THE VOLCANO OF KLUCHI OR KLUCHEFSKAYA, KAMSCHATKA.

Kojerevsky—a village of ten huts and sixty-three inhabitants—lies at the foot of Uskovska, a mountain of nearly 13,000 feet, whose summit from this aspect presents the appearance of a uniformly rounded dome of snow. It is in reality twenty-three miles off as the crow flies, but the giant scale on which nature works in these regions belittles space to an extent that is inconceivable until the hard facts of actual measurement are before one. A little farther to the south and east is Kluchi, whose sharp peak rises to a vertical height of 3¼ miles above the river, guarded on the right by Kojerevska, which is inferior to it in altitude by 1,500 feet.

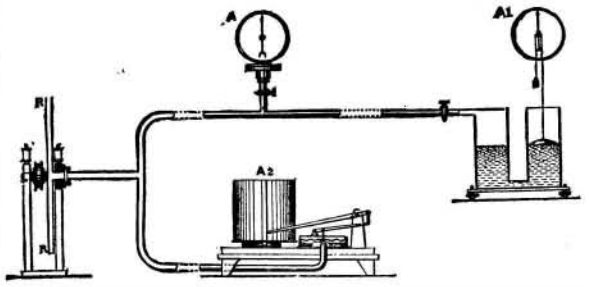
The sun was setting as we rounded a corner and came in sight of the village of Kluchi, its smoke hanging as a blue haze in the still evening air. To our left, the Harchinska Mountains, furrowed with deep gorges, looked almost black against the amber sky. The huge cone of Kluchi caught the last rays of the sun and flushed a pale pink, while at the lip of the crater a fleecy puff of smoke hovered for an instant as if in doubt, and then floated out a long thin streamer to the east. Around his shoulders hung a thick belt of cloud, gathering rapidly with the fast approaching night, and beneath, slope after slope rose steadily up to meet the pyramid above.

The morning of September 13 broke with hardly a cloud, and the view of the mountains, which now lay nearly due south of us, was magnificent. The even slopes of ruddy vegetation rise smoothly upward till, at the height of two or three thousand feet, the snow is reached. The outline of the mighty volcano was as perfect here as before, and its exquisitely graceful slope as unbroken. Near the summit, on the side immediately facing us, a deep furrow, as yet untouched by the rays of the morning sun, showed the remains of some past eruption—a huge scar which the snows of many winters had done their best to obliterate. From the crater light puffs of smoke drifted slowly away to the east, far whiter than the snow which lay below, for on all sides, and especially near the summit, a sprinkling of ashes had dulled its purity almost to a gray. The rounded half dome of Uskovska to the west showed a vast field of unbroken snow, and on the side toward Kluchefskaya appeared to have been completely blown away by some great eruption in past years, leaving a huge open crater, the western walls of which alone were standing. The upper part of these, which was all that we were able to see, seemed to be almost vertical upon the inner face. Between the two mountains was a lesser cone, which, like Uskovska, appeared extinct.

We had an excellent opportunity for taking observations on the heights, the river forming a good base. We accordingly took advantage of it, and from the results of this and other work the following may be given as fairly accurate altitudes for the four chief volcanoes lying to the south of the lower part of the Kamschatka River: Kluchi or Kluchefskaya, 16,988 feet; Uskovska, 12,508 feet; Kojerevska, 15,400 feet; Tolbatchinska, 11,700 feet.

We were informed that an eruption of Kluchi had occurred in 1879. The mountain is always more or less in a state of activity, but on the morning of August 14 dense clouds of smoke appeared above the crater, and at midday the sky was as dark as night. Before long ashes began falling, and in a few hours the ground was covered with them to the depth of three inches. There was no earthquake, but on the following morning a small stream of lava poured from the lip of the crater on the north side. It descended but a short distance, however, and, shortly after, the mountain returned to its usual state of threatening quiescence. With this exception there have been no eruptions within the memory of man, or at least none of any magnitude. A few ashes often fall, and had done so not long before our visit, but the recent falls of snow had done much to hide them.

Kluchi appears to have been still more active in the middle of the last century. Krasheninikov says that "it throws out ashes twice or thrice yearly, and sometimes in such quantities that for 300 versts around the earth is covered with them to the depth of a vershoke (nearly two inches). From the year 1727 to 1731 the inhabitants observed that it burnt almost without interruption, but they were not under such apprehensions as in the last conflagration in the year 1737. This terrible conflagration began the 25th of September, and lasted one week, with such violence that to the people who were fishing at sea near the mountain it appeared one red hot rock, and the flames which burst through several openings sometimes showed like rivers of fire, with a shocking noise."



RUNG'S PNEUMATIC SPEED INDICATOR.

On the 6th of October there was an earthquake of tremendous violence in the Avatcha district and the southern point of Kamschatka, regions which, it should be observed, lie in a direct line between Kluchi and the volcanic chain of the Kuril Islands. An enormous tidal wave occurred, "overflowing the shore 200 feet high," and killing many of the inhabitants; but the country in the immediate neighborhood of the volcano did not appear to suffer much, although a violent earthquake was experienced at Nischni Kamschatka on the 23d of the same month.

In 1762 and 1767 outbursts again occurred, though of very much less severity, but subsequent to that time no accounts of other eruptions have, as far as I am aware, been published, with the exception of that of Professor Adolph Erman, who, in 1829, found the peak "in picturesque and sublime activity, and approached the burning lava, which poured forth a continuous stream," till he reached the height of 8,000 feet above the sea.—*Dr. F. H. H. Guillemard, Cruise of the Marchesa.*

MRS. HARDWICKE, widow of the founder of "Science Gossip," preserves eggs by carefully oiling them with a soft brush all over and packing them in jars with plenty of bran between each layer. A thick brown paper should be tied over the mouth of the jar when it is full. "When eaten at three months old," she says, "you could not tell them from fresh eggs."

KLUCHI OR KLUCHEFSKAYA, VOLCANO, 16,988 FT., KAMSCHATKA.

PNEUMATIC SPEED INDICATOR.

This indicator is the invention of Captain G. Rung, of the Danish artillery, and has already been in use for about a year and a half in the Danish navy, where it seems to have given great satisfaction. The principal merit of this invention lies in its extreme simplicity and consequent cheapness and non-liability to get out of order. The apparatus consists, first, of a rotating tube acting as a centrifugal exhauster. This is connected with a pipe leading to an indicator, by which the air pressure within the pipe is made to exhibit the number of revolutions per minute of the exhauster. Several different forms of indicator are made, and in the adjoining illustration three independent methods are shown. In this figure, R R is the rotary tube, which is driven from the shaft of the dynamo or other machine. A is an indicator, constructed precisely on the principle of the aneroid barometer, and of which, therefore, no further description is necessary. The scale is calibrated, so as to be read directly in revolutions per minute. Another form is indicated at A_1, in which a U tube containing water is employed, one branch being connected with the rotating exhauster and the other remaining open to the atmosphere. The difference of pressure in the two limbs, which is proportional to the speed, is indicated, as in the ordinary mercurial barometer, by means of a float attached to a cord passing over a pulley carrying an index hand, and which is counterbalanced by a weight. This is a very sensitive and also a very accurate arrangement. Evaporation is compensated for by means of a small plunger, not shown in the figure, by adjusting the position of which the needle may be set to zero at any time. A_2 represents a recording arrangement, in which the point of a bent lever traces a line upon a sheet of paper wrapped on a cylinder, which is rotated by clockwork. The position of the lever is determined by the degree of exhaustion in an aneroid chamber.

In addition to the advantages already named, there are two important features which may be said to be almost peculiar to this system. It permits of an accurate indication of the speed of any class of machinery at any distance from the machine itself. And a single indicator may be applied successively to any number of rotators. It is usually sufficient to have only one indicator connected with a common reservoir, to which the pipes from the rotators can enter through stop cocks. The latter feature is of course an admirable one from the economical standpoint.—*The Electrician* (*London*).

Electrolytic Inlaid Work.

This class of work in metal decoration can be executed by aid of the electric current in the following way: The plate of copper which is to receive the inlaid design is dipped into melted wax, so as to receive a thin coat of it, and the design is drawn through the wax, so as to leave the copper perfectly exposed in the lines. The plate is now connected with the positive pole of a battery, and a second copper plate is connected with the negative pole, and both plates are suspended in a solution of sulphate of copper. Under the action of the current, the copper of the first plate is attacked and dissolved where the lines were drawn through the wax, so as to produce an etching of the design on the surface, while an equivalent of the copper is deposited upon the other plate. When the design has been etched about 1 mm. (one twenty-fifth inch) in depth, the plates are removed from the bath, by a few drops of hydrochloric acid the sulphate of copper solution adhering to the lines is removed, and the plate is washed in pure water. Next, the same plate is connected to the negative pole of the battery, to whose positive pole a plate of platinum is connected, and the plates are suspended in close proximity to each other in a nickel or silver bath. The reverse process now takes place. According to the solution employed, metallic silver or nickel is deposited in the lines etched in the copper following the design inscribed in the wax, and this operation is prolonged until the lines are perfectly filled up. The wax coating is readily removed by a wooden scraper and by washing with alcohol. This gives upon the copper surface a design in inlaid metal, either silver or nickel, which in beauty and durability surpasses any produced in other ways.—*Centralblatt fur Opt. und Mech.*

Do we Own Behring Sea?

The brief filed at Sitka by the counsel of the United States government shows to what extent the State department is prepared to go in maintaining our claim of exclusive jurisdiction over Behring Sea east of the line established by the treaty of 1867 as the boundary between Russian and American waters in the North Pacific.

The British sealers were seized at a point in Behring Sea about 130 miles north of the island of Ounalaska, the nearest land. They are prosecuted under a section of the revised statutes which provides that no persons other than those licensed by the government shall kill any fur-bearing animal "within the limits of Alaska Territory or in the waters thereof." The defense, of course, is a denial of the United States' jurisdiction in Behring Sea beyond the marine league belt recognized by the common law of nations.

This controversy opens the most important international question with which the United States is at present concerned. In view of the importance of the principle and the magnitude of the sea area involved, the century-old headland question of the Atlantic fisheries becomes insignificant in comparison. The United States asserts the doctrine that from the chain of Aleutian Islands up to Behring Strait the waters of the North Pacific Ocean are landlocked and belong exclusively to us, with the exception of a narrow strip along the Asiatic coast; and that we have the same dominion over them as over the waters of Lake Michigan, or of Chesapeake Bay, or of Long Island Sound.

The sea area covered by this most important and interesting claim is about three times as great as the entire Gulf of Mexico. Roughly speaking, it is equal to the Mediterranean, the Adriatic, the Ægean, and the Black Seas combined. Take a map of the world on Mercator's projection, and draw a line from the middle of Behring Strait southwesterly to a point midway between Attou Island, the westernmost of the Aleutian archipelago, and Copper Island, just east of Kamschatka. That represents the line of demarkation precisely stated and established by the treaty ceding Alaska to the United States. The triangular body of water inclosed by this imaginary frontier on the northwest, by the chain of the Aleutian Islands on the south, and on the east by the coast of Alaska proper, forms the "inclosed sea" over which the State department claims exclusive dominion for the United States.

Attou Island, the westernmost point of United States territory, is in the longitude of New Zealand. It is actually further west of Sitka than San Francisco is of New York. Attou is as far west of New York as New York is west of Trebizond or Moscow. More than a hundred miles beyond this island, in the open Pacific waters, is the western limit reached by the laws which Congress makes—that is the claim.

Can we shut the world out of Behring Sea? Is that body of water really an inclosed sea, an inland sea, in the sense recognized by the international code? In selling Alaska to us, had Russia the right to convey also exclusive dominion over this vast region of brine? These are the points involved in the controversy about the British sealing schooners seized by our revenue cutters in order to protect the business of our tenant, the Alaska Commercial Company. It appears that our government is preparing to answer all of these several questions unqualifiedly in the affirmative.

The one vital point in the brief prepared by Mr. A. K. Delaney, counsel for the United States in the cases of the captured British sealers, is the argument that in the treaty settlement between Russia and Great Britain in 1825, Russia's dominion over Behring Sea was not challenged by Great Britain—in other words, that it was tacitly recognized. Nevertheless, the question is in a shape that admits of widely different constructions. "If a sea," says Vattell, in his treatise on the Law of Nations, "is entirely inclosed by the territories of a nation, and has no other communication with the ocean than by a channel of which that nation may take possession, it appears that such a sea is no less capable of being occupied and becoming property than the land, and it ought to follow the fate of the country that surrounds it."—*New York Sun.*

Steam Heating for Railroad Cars.

The sure approach of colder weather has, we are glad to notice, revived the question of heating our railroad cars by other means than the outrageously dangerous coal stove. Public sentiment, irritated by the several holocausts of last winter, naturally demanded a change, and several of the State legislatures made laws compelling such change. So far this is good, and several of the railroads have already arranged for the introduction of a safer means of heating their passengers. Most of the attempts so far have quite naturally looked to steam as the easiest solution to the heating problem, but there is considerable difference in the divers systems as to the mode of application and source of supply.

The Pennsylvania Company is reported to have successfully solved the problem, so far as its future on the question is concerned, by taking the steam from the locomotives, and gradually extending its experiments until eight cars are easily, safely, and comfortably warmed; and it is stated that the intention of the company is to apply it to several of its best trains as soon as possible and then continue its development.

This solution is perhaps as good as could be obtained, provided that the cars were warranted always to be in conjunction with a locomotive, and the said locomotive warranted always to be in proper working. But, as the *Railway News* suggests, accidents will happen, and if no other means of heating the cars is provided for, what is to become of the passengers if an accident happens to the locomotive? They may possibly freeze to death if the eventuality is not otherwise provided for. In most cases of accidents, railroad men know that it is just the locomotive which runs the greatest danger. The system to be generally adopted must provide for this eventuality, and if its steam is obtained from the locomotive, it must have some secondary source of supply, individual to the car itself and applicable when required.

Complementary Colors.

A. G. Crace, in *The Architect* (London), repeats as follows what most people know, but some do not:

All colors have their complementaries, which add to or detract from the beauty of the adjoining colors, according to what they may be. Thus, the complementaries of red are green; blue are orange; yellow are violet. If you cut out pieces of gray paper in an ornamental form, and stick a piece on each of the three colors I have named, you will find, in a shaded light, the gray will be fully tinted by the complenientaries of these colors. But you cannot lay down precise rules. An experienced artist can bring any two colors together by properly modulating them. Nothing is so charming and so refreshing to the eye as an harmonious arrangement of colors. They are "like a sweet chord of music to the sense." The hand of nature never errs, whether it brings together scarlet and crimson, as in the cactus; scarlet and purple, in the fuchsia; yellow and orange, as in the calceolaria; or the colors in the varied plumage of exotic birds—the harmony is always beautiful, ever perfect. The laws of harmonious coloring are a necessary part of the knowledge of the manufacturers of colored fabrics. I will suggest a few contrasts:

1. Black and warm brown. 2. Violet and pale green. 3. Violet and light rose color. 4. Deep blue and golden brown. 5. Chocolate and bright blue. 6. Deep red and gray. 7. Maroon and warm green. 8. Deep blue and pink. 9. Chocolate and pea green. 10. Maroon and deep blue. 11. Claret and buff. 12. Black and warm green.

The Great Telescope.

An opportunity to see the largest refracting telescope in the world, which was afforded the public recently by the manufacturers, Warner & Swasey, was improved by a multitude. A constant procession of carriages and pedestrians moved to the works during the afternoon and evening and viewed the immense telescope with wonder and delight. The instrument will be dismounted within a few days and shipped to the Lick Observatory, Mt. Hamilton, Cal. The manufactory has been the Mecca for astronomers from all parts of the country for several weeks, and the visitors yesterday, comprising the leading scientific and business citizens of Cleveland and vicinity, were eager to improve the opportunity to see the great instrument. The column which supports all the movable parts is as high as a three story building. It is of cast iron, ten by seventeen feet at the base and four by eight feet at the top, and weighs 36,000 pounds. Surmounting this column is the head, weighing 8,000 pounds, in which turns the steel polar axis, ten feet long and twelve inches in diameter, weighing 2,800 pounds. When the instrument is placed in position in the observatory, this axis will be adjusted parallel to the axis of the earth, and consequently will point to the exact north pole of the heavens, around which all stars seem to revolve. At the upper end of the polar axis and at right angle to it is fastened a heavy cylinder or sleeve, which forms bearings for the steel declination axis. This axis is ten feet long and ten inches in diameter, weighing 2,300 pounds. Attached to the declination axis is the great steel tube, at the end of which will be placed the world renowned thirty-six inch object glass. The object glass, weighing with its cell 638 pounds, is now at the observatory on Mount Hamilton. This great lens, which is nearly 50 per cent more powerful than any other yet made, will gather the light from stars millions of miles away and concentrate it at the eye end of the tube, 56 feet 6 inches distant, where the brilliant image of the star is magnified by eye pieces or microscopes and observed by the astronomer. A great variety of eye pieces are provided, magnifying from 180 to 4,000 diameters. This eye end of the telescope is a marvel of intricate mechanical construction. It seems to be a series of telescopes within telescopes and wheels within wheels. In fact, there are five complete telescopes here besides the large one. Two of these, with object glasses six inches and four inches diameter, are in themselves as powerful telescopes as many in use in colleges. These serve as finders, to aid in pointing the great tube to the star desired. The other three small telescopes are for reading the fine graduations on the right ascension and declination circles located on the polar and declination axis. These circles are illuminated by electric light, and the readings give the exact position of the observed star to a single second.

Within reach of the astronomer while making his observations are a dozen wheels and handles, by which he can adjust the telescope so as to bring the star in the exact center of the field of vision. The tube is four feet in diameter at the center, tapering toward each end to thirty-eight inches. It weighs with all its attachments 8,600 pounds, and it is so nicely balanced on anti-friction bearings that it can be directed to any point in the heavens by a light pressure from one finger. All the motions, adjustments, and readings here described as being made by the astronomer in his position at the eye end of the instrument are also made by an assistant at his station on the balcony which surrounds the head of the telescope.

To enable the assistant to direct the instrument to any star, he is provided with a system of wheels and reading telescopes, so that he can do his work without even looking at the star. But even this is not considered sufficient, for just beneath the telescope head and within the upper section of the column is a powerful driving clock, governed by a double conical pendulum and regulated by electric connection with the standard sidereal clock of the observatory. The pendulum balls weigh 125 pounds and make one revolution per second. By an ingenious system of mechanism the driving clock is so connected with the polar axis of the telescope that the great tube when pointed to a star is made to move backward as fast as the earth moves forward in its diurnal motion, this counteracting the motion of the earth and making the star appear to stand still in the center of the field of the telescope. Access to the driving clock and balcony is gained by a spiral staircase at the south side of the column. The center of motion of the instrument is thirty-seven feet above its base. When the telescope is pointed to the zenith, the objective glass will be sixty-five feet above the base. The whole telescope complete weighs 65,000 pounds. So perfect are the details of its construction, many of them being invented by the manufacturers, that the colossal instrument can be used more conveniently and rapidly than many smaller instruments.

A telescope of such size is especially suited for such work as stellar photography and spectroscopy, because it collects so large an amount of light. The instrument will be mainly devoted to investigation in these two directions. Now, the photographing of faint stars requires an exposure of a sensitive plate for a long time, even for hours. During this time the image of the star on the photograph plate must remain absolutely at the same point. Hence the utmost care and pains were required to make so enormous a mass move accurately, neither faster nor slower than the earth on its axis.—*Chicago Leader.*

Railway Ties.

Among the interesting questions which are brought out in Mr. Dudley's dynagraph inspections, some of the most important have been those relating to the life of ties. He has observed that on the Old Colony and on the Boston & Maine, although the road looks in better surface than where chestnut or oak ties are used, it does not take so good a diagram. The cedar ties with which these roads are largely laid are so much softer than oak or chestnut that when an inequality exists it extends over a longer portion of the rail. Thus the bends in the rails are longer, which is better for the rails, but the surface of the rails is not so good; and when a point begins to get low, it not only wears into the tie faster on account of its greater softness, but it begins to cut into adjoining ties, which are not firm enough to resist the additional strain a low tie next to a high one produces. It would therefore seem to be a question not yet conclusively settled whether cedar ties are so economical as their greater durability would seem to imply. The greater amount of labor required to keep the surface in good condition, or the greater cost of hauling freight over the track when it is not so, may in the end balance the supposed gain in using a wood which does not decay quickly, but is very soft.—*Railroad Gazette.*

A Message from the Sea.

According to information received at Lloyd's from the Governor of South Australia, dated the 22d ult., a dead albatross has been found on the shore at Fremantle, and attached to its neck was a piece of tin, on which the following was written in French: "Thirteen shipwrecked persons are on the Crozet Islands, 4th August, 1887." The vessel to which these shipwrecked persons belonged is supposed to be the Tamaris, bound from Bordeaux for Noumea, which vessel was posted at Lloyd's as missing on the 31st of August, and the crew of which was composed of 13 men.