fluctuations are caused by the change in the relations of the position of the earth to the heavenly bodies. The daily fluctuations are caused by atmospheric tides, and the hourly to a variety of causes some of which are yet obscure. These variations are so uniform that Humboldt said of them that it was quite possible at the equator to determine the time of day by the barometer. The monthly variations are greatest in the tropics. The barometer stands lower generally in summer than in winter, the difference depending chiefly upon the greater amount of moisture contained in the air during the summer season, which renders the atmosphere lighter, the gas of water having only about six tenths the weight of air. The speaker dwelt at some length upon this point, but entirely omitted to mention the effect upon the atmosphere, of water existing as water in the air, as it occurs during the fall of rain or when it is suspended in the vesicular condition known as fog.

The irregular fluctuations are caused by changes in the temperature, hygrometric condition, and disturbances of the atmosphere by winds, which, as it were, roll a wave or swell of the ærial fluid before them. Such variations increase toward the poles, so that in our latitude the barometrical column is in a state of almost constant perturbation. These perturbations are so small, as in the ordinary mode of observation to be imperceptible, but they are none the less real.

The lecturer next introduced and explained diagrams illustrative of the variations in the barometrical column corresponding to the direction of winds, both in North America and Europe, and followed these with a diagram, which we reproduce herewith, illustrative of Redfield's theory of storms or cyclones, which he said was now fully established.

The large arrow in the diagram shows the general direction of a storm for the northern hemisphere, but while the storm, as a whole, proceeds from the southwest toward the northeast, it at the same time revolves around a center in the direction of the arrows, or in an opposite direction to the hands of a watch, the wind blowing in any part of the area covered by the storm as indicated by the direction of the arrows in that part of the diagram. As these storms approach, the barometer first rises abruptly then rapidly falls. As the first part of the storm that reaches us at any point to the right of the large arrow is the northeast part, the wind will consequently at first blow from the south east. As the storm advances the wind will blow successively from the south, southwest, west, and northwest, at which time the weather clears up and becomes settled. If at the approach of a storm to any point the wind blows from the northeast or east, that point lies to the left of the line of approach, as shown by the large arrow. The wind will then change, first to the north and from thence to the northwest which will end the storm.

Hundreds of millions of dollars might be saved if sea captains would understand and apply this theory. The position a vessel occupies in relation to the general line of progression, can be determined by the direction from which the wind blows at the point it occupies, and the vessel can then be headed so as to get out of the gale by the shortest route, as shown in the diagram, which explains itself.

Our limited space prevents us from doing full justice to this interesting and practical lecture, which was listened to throughout with profound attention, and frequently applauded, although more than usually protracted.

PHILOSOPHY OF THE TEA-KETTLE--A LECTURE BY PROFESSOR SILLIMAN.

[Reported for the New York Tribune.]

Professor Silliman delivered a lecture on the above subject before the American Institute, Dec. 16, 1868. After the usual introduction Professor Silliman commenced his lecture by narrating briefly the story of Watt's experiments with the tea-kettle in his youth, which first attracted his attention to the study of steam and its application to mechanical works. After some remarks upon the phenomena of heat, while the water in a vessel upon the stand was gradually rising in temperature, by the heat of a Bunsen burner, he said: This vessel which we are heating has now become filled with bubbles. Fishes breathe water because it contains atmospheric air, while it is richer in oxygen than common air. The first phynomenon therefore in seeing that kettle boil is the displacement of the air. Tasting water that has been boiled, after the air has been expelled, and before the air has time to return, it is flat and unpalatable. The tea-kettle is boiling under the pressure of the atmosphere. Every individual carries a tun weight in the pressure of the atmosphere upon his person. Ordinarily we do not feel it; but in walking on the surface of miry clay we feel it, because then the upward pressure on the soles of our feet is removed. The second condition we have to consider, then, in the boiling in the tea-kettle, is that we are boiling the water under the pressure of 15 pounds to the square inch. Boiling is not always necessarily connected with temperature. If the pressure of the atmosphere is taken off, in whole or in part, there may be ebullition without great heat. [Water at 120° was here boiled in the air pumps.] Boiling consists simply of little bubbles of vapor rising and escaping from the surface of the fluid. An egg might be boiled all day in water at 120° without being cooked. because it requires a greater heat to cook it. As these little bubbles rise in the tea-kettle, they strike a colder stratum of water and are condensed, the water failing to fill the vacuum, producing the sound we call the singing of the tea-kettle. The next stage of our process of boiling will be the process of distillation, which consists in the transfer of particles of water out of the liquid state into vapor, then its translation and final recondensation in another place.

The amount of heat passing into the water in the tea-kettle would be measured by the thermometer until it reached 212°. At that point the thermometer would cease to rise, although the heat was still passing as rapidly as before into the water; the surplus being employed in converting the water into steam, which escapes from the vessel. Having heated water in a glass vessel to the boiling point, we remove the fire and cork it up. It continues to boil; and upon pouring cold water upon the surface, it boils still more violently. Why? Because the condensation of the steam removes the pressure, and the water boils more readily, even at a lower temperature. He proceeded to try Count Rumford's experiment of building a hot fire, with a temperature of not less than 2,000° above a vessel of water. The surface of the water boiled, as shown by its condensation upon a cold glass plate laid above it; but the water in the vessel was not heated. It is necessary, therefore, to heat the tea-kettle at the bottom, and not at the top. If we desire to boil substances which will be injured by the temperature of 212°, we may readily boil them at any lower temperature above 100° by removing the pressure of the atmosphere. Taking equal quantities, by weight, of ice at 32°, and boiling water at 212°, the ice was melted by the water, and the temperature of the mixture was 52°. There had disappeared 140° of heat, and this was the latent heat, without which the water would remain ice. Everyone has noticed that the melting of ice in the spring causes a great chill in the atmosphere; for whenever and wherever ice is melted, it absorbs inevitably 140° of heat. On the other hand, the vaporization of water takes up a great deal of heat, which is rendered latent; for steam itself, at the pressure of the atmosphere, has only a temperature of 212°. If we measure the heat thus becoming latent, we shall find that it amounts to about 970°. By adding constantly a given quantity of heat, we shall find that it takes 5½ times as long to convert a given quantity of water into steam as to raise it from 320° to 212°. This latent heat would be enough to heat water, if a solid, red hot. If we add to the pressure of the atmosphere, we shall have a higher temperature of the steam; but the amount of latent heat in the steam will be less, the sum of the latent and the sensible heat being a constant quantity, equal to 1,180° Fahrenheit. The conversion of water into steam will expand it into 1,700 times its former bulk, and this exerts a prodigious amount of mechanical force which is utilized in the steam engine. Heat is nothing but a mode of motion; and the steam engine enables us to make that motion useful in the form of mechanical power. He illustrated the reconversion of motion into heat by rapidly turning a brass tube containing ether and corked up, and holding around it a wooden clamp until sufficient heat was generated to convert the ether into vapor and blow the cork from the tube. Count Rumford, in the latter part of the last century, tried a similar experiment upon a much larger scale. When in the employment of the Bohemian government at Munich, he made those remarkable experiments which have signalized his name in this department of knowledge; for he employed horse power in the boring of cannon held in a vessel of water at the ordinary temperature, noting the time occupied, and the amount of force supplied. In about two hours and twenty minutes he brought this large body of water into a state of ebullition, simply by the mechanical power applied in boring; and he determined by these experiments that in order to raise a pound of water through one degree of Fahrenheit, there must be a different power applied to raise one pound to the hight of 772 feet. This is what is called the mechanical equivalent of heat. Professor Silliman next treated heated water in a closed spherical vessel connected with a column of mercury and a thermometer. When the pressure of the steam had forced the mercury to the height of 33 inches, corresponding to a pressure a little more than that of the atmosphere, the thermometer had risen to 245°. He then opened a tube to allow the steam to escape into a vessel, at first producing a rattling sound in consequence of the condensation of the steam by the water and the falling of the water to fill the space thus left vacant; but very soon the water was raised to the boiling point, and the rattling ceased, and the steam passed noiselessly through the water, and escaped. It is easy to convey heat in the form of steam; and it is now common to convey it in pipes sometimes for long distances to wooden vessels, where it is desired to boil water. Steam is the most wonderful vehicle for transporting heat with which we are acquainted. This hall is heated by steam from a boiler in the celler, giving us 1,000 degrees of heat, the latent heat of the steam becoming sensible as it is condensed in the pipes, and with such astonishing rapidity that it sufficiently warms the atmosphere of the room, furnishing one of the most efficient means of heating which is known. Heating either by hot water or by steam, the relative merits of which I am not now discussing, is by far the most economical, the most efficient, and the most agreeable of all artificial means. Professor Silliman then exhibited a toy steam engine, rated at two-mouse power [laughter], and proceeded to give an explanation of the steam engine as invented by Watt. The first step of improvement was to close the cylinder at the upper end; hitherto it had been open. In the former steam engine the steam had forced up the piston, and upon the condensation of the air in the piston by cold, the atmospherial pressure brought it back again. Watt had introduced other improvements, among which were the injector, the governor, and the cut-off. There has never been in the history of inventions since the world began any machine or apparatus which was so perfect as it left the hands of the inventor, as the steam engine was when it left the hands of Watt. You may stand to-day beside the most stupendous piece of steam engineering in the world, and you will see connected with it no essential change from his invention. It is true that he had no machinery or tools competent to reach the exact results that we can now produce. He had no turning lathes, boring-machines, planing machines, but all was done by a cold chisel, the hammer, the file, etc.; and the marvel is that he produced such results as he did. I have often thought with what delight that great man would stand upon one of our first-class steam frigates, or by one of our first-class pumping engines, such as are used at the reservoirs in Brooklyn and New York, and see the perfection, the finish, and the smoothness of the work, a result possibly solely due the genius of Watt, because without that power we could not have had the apparatus with which to apply it. Professor Silliman next proceeded to illustrate the irregular expansion of water near the freezing point. He filled a vessel with water at 55° and surrounded it with ice and salt to reduce its temperature. A freezing mixture is composed of two solids having an affinity for each other, but which cannot unite without becoming fluid; and in order to become fluid a large amount of latent heat is required, which must be borrowed from the surrounding substances. In the vessel of water he immersed two thermometers, one near the top and the other near the bottom. As the temperature of the water fell, the temperature of the lower thermometer descended to 39½°, and there remained stationary, while the upper thermometer continued to fall, and at last reached the freezing point. Why does not that system of currents keep going on like the boiling of water in a flask, so that the whole shall freeze at the same time? That is just where this wonderful exception takes place, and it is the great delight of a devoted mind to believe that the exception is a part of the original intention of the Great Architect in the formation of the world in adapting it to be inhabited by human beings, because we may readily believe that, except for this irregularity in the expansion of water the world would be uninhabitable. At the temperature of 39½° the very contrary effect takes place, and the water begins to expand, it increases in bulk, and consequently becomes specifically lighter, and, like a cork, floats upon the surface, or immediately beneath it; so that you will have the surface of the water cooled down to 32°, and converted into ice, and yet that freezing does not extend much below the surface. You rarely find in the coldest winter that ice is formed more than two feet thick. If you observe a caldron of molten iron as it cools, does it solidify first on the top? No. Does a mass of lead in a ladle solidify at the top? No; but equally at the bottom. In most cases the solid, which is the result of congelation, is heavier than the fluid in which it is formed and sinks to the bottom, whereas in the case of the water the solid is much lighter than water. We have here another exception that the ice which is formed is lighter than the water and it floats upon it. When we see an iceberg from 100 to 200 feet above the surface of the sea we know that for every foot of elevation above water there are 10 feet of depression beneath the surface; so that what we see is only one eleventh of the whole bulk. Lake Superior has a uniform temperature of about 40°, and beneath the surface in the Winter, in any of our lakes we shall find water at about that temperature. This is an important fact with reference to the inhabitability of our globe; because, you observe, that if water as it solidified continued to shrink and to become heavier, the whole mass would become frozen in a single winter so that no summer would be long enough to melt it, and eternal death would rest upon the surface of the globe. In the freezing mixture Professor Silliman inserted one end of a closed tube, containing vapor, and containing water in a bulb at the upper end, and the condensation of the vapor from the abstraction of the heat by the freezing mixture, in its turn, abstracted the heat from the water in the bulb above so rapidly that it was frozen solid.

He then illustrated the heating of houses by hot water pipes, showing that the heated water would rise, from its being lighter than not heated, and thus a circulation of water never heated above the boiling point, and therefore not liable to burn the atmosphere by charring particles of dust in it, would be constantly maintained. He proceeded to speak of the chemical constituents of water, being two atoms of hydrogen and one of oxygen. These two gases which have never been reduced to liquid form by mechanical power, would readily unite by the magical power of chemical combination, and form that wonderful matter which we call water. The ancients in their philosophy said the earth is composed of four elements, earth, water, air, and fire. We may interpret this under the light of modern science thus: Earth is the solid, water is the liquid, air is the gaseous condition of matter, and fire is the force that converts them all from one condition into the other. We have in water the solid ice, and permanent as granite, so long as the temperature is unchanged. We have in water an inelastic, mobile, transparent fluid. We have in water the perfectly elastic invisible gas which we call steam. Although we cannot by mechanical means compress the gases which constitute water into liquids or solids, yet by their union we can condense them into water, and we can by their union produce the highest degree of artificial heat which it is in the power of man to produce mechanically. Two vessels, one containing hydrogen and the other oxygen gas, were connected with a single tube. The former being turned and lighted produced an ordinary flame (the gas not being pure), but upon turning on the oxygen gas the two produced a much whiter and more brilliant light. Placing in the blaze a mass of cold iron, the water produced by the union of the gases was condensed upon its surface, falling from it in drops. He next placed in the blaze a slender bar of steel, and the heat was so great as to burn the steel, scattering it in a shower of intensely brilliant sparks. These two elements, by their collision, produce an amount of heat, as a mode of motion which is beyond that which we can produce by any other artificial means which is purely mechanical. We can, indeed, by this voltaic current, acting chemically, produce a current of electricity in the focus of which everything which can be melted, melts, and everything that melts volatilizes. That, as I have said, is a mode of motion. It can be converted into motion, and motion in like manner can be converted into heat. We are living upon a ball of matter moving through space with planetary velocity, and if that mechanical motion with which the earth is moving in its orbit could be suddenly arrested the amount of heat which would be equivalent to that mechanical motion would not only be sufficient to melt the whole earth, but to actually volatilize it into the nebulous state again; nay, it would be sufficient to volatilize six worlds as large as that which we occupy. I am prepared to show you some wonderful experiments with the spheroidal condition, but I have not time, and I will close this already too long lecture with a single illustration more.

There is an erroneous idea that steam-boiler explosions are produced by the formation of a certain gas. The only gas is steam, and it is only because there is too much steam. There is often too much steam because there is too little water; and also owing to the fact that when water comes into contact with superheated surfaces of iron it is suddenly converted with great violence into steam, sufficiently powerful to tear the strongest metals. Chemists utterly deny that there is any foundation whatever for the popular notion among mechanics that there is produced, in cases of explosions of steam-boilers, a kind of gas.

The lecture of Professor Silliman was illustrated by a great variety of experiments, many of which were received with much applause.

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FACTS CONCERNING THE FINANCIAL CONDITION OF THE SOUTH.

The following facts concerning the financial condition of the South were furnished to us by the manager of a leading journal, published at Mobile, and are doubtless substantially correct.

During the war, and while Confederate currency wasabundant, the planters entirely paid up their debts.

For the two years subsequent to the war, but little capital was embarked in trade in the South, and hence but little credit could be extended to the planters, and they were forced to work through, economically, with the little specie currency they quite generally had stored away. That they might live within themselves, the attention of planters was largely directed to the growth of breadstuffs and meats, and more corn, wheat, and bacon were made in the South than ever before.

During this present year a fair crop of cotton has been made, and generally made with provisions and feed of home growth, so that the planter has received but small advances and is not now in debt. From the high price of our staple—cotton—more money will be distributed in the South this year than ever before, not excepting the year of the great crop—1860.

This year's cotton crop will net the planters of the South the immense sum of *two hundred and fifty million dollars.*

The crop of Mobile alone will bring not less than *thirty million dollars* to be distributed from that point.

The entire debt of the South, abroad, and in the North and West, is less than fifty million dollars.

The vast sum of more than *two hundred million dollars* will be loose money in circulation in the Cotton States.

The restoration of political quiet, following the determination of the Presidential election, will cause a confident free use, circulation, and expenditure of all this currency. In the old time the planter in the South used the gains of each year (in fact was generally a year ahead in debt to his factor) in the purchase of more negroes or more lands, and hence had but little or no money to expend for luxuries and the merchandise of trade.

Now there are no negroes to buy.

The principle of small and well cultivated plantations is accepted, and no planter wishes to buy more land.

The gains of the planter will now be invested in the purchase of improved farm implements, household furniture, articles of comfort and luxury, dry goods, clothing, books, sewing machines, pianos, and other musical instruments, etc., etc.

The trade of the South will now be an exceedingly rich one. While the great West is now undergoing hard times incident to the low prices of breadstuffs, the South will be prosperous in the wealth of her staple, now bringing the most profitable prices.

No part of the country to-day offers a richer field for the enterprising merchant and manufacturer than the Cotton States. These views are plain and simple, and will present themselves with force to every shrewd observer and thinking man.

The man who sees this condition of things aright, and takes immediate advantage by placing himself before the people of the South with his business properly advertised, cannot fail to secure a lucrative trade and large returns of profits for his expenditures.

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The Great Floating Dock for Bermuda.

This enormous maritime structure is now completed. The following is a concise history and description of the gigantic undertaking:

The British government, being impressed with the ababsolute necessity of providing dock accommodations for the iron-clad ships and other vessels constituting the North American and West India squadron, determined some time since to build a capacious floating dock of iron for service at Bermuda. When Admiral Sir Alexander Milne commanded on that station he pointed out to the Admiralty this great want. During the past ten years many iron-clads have been added to our fleet; and although most of these have been payed below water line with various compositions, the hulls of most ships after service afloat were exceedingly foul. The iron men of war on the North American and West India stations were no exception, but after a shorter or longer time afloat were more or less covered below water-line with barnacles, weeds, and parasites, thus impeding the speed of the vessel and causing other annoyances.

The want of a dock in the West Indies, in which a ship could be laid up for cleaning the bottom and for necessary repairs, induced the government to construct a monster floating machine at a cost of nearly £250,000. This dock was built by Messrs. Campbell, Johnson & Co. of the Albert Works, Silvertown, from plans patented by Mr. Campbell, and adopted for the Royal dockyard at Bermuda by Colonel Clarke, R. E. the government director of works. This great iron floating structure, the largest in the world, is of the following dimensions: Extreme length, 381 feet; width inside, 83 feet 9 inches; width over all, 123 feet 9 inches; depth, 74 feet 5 inches. The weight of the dock is 8,350 tuns, and it is asserted that a vessel weighing 10,000 tuns or more may be easily lifted, making the total approximate displacement about 19,000 tuns.

The dock is U-shaped, and the section throughout is similar. The iron-clad Bellerophon, and ships of similar and of smaller size, may be easily received into this capacious hollow, and when once the dock is in position ships forming the squadron on the West Indian station will no longer be subject to great and ever-recurring inconvenience. It is built with two skins fore and aft, at a distance of 20 feet apart. The plans show that the space between the skins is divided by a watertight bulk-head, running with the middle line the entire length of the dock, each half being divided into three chambers by like bulk-heads. The three chambers are respectively named "load," "balance" and "air" compartments. The first-nameb chamber is pumped full in eight hours when a ship is about to be docked, and the dock is thus sunk below the level of the horizontal bulk-heads which divide the other two chambers. Water sufficient to sink the structure low enough to admit a vessel entering is forced into the balance chambers by means of valves in the external skin. The next operation is to place and secure the caissons and eject the water from the "load" chamber. Then the dock with the vessel in it rises, the water in the dock being allowed to decrease by opening the sluices in the caissons. The dock is "trimmed" by letting the water out of the "balance" chamber into the structure itself. The inside of the dock is cleared of water by valves in the skin, and it is left to dry. When it becomes necessary to undock the vessel the valves in the external skins of the "balance" chamber are opened in order to fill them, and the culverts in the caissons are also opened, and the dock sunk to a given depth. From keel to gunwale nine main water-tight ribs extend, further dividing the distance between the two skins into eight compartments. Thus there are altogether 48 water-tight divisions. Frames made of strong plates and angle iron strengthen the skins between the main ribs. Four steam engines and pumps on each side—each pump has two suctions, emptying a division of an "air" chamber—are fitted to the dock, and these also fill a division of the "load" chamber. When it becomes necessary to clean, paint, or repair the bottom of the dock it is careened by the weight of water in the load chambers of one side, and the middle line is raised about five feet out of the water. This gigantic structure is a splendid specimen of workmanship; and, although intrinsically ugly, the skillful toil of the artisan for two years is manifest in the *tout ensemble* of the first great floating dock ever put together in England.

Two other vessels of this kind, have, we believe, been built and sent abroad—one to Cadiz and another to Callao—in pieces; but this is the only dock fitted in this country ready for transport in a complete condition.

The question has been asked whether it would not have been judicious to construct an ordinary dock at Bermuda; but when it is remembered that the island itself is only a coral reef, and that no good foundation can be got, the answer is directly given to this query. Then arises a surmise whether such a leviathan machine could successfully encounter bad weather in the high seas. There is no reason to suppose that the dock would founder, because it can be made as tight as a bottle; and should it get in the trough of a heavy sea, end on, the water would enter at one end and flow from the other. It would, in fact, live on the wave like a well corked bottle. The vessels towing it out would have to keep its head to the gale, and avoid collision; then there would be no risk and little danger.

The Bermuda dock has an enormous rudder, and this has lately been increased considerably in area at the after-end by a large number of planks, in order to give more steerage power. Its cutwaters are formed like the bows of a barge, to divide the water, and by that means diminish the resistance, and enable the dock to be more easily towed."—*London Scientific Review.*

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Interesting Planetary Discoveries.

The planet Mars is the only object in the whole heavens which is known to exhibit features similar to those of our own earth, and the accumulated explorations and discoveries of astronomers during the last two hundred years have resulted in the construction of a globe representing the characteristics of this planet as astronomers believe them to exist. At a recent meeting of the Astronomical Society of England, a globe of Mars was exhibited, on which lands and seas were depicted as upon an ordinary terrestrial globe. By far the larger portion of these lands and seas were laid down as well known entities, respecting which no more doubt is felt among astronomers than is felt by geographers concerning the oceans of our own globe. An interesting description of this globe appears in *Fraser's Magazine.* To the lands and seas, developed in the planet, are applied the names of those astronomers whose researches have added to our knowledge on the subject. Each pole of Mars, it seems, is capped with ice, which varies in extent according to the progress of the seasons. Around each cap is a polar sea, the northern sea being termed the Schroter Sea; the southern, Phillips Sea. The equatorial regions of Mars are mainly occupied by extensive continents, four in number, and named Dawes Continent, Madley Continent, Secchi Continent, Herschel I (Sir W.) Continent. Between Dawes and Herschel Continents flows a sea shaped like an hour glass, called Kaiser Sea, the large southern ocean out of which it flows being denominated Dawes Ocean. Between Madler and Dawes continents flows Dawes Straits, connecting a large southern ocean and a northern sea, named after Tycho Herschel continent is separated from Secchi continent by Higgins inlet, flowing from a large southern sea, termed Maraldi Sea. In like manner Bessel inlet, flowing out of Airey Sea (a northern sea) separates the Madler and Secchi continents. Dawes Ocean is separated into four large seas, and large tracts of land lie between, but whether they are islands or not is not certain. In Delarue Ocean there is a small island, which presents so bright and glittering an aspect as to suggest the probability of its being usually snow-covered. These seas, separated by lands of doubtful extent, reach from Delarue Ocean to the south pole.

One of the most singular features of Mars is the prevalence of long and winding inlets and bottle-necked seas. These features are wholly distinct from anything on our earth. For instance, Higgins inlet is a long, forked stream, extending for about three thousand miles. Blesse inlet is nearly as long, and Nesmith inlet still more remarkable in its form. On our earth, the oceans are three times as extensive as the continents. On Mars, a very different arrangement prevails. In the first place, there is little disparity between the extent of oceans and continents, and then these are mixed up in the most complex manner. A traveler, by either land or water, can visit almost every quarter of the planet without leaving the element in which he began his journeyings. If he chooses to go by water he could journey for upward of thirty thousand miles, always in sight of land—generally with land on both sides—in such intricate labarynthine fashion are the land and seas of Mars intertwined.—*Boston Journal.*

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Vesuvius on the Rampage.

A correspondent of the *Pall Mall Gazette* has been to look at Vesuvius, to see for himself what the eruption of a volcano is like. He finds it sufficiently terrible. He went up the mountain and stood upon the lip of the crater, and peeped into the roaring abyss on one side, taking advantage of a strong wind that was driving all the suffocating steam and vapor to the other. Presently the eruption came:

> It does not consist, as the pictures necessarily lead one to suppose, of a continuous shower at all. Still less does it consist of a continuous shower of black ashes shot out from a fire blazing on the top of the mountain; it is rather a series of explosions. But the roar and glare of the great abyss is continuous. You look into the pit, and though you see no actual flame, yet its sides are in a state of constant incandescence; from the mouth of it there roars up incessantly a dense cloud of steam; and in the depths of it below you hear the noise of preparation for the outburst that is next to come. Then you hear a sharper crackel, and then, without further warning, follows a loud explosion, which shoots into the air a torrent of white-hot missiles of every shape and size. So enormous are the forces at work, that not only small pieces of stone and sulphur, such as you might carry away as mementos of your visit, but huge blocks of mineral, each enough to load a railway ballast wagon, and all in a state of perfectly white heat, are tossed up as though they were so many cricket balls. The explosion lasts, perhaps, no longer than a minute; and then there is a cessation of some seconds, with the noise only of internal preparation once more, after which the explosion is repeated.

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Printing in Colors. A Step in Advance.

We have before us a copy of a new illustrated weekly, the *Western World,* a popular literary and family paper, published by French & Wheat, 13 Park Row, New York. We give this new enterprise a cordial welcome and predict for it large and increasing public favor. The contributions to the number before us indicate thorough acquaintance on the part of the publishers with the tastes of the American public. The stories are chaste and entertaining, the miscellaneous matter selected with great care and judgment, and the editorial matter of a high order in subject, thought, and style.

But the most striking features of this publication are its illustrations, heading, and border. These are printed in colors by a patented process by which the different colored impressions are given to the paper by a single feeding. The process is still in its infancy, yet, notwithstanding the difficulties which attend the earlier stages of any improvement, the effects produced are novel and striking, approximating very nearly to chromo-lithography. The general appearance of the paper is very pleasing, and this method of printing in colors must be considered a decided step in advance.

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OBITUARY.

We regret to announce the death of Prof. Wm. E. Jillson, which occurred at his home in Jamaica Plain, Mass., on the 29th ult. Mr. Jillson will be remembered by inventors and others who had occasion to consult the Patent Office Library, from 1860 to 1865, as its accomplished librarian. In 1865 he resigned this position to accept one in the Boston Public Library, where he remained up to the time of his death. He was considered one of the most accomplished bibliographers in the country.

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THE Pittsburgh *Dispatch,* in speaking of some of its more useful exchanges, says:

> Another paper, of a very different class, which we always read with interest, is the SCIENTIFIC AMERICAN, the best journal of the kind published. It not only abounds with information, of the most useful kind to inventors and mechanics, but its general articles are always well written and full of interest. The number before us is one of the best of the paper which we have yet read, and shows that the publishers are up to the spirit of the times in the way of progress and improvement.

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WE are indebted to Messrs. E. R. Jewett & Co., Buffalo, for proof sheets of engravings, designed to illustrate the Patent Office report for 1867. We have so often spoken in praise of these artistic illustrations, that it is unnecessary now to say more than to commend the great fidelity with which these drawings exhibit the real point upon which the claims to a patent are based.