines the breaks that are noticed in Fig. 4. But the paper is not always replaced at the same minute, and, on another hand, it is never certain that the holder will be raised to the same point. The window, being closed during the few instants necessary for the change of the paper and for the renewal of the lamp, it suffices to note exactly the hour at which it is opened after raising the holder, and to afterward inscribe such hour upon the sheet.

The hour may likewise be marked by a periodical disturbance of the magnetized bars. To do this there is adapted to the clock an electric contact, which closes a circuit for a few instants every hour, at the moment the minute hand is at twelve. This circuit contains a small pile, and the current passes into three bobbins without iron placed near each instrument. There result from this, hourly oscillations of each bar and a temporary disturbance in the corresponding curve.

Finally, there are likewise obtained on the paper the different inscriptions that mark the curves; as, MAGNETISM, *Saint Maur Park, Horizontal Component*, etc. These inscriptions are transparent on the blackened glass that forms the back of the holder. In order to produce them upon the sheet of paper, we begin by covering the sensitized side of the latter, and then expose the frame for a few seconds to the light of a candle. The sensitiveness of the paper is such that this short exposure suffices for a good photographic impression of the inscriptions through the sheet. The frame is taken from the holder every day at noon, and the paper is taken out and replaced by another. Then the frame is put back in place and raised by a cord to the upper part of the dark chamber, where it is held anew by the ratchet-wheel.

The action of the light on the gelatino-bromide of silver paper appears only on developing the proof. The image is revealed by the well-known oxalate of iron process, and is afterward fixed by means of hyposulphite of soda. On coming from the bath the proof exhibits itself as shown in Fig. 4, save that there is no date, this being added by hand after drying. This figure, moreover, is a reduction.

The images being revealed, there remains nothing more to do but translate the curves into numerical values. It is necessary, then, to proceed first to the graduation of the apparatus. For the declinometer, we revolve the case, and consequently the fixed mirror, by a known angle which is indicated by the lower graduated circle; the datum line is thus moved, and the distance of the two images of the mirrors before and after the rotation gives the angular value of the millimeter on the paper. In the same way, on turning the winch to an angle of only 90°, for example, we observe by the displacement of the movable image the influence due to the torsion of the suspending thread, although such influence is very slight.

From these experiments are deduced the angular value that a distance apart of one millimeter represents upon the paper. The object of graduating the two other apparatus is to find out to what fraction of the vertical and of the horizontal component the ordinate of the curve corresponds.

For this purpose we place successively near the declinometer, the bifilar, and the balance, in a special position and at a uniform distance, for five or ten minutes, an auxiliary magnet supported by a comparing rule. The action of this magnet modifies the position of each of the three bars, and produces a sudden movement of the movable image. These separations, which leave their trace on the paper, permit of determining, by calculation, to what fraction of the components one millimeter on the paper corresponds. The sensitiveness of the various apparatus is so regulated that the variations of the different elements shall be always comprised within the limits of the paper. It is by analogous experiments that we measure and verify from time to time the value of one division of the scales of the direct reading apparatus. The ordinates of the three curves give, then, the variations in the three elements, save the corrections of temperature relative to the two latter. Every day, moreover, the results of the registering apparatus are controlled by those that are given by the direct reading variation apparatus.

The Mascart registering magnetometer formed part of the scientific apparatus carried by the French Cape Horn expedition. It is operating at present at the Petit Port Meteorological Observatory, at Nantes, and other stations are taking measures to have it in use before long.

It is to be hoped that the economic features connected with this apparatus, that are well in harmony with the modest sum at the disposal of country observatories, will quickly make the use of it general. A comparison of the results obtained simultaneously at different stations will furnish science with documents, on the importance of which it were useless to dwell, and which up to the present time have been lacking for the study of that so little known portion of the physics of the globe called *terrestrial magnetism*.—*Th. Moureux, in La Nature.*

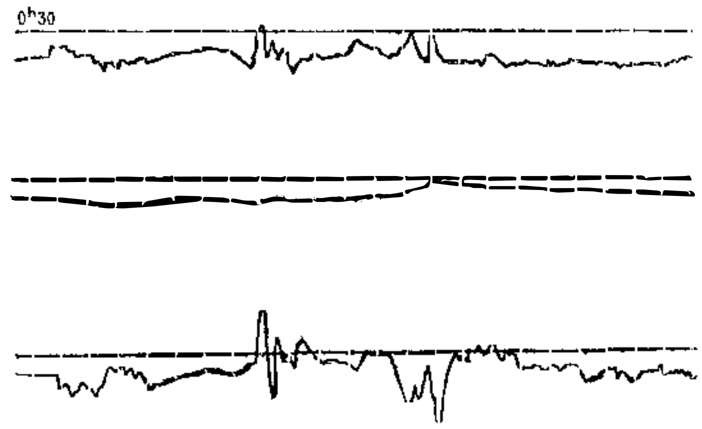


Fig. 4.—SPECIMEN OF THE REGISTERED CURVES.

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A HARTFORD, Conn., correspondent, referring to the recent remarkable sunsets, says that they are very common in Norway, where, if very red, they are taken to indicate rain; but if of a lighter hue and clear, the weather thereafter is likely to be fine for many days.

### Ropes vs. Leather Belts for Driving Machinery.

At the October meeting of the New England Cotton Manufacturers' Association reference was made to the adoption, by many English mill owners, of ropes for driving machinery instead of the gearing formerly so largely used, or the belting so universally employed in this country. These ropes are run in V-shaped channels in the pulleys; and for transmitting say 700 horse power, mention was made of twenty of them being run on a wheel 12 feet in diameter, conveying power to wheels 7 feet in diameter, the ropes being 2 inches in diameter after stretching. In favor of this system was urged, first, the very low cost of the rope as compared with good belting; second, its lightness, and the consequent saving in power in running; and third, the convenience with which power could be added by putting on additional ropes to the full extent of the number of grooves on a pulley, with the security, also, of never having to stop the machinery for a break down, as no more than one or two ropes would ever be likely to break at one time.

Notwithstanding these apparent advantages, we do not apprehend there is any danger of rope being substituted for leather belts in any of our factories. The English manufacturers never had a full idea of how well power could be conveyed by leather belting until we taught them.

Ten years ago their large belts were generally made so that there were ridges at the laps, and they could not have that thorough pulley contact necessary to the effective transmission of power; but our belt manufacturers, at the very commencement of the business, made their belts of an even thickness throughout, skiving down the ends, forming the laps to a perfect match. The English manufacturers were for years very incredulous as to the possibility of conveying high powers by belting, as was done in this country, and they used gearing in a much larger ratio than ever we did. But to go from gearing to rope traction seems, indeed, like stepping from one extreme to the other. The ropes used are not supposed to lie in the bottom of the grooves of the pulleys, but are held in and pinched by the crotch which the sides of the grooves form. This makes the transmission of the power a direct pull to force the rope into the groove, which it must as rapidly leave with the rotation of the pulley. The life of a rope thus used, therefore, can in no way compare with that of a good leather belt, which, when properly put up, and of sufficient size for the work required of it, will last almost a lifetime. American belt manufacturers have equipped many factories in England and Scotland and on the Continent of Europe, and we do not believe that any mill owner, either here or there, will ever go from the use of such belts to the employment of ropes for driving machinery.

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### Reflex Nervous Influence.

It has oftentimes been cast up to physicians, by those who ought to know better, that the mysterious and ill-defined influence of "reflex action," is utilized as a shield to cover ignorance, and as a loophole to crawl through and escape when confronted with a morbid condition, the intimate nature and etiology of which they are unable to fathom.

That some men have availed themselves of this convenient and comprehensive term is undoubtedly true; but that such a thing as reflex action is a reality, and that it is a much more potent etiological factor of disease than is ordinarily believed, is also true.

By reflex action we mean that an impression made upon some nerve termination in one portion of the body is carried along this nerve to a center, and from there reflected, as it were, along some other nerve to a part of the body remote from the point of first impression, at which latter point its power to disorder healthy action is made manifest, while no morbid phenomena are observable at the point from which the irritation has really arisen.

This is a plain definition of "reflex action," devoid of all technical and superfluous words; and that diseased conditions frequently have such origin, no one of experience will deny.

But the general practitioner, we fear, does not take this factor sufficiently into consideration in the formation of his opinion of the cause of disease, and since, therefore, his remedies are directed rather to the effect than to the cause of the effect, he is met oftentimes with failure, when, did he but realize the actual influence of reflex action, and look to the proper point for his cause, and guide his therapeutics accordingly, he would have much better results.—*Med. and Surg. Reporter.*

### How to Boil Linseed Oil.

First be sure that you have the pure linseed oil. There is much sold as such manufactured out of peanuts. The test is simple. Nut oil has a sharp, acid taste, smells just like sour peanuts, is darker and thicker than the other oil, has a clinging tendency when rubbed on the finger, dries with a gloss even in priming coats, and is very much given to gumming up when sanded. Pure linseed oil has a bright amber color, runs freely, sparkles when flowing from the can, tastes smooth and mild, and has the smell of a flaxseed poultice. When you are satisfied that you have the genuine oil, and wish to boil it thoroughly, first take, say about one-half pound of red lead and the same quantity of sugar of lead, put into five gallons of the oil, and place over a slow fire so as to boil evenly. Do not let your fire get either too hot or too low; keep an even temperature, if possible; coke or charcoal is preferable to either hard or soft stone coal. Avoid a wood fire, as, after the oil gets to boiling heat, a sudden flame shooting up might ignite the entire lot. Let it boil seven hours full; the red lead and sugar of lead will then become dark brown. Stir all the time while boiling slowly, and only one way; do not change the direction of the stroke or you will burn the oil, just as you would starch. After you have taken it from the fire, cover it up and let it stand to cool off, say over night. The sediment will settle; pour out the oil and strain; your oil is boiled, and a better article you could not have, as all the fatty substances are destroyed. This is the English method, used in all the carriage factories in the United Kingdom.—*U. S. Carriage Monthly.*

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### Geological Changes at Salt Lake.

Mr. G. K. Gilbert has recently, according to *Science*, given some rather disturbing suggestions to the people of Salt Lake City (Salt Lake *Weekly Tribune*, concerning the probability of destructive earthquakes there. He describes the slow and still continuing growth of the ranges in the Great Basin by repeated dislocation along great fractures, the earth's crust on one side being elevated and tilted into mountain attitude by an upthrust that produces compression and distortion in the rocky mass, until the strain can no longer be borne, and something must give way. Suddenly and violently there is a slipping of one wall of the fissure on the other, far enough to relieve the strain, and this is felt as an earthquake; then follows a long period of quiet, during which the strain is gradually reimposed.

Such a shock occurred in Owen's Valley, along the eastern base of the Sierra Nevada, in 1872, when a fault scarp five to twenty feet high and forty miles long was produced. A scarp thirty or forty feet high is known along the western foot of the Wahsatch Range, south of Salt Lake, and other scarps of similar origin have been found at the bases of many of the Basin ranges. The date of their formation is not known; but it must be comparatively recent, because they are still so little worn away. Wherever they are fresh, and consequently of modern uplift, there is probable safety from earthquakes for ages to come, because a long time is needed for the accumulation of another strain sufficient to cause a slipping of one wall of the fissure on the other.

Conversely, when they are old and worn down, the breaking strain may even now be almost reached, and an earthquake may be expected at any time. This is the case at Salt Lake; for, continuous as are the fault scarps along the base of the Wahsatch, they are absent near the city. From the Warm Springs to Emigration Cañon they havenot been found, and the rational explanation of their absence is that a very long time has elapsed since their last renewal. In this period the earth strain has been slowly increasing. Some day it will overcome the friction, lift the mountains a few feet and re-enact on a fearful scale the catastrophe of Owen's Valley.

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### A California Mirage.

According to the San Francisco *Call*, visitors to the Cliff House on the afternoon of November 12 were repaid by a clear view of the North Farallon, which, from the Cliff House point of view, is absolutely below the horizon. The clearly defined heights, seen as though they were within a dozen miles of shore, were at first thought to be the sail-draped masts of some ocean ship, and when they were identified as the cliffs of the North Farallon, there was great interest displayed by the residents and visitors at the Cliff House. In addition to the well worn marine glasses, a telescope was brought into use, and the unusual sight of islands known to be below the line of the horizon, but plainly pictured in the mist-producing mirage, was regarded with intense interest. The effect, just before the setting of the sun, was as though far out in the ocean some jutting rocks had been utilized for the building of gracefully outlined castles, and when the light disappeared in the cloudless western horizon, and with it the beautiful mirage, the effect was as though the observers had been gazing on "castles in the air." So clear was the atmosphere that the South Farallon, with its light house tower clearly discernible, was seen as long as the already set sun left a golden streak of light in the west. The whole effect was beautiful in the extreme, and so rare that it held enchanted every one who chanced to be where it could be seen, until darkness came and hid all view of the ocean.

### Painting Iron.

The value of red lead as a preservative for iron has been generally accepted. Wrought iron requires a hard and elastic paint, which will hold itself together even if the scale beneath gives way. The following experiments, made under the auspices of the Dutch State railroads, may be instructive. Iron plates were prepared for painting as follows: Sixteen plates, pickled in acid (hydrochloric), then neutralized with lime (slaked), rinsed in hot water, and while warm rubbed with oil. The same number of plates were cleared of scale, so far as it could be removed by brushing and scraping. Four plates from each set were then painted alike—namely, four plates with coal tar and four plates with iron oxide A, another set with iron oxide B, and the remaining set with red lead. They were then exposed three years, and the results observed were as follows: The coal tar on the scrubbed plates was quite gone, that put on the pickled plates was inferior to the others. The iron oxide A on the scrubbed plates was inferior to the other two, while on the pickled plate it held well. The oxide B was found superior to that of A, but inferior to red lead, while the plates covered with red lead stood equally well on both prepared plates, and were superior to all others. From these results it is evident that pickling the iron removes all the black oxide, while scrubbing does not. It is also shown that the red lead unites with oil to form a hard, oxy-linseed oil acid soap, a harder soap than that given by any other combination. The red lead is shown by those experiments not to give way under the scaling; it is more adherent to the surface, more elastic and cohesive. On the Cincinnati Southern Railroad, experience extending over some years has shown that red lead has proved the most durable paint in the many miles of iron trestle and bridgework. It is found that the iron oxide is washed away by the rain and perishes in spots, although a valuable paint if frequently renewed. Red lead, on the other hand, is more expensive than iron oxide and is difficult to be obtained pure. It is adulterated with brickdust, colcothar, and other substances, and has lost its high repute.

Referring to white lead as a material for painting iron, one authority observes that "white lead should not, if possible, be used in priming iron, nor in any priming coat; moreover, it is a less desirable overcoat than iron oxide. The class of iron paints compounded of ores of natural iron rust, combined with clay or some other form of silica, are very useful, as they contain no water nor sulphuric acid. Magnetic oxide, or pure iron oxide, is an excellent protection for iron, says one writer; it is impossible to scrape it off. It is also of value in woodwork, and resists the action of salt water and sulphurous gases, so destructive to most paints. There is no doubt the great protective element in paint is the oil, and the conditions required for success are stated to be to prevent the drying part of the oil from becoming hard dry; the soft-keeping, non-drying acids must be kept from flying away in such a quantity as to reduce the oil to a brittle mass. In other words, the elastic qualities of the oil must be protected from the action of the oxygen.

### Vegetable Wool, or Silk Cotton.

BY JAMES COLLINS.

Kapoc, or kapok, as it is more usually rendered, is a Malayan word, signifying cotton or a cotton-like substance, *i. e.*, silk cotton; real silk being known as *sutra*. *Kapas* is also used in Malay for cotton or silk cotton, the same vernacular name obtaining in Bengalee and other dialects; but in this latter case the term is restricted to true cotton plants (*Gossypium sps*).

Kapok silk cotton is furnished by the *Eriodendron anfractuosum*, DC., the *Bombax pentandrum* of Linnæus. The plant has been placed in various natural orders, some giving it a place in Bombaceæ, others in Sterculiaceæ or in Malvaceæ.

The tree is from 50 to 60 feet in height, the trunk being prickly at the base and the branches growing out horizontally. There are five to eight leaflets, lanceolate in shape, and either entire in their margins or serrated toward the apex. The capsule, or fruit, is five celled and five valved; the cells contain many seeds, covered with silky or cottony hairs, which form the kapok or vegetable silk. The gum furnished by the tree, when mixed with spices, is used in India in bowel complaints, and the seeds yield a dark colored oil. The tree is of rapid growth, and is lofty and imposing in appearance. It is found in India, the Malayan Archipelago, and in Africa and other countries. In the East generally, kapok is used for stuffing pillows, etc., and for tinder; but it has been found that the smoothness of the fiber prevents cohesion, or "felting," so necessary and important for spinning purposes. In Africa the tree is looked on with veneration, and is termed the "god tree," in some districts it being looked upon as a sacrilege to cut the tree down. Still the trunk is used for forming canoes, and although the wood is soft and liable to the attacks of insects, if soaked in limewater it becomes much more durable. The silk cotton, either alone or mixed with cotton, is largely utilized in Africa. The young leaves are used as food, and form not a bad substitute for "Ochro" (*Hibiscus esculentus*).

Another tree yielding silk cotton in India is the *Cochlospermum gossypium*, DC., the *Bombax gossipinum* of Linnæus; a member of the tea order (Terustrœmiaceæ). It is a tree attaining a height of 50 feet, and the soft silky hairs surrounding the seeds are used for stuffing purposes. The tree has large, conspicuous, yellow flowers, and is not uncommon in Southern India, Travancore, and Coromandel. The *Calotropis gigantea*, or Mudah tree (nat. ord. Asclepiadaceæ), also yields a like substance.

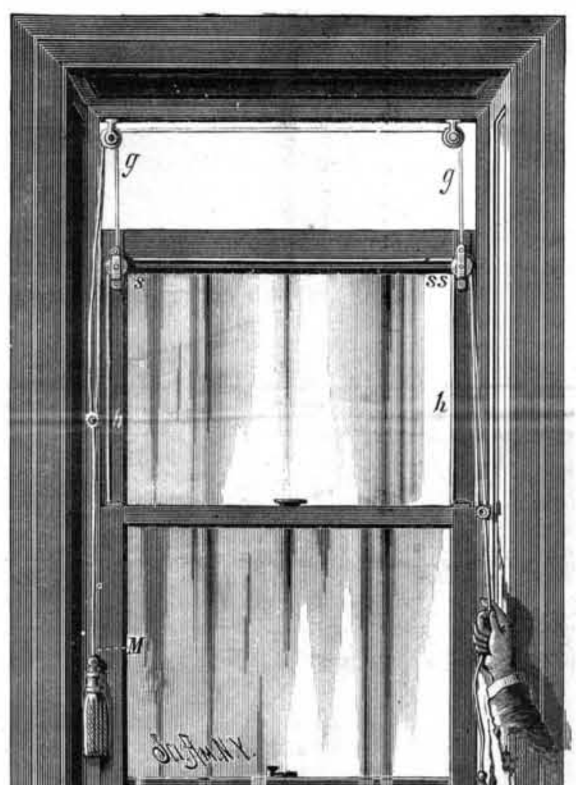
In America, both North and South, various so-called "milk-weeds," as *Asclepias verticillata*, and other plants, such as species of *Bombax*, etc., yield silk cottons, while the *Asclepias syriaca* obtained the attention of European agriculturists as early as 1785, and paper has been made from the cortical fibers of this plant. The young shoots of the plant, too, are said to equal asparagus in flavor.

These are only a few of the plants yielding silk, cotton which might be mentioned. Silk cotton has made its appearance in the markets from time to time, and in 1851 the jurors of the Great Exhibition recommended this substance for stuffing purposes and in mixed fabrics, and notices respecting it have occasionally appeared in this *Journal*. For the lining of quilts, quilted petticoats, etc., silk cotton seems to answer admirably, but its want of cohesion, or non-felting qualities, renders it of no use for spinning purposes, except as a mixture to impart a silky gloss to the fabric so mixed. The price is low, it is light in weight, elastic, and soft, and is said to resist the attacks of insects.—*Journal of the Society of Arts.*

### WINDOW SASH ADJUSTER.

The lowering and raising of the upper sash of a window is usually an awkward matter, and in large plate glass windows one of considerable difficulty. Either a pole or a chair must be brought, or else the lower sash is lifted, and the upper one then drawn down or pushed up from the outside.

The accompanying engraving shows a simple and permanent attachment for adjusting the two sashes, which are balanced in the usual manner by weights in the box-frame.




RUSSELL'S WINDOW SASH FASTENER.

A double side-pulley, S S, and a single one, S, are screwed to the face of the upper sash, and through these pulleys is reeved a cord, *h*, whose ends are attached to the top rail of the lower sash. A similar cord, *g*, is reeved through a double and a single pulley screwed to the upper portion of the window frame, its ends being attached to the top rail of the upper sash as shown in the figure. The pulling cords, M and N, carrying thimbles at their upper ends hang from the loops of the cords, *g* and *h*.

By pulling down the cord, N, either the upper sash may be lowered or the bottom one raised, as desired. [On holding the *lower* sash by pressure of the hand or a clamp, the cord, N, draws down the upper sash; on holding the *upper* sash by its cord, M, the cord, N, will draw up the lower sash.]

The upper sash is raised and closed by pulling the cord, M; the lower sash is drawn down and closed by the hand, or by a cord not shown in the engraving fastened at one end to its top rail.

This invention has been patented by Mr. S. H. Russell, No. 10 Cedar Street, New York city, from whom further information may be obtained.

### Coke for Foundry Purposes.

Coke is being successfully introduced for foundry purposes in New England and elsewhere in preference to anthracite. The advantages claimed for coke over anthracite are: 1. A duty 30 per cent higher than anthracite. 2. A rate of smelting from 30 to 50 per cent higher than that of anthracite. 3. A less powerful blast is needed. 4. The castings are softer.

### Affairs at the Patent Office.

[SPECIAL CORRESPONDENCE.]

WASHINGTON, D. C., December 17.

As those applications for patents on which the final fees were paid on the 13th inst. will not be issued until January 1, 1884, all the patents which will be issued in the year 1883 have now been determined upon, and the total issues for the year may be obtained. A calculation shows that during the year 1883 there have been issued 21,196 patents, 167 reissues, 1,020 designs, 902 trade marks, and 906 labels. The total number issued since July, 1836, when the record was first started, is 289,793 patents, 10,418 reissues, 14,465 designs, 10,769 trade marks, and 3,743 labels.

These figures indicate in some degree the immense amount of labor performed by the Patent Office, and the record for the present year shows how rapidly the spirit of invention is increasing.

During the past week the speaking telephone interference cases were heard before the Examiners-in-Chief in Appeals from the decision of the Examiner of Interferences. The occasion was a notable one from the number of distinguished counsel who appeared for the different claimants, among them Mr. Roscoe Conkling.

These interferences were declared in 1878, and they involve not only the art or method broadly of transmitting articulative speech by throwing electrical undulations corresponding to the sonorous vibrations of the spoken words upon a wire, but the various forms of application that had been suggested up to that time for carrying this method into practical operation. Seven parties now lay claim to the merit of this striking invention, viz.: Alexander Graham Bell, J. W. McDonnough, Thos. A. Edison, Elisha Gray, A. E. Dolbear, Francis Blake, and J. H. Irwin. A vast amount of testimony was submitted, and the Examiner of Interferences, after a long delay, announced his opinion last June in a pamphlet of 350 printed pages.

This opinion is an epitome of the case. The first thirty pages are devoted to an examination of the state of the art as described in prior publications. An explanation and construction of the various issues involved occupies the next thirty-five pages, and in two hundred and seventy-one pages following the Examiner traces the history of the invention of each party as disclosed in the testimony. The conclusion is then drawn that Bell is entitled to judgment of priority for the fundamental invention of the telephone as a whole and for the greater part of the particular devices involved in the interference. Mr. McDonnough is, however, adjudged the first inventor of the telephone receiver, which is a constituent and necessary part of any speaking apparatus, and Mr. Edison is awarded a particular form of the water telephone, an instrument now out of use and of very little importance.

While the Examiner enters upon a minute investigation of the facts of the case, he declares that he is controlled to some extent by certain technical presumptions arising upon the face of the papers. These state that he is not entirely clear that Bell had any knowledge, at the time his application was filed, of any practical apparatus for speaking purposes, but that he must assume, as in other cases, that the invention was made at least as early as that time. The Examiner's rulings upon these points, as well as his findings of fact, were arraigned as errors upon the appeal. It was argued before the Board that the controversy should be determined upon its merits, and not upon strained constructions of the issue and technical presumptions at variance with the facts in the case. The hearing was concluded on December 15, and it will probably be some months before the Board will formulate its decision. FRANKLIN.

### Wire Fence Telegraphing.

An experimental work has been going on for a short time along the Milwaukee and St. Paul Railroad Branch and the Brandon Branch, about 30 miles in length, the object being to determine whether or not the barbed wire of the fence on either side of the road can be utilized for telegraphic purposes. The fence wire was placed in proper condition for a sufficient distance to make a satisfactory test, the wire being run under the surface at road crossings. Superintendent of Telegraph Simpson decides that the plan is not practicable. Telegraph work can be done over the fence wire at this time, he says, but during the winter months, when huge snow banks completely cover the fence, the line would be made useless. There are thousands of miles of wire fence along the Western lines, and it has been contended that they should be utilized for this purpose.

### A New Treatment for Neuralgia.

The latest agent introduced for the relief of neuralgia is a 1 per cent. solution of hyperosmic acid, administered by subcutaneous injection. It has been employed in Billroth's clinic in a few cases. One of the patients had been a martyr to sciatica for years, and had tried innumerable remedies, including the application of electricity no fewer than 200 times, while for a whole year he had adopted vegetarianism. Billroth injected the above remedy between the tuber ischii and trochanter, and within a day or two the pain was greatly relieved, and eventually quite disappeared. It would be rash to conclude too much from these results, in the face of the intractability of neuralgiæ to medication, but if it really prove to be as efficacious as considered, hyperosmic acid will be a therapeutic agent of no mean value.—*Lancet.*