

Tests for Good Burning Oil.

Professor J. Lawrence Smith, in his report as Centennial judge, says that good petroleum should have the following characteristics: 1. The color should be white or light yellow, with blue reflection; clear yellow indicates imperfect purification or adulteration with inferior oil. 2. The odor should be faint and not disagreeable. The specific gravity at 60° Fah. ought not to be below 0.795, nor above 0.84. 3. When mixed with an equal volume of sulphuric acid, of the density of 1.53, the color ought not to become darker, but, on the contrary, lighter. A petroleum that satisfies all these conditions and possesses the proper flashing point may be set down as a pure and safe article. Too much care cannot be exercised in examining this oil for household use.

CURIOUS HEDGE FIGURES.

It was the fashion, a century ago, to trim hedges and close-leaved trees into fantastic forms, resembling animals, buildings, etc. In many old gardens in France this custom is still maintained, and the visitor may walk through alleys on either side of which are high walls of dense verdure cut perfectly square, and occasionally arching overhead. At corners these fantastic figures in living green are often encountered, they being the product of the gardener's skill in training and clipping. Our engraving represents three quite large objects made in box, and exhibited growing in the Dutch Garden at the Paris Exposition.

Food Supply of Paris.

There are 26 millers in the environs of Paris, St. Denis, and Sceaux, who employ 234 men. There are, in the departments of the Seine, 1,694 bakers, who employ 7,264 hands, 2,251 being females. Besides these there are 1,062 pastry cooks, who employ 3,156 men and 555 women. In the mills the men get, on an average, 7s. per day; the bakers about 5s. 6d. for men in the town, and 3s. for women, in the suburbs the men 3s. 6d., and the women 2s. 3d. The pastry cooks in Paris get 6s. for men and 5s. for women; in the suburbs 3s. 6d. for men, and 2s. for women.

THE LEONA GOAT SUCKER.

The curious feature about this bird is the long and very elastic feather shafts which rise from the middle of the wing coverts and extend to a length of twenty-eight inches. They are totally destitute of barbs except at the extremity, where they suddenly give out a broad web of four or five inches in length. The object of these odd appendages is not known. They are found only on the male bird, and evidently bear an analogy to the train of the peacock and the long tail feathers of the pheasant among the birds, as well as to the beards, horns, tusks, manes, and similar masculine appendages of male quadrupeds.

The plumage of the Leona goat sucker is very prettily marked with spots and bars of rusty red and black upon the usual brown ground. Every primary feather possesses nine rusty red spots and as many of a black hue, and there are many other spots and bars scattered over the body and wings. The bird is not a long one, measuring only eight or ten inches in total length. It is a native of Western Africa. We take our illustration from Wood's "Natural History."

Oatmeal.

Liebig has chemically demonstrated that oatmeal is almost as nutritious as the very best English beef, and that it is richer than wheaten bread in the elements that go to form bone and muscle. Professor Forbes, of Edinburgh, during some twenty years, measured the breadth and height, and also tested the strength of both the arms and loins, of the students in the university—a very numerous class, and of various nationalities, drawn to Edinburgh by the fame of his teaching. He found that in height, breadth of chest and shoulders, and strength of arms and loins, the Belgians were at the bottom of the list; a little above them the French; very much higher, the English; and highest of all, the Scotch and Scotch-Irish from Ulster, who, like the natives of Scotland, are fed in their early years with at least one meal a day of good oatmeal porridge.

Salt in Beer.

The presence of a small percentage of salt in malt liquors may be unobjectionable, or even necessary to bring out the flavor of the principal ingredients; but it is impossible to veil the fact that, whether a very saline water is selected for brewing purposes or salt be introduced in any considerable

quantity during the manufacture of beer, the expedient is a device to create thirst and increase the demand for drink. It is, therefore, a matter of public interest to see that the adulteration of malt liquors with salt is prevented by the enforcement of the law. If the brewers take the hint given to them by Mr. Selater-Booth recently, and carry a representative case to the Court of Appeal, those who are anxious to minimize that excess in drinking which constitutes a ceaseless cause of loss and injury to the working classes of this country, should see that the true nature of the adulteration is exposed. We can easily understand that beer containing an "insufficient" quantity of salt will not be profitable. It may well find its way back to the brewers, because, the thirst producing element being absent, the publican would find the article lie on his hands. The mysteries of the trade in intoxicating beverages are many and bewildering, but we venture to hope the legislature and the public are too deeply impressed with the importance of encouraging temperance to be greatly moved by compassion for the

of temperature and moisture consequent on their having been kept for more than a year in the store room of an ordinary dwelling house—are still perfectly good and sweet, their natural characteristic flavors being well preserved. Some lime fruit juice biscuits, for instance, which are more than a year old, have preserved, in a very perfect manner, the peculiar flavor by which the juice of the lime can always be distinguished from that of the lemon.

The primary principle of Dr. Morfit's process is the getting rid of nearly the whole of the natural water contained in the substance to be preserved, by submitting it to a certain degree of heat, the place of the water being supplied by gelatin. The compound is then dried, and in this state it may be kept for any length of time, or else it may be made up into biscuits by incorporating it with biscuit powder.

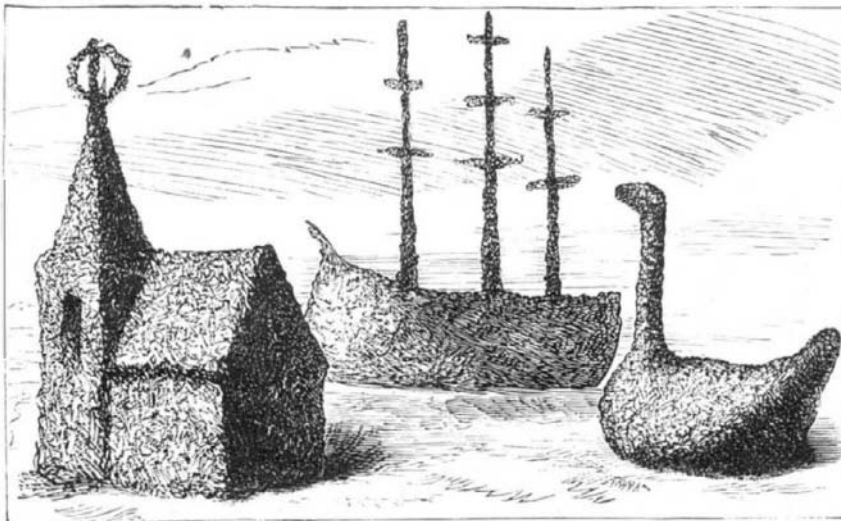
Let us take Dr. Morfit's method of preserving beef as an example. The beef must be as free from fat and bone as possible, and should be first stewed in its own liquor, or with the least possible quantity of water, and seasoned or not according to taste. The whole is then reduced, by any available mechanical means, to a state of smooth and fine pulp, and triturated with a solution of gelatin in water. One pound of gelatin is enough for 15 pounds of meat, fowl, or fish, the gelatin being dissolved either in a sufficiency of water or in the natural juice of the substance itself. In the case of fruit—such as gooseberries, currants, or plums—they are stoned or skinned when necessary, and cooked or not, as the case may be. They are then made into a pulp and mixed with gelatin dissolved in water or their own juice, heated so as to insure a thorough mixture of the ingredients, and then poured into coolers. In certain cases the gelatin may be replaced by mucilage of Irish moss, but the result, although cheaper, is not so good.

Dr. Morfit's method of condensing milk without the use of sugar is of great interest, seeing that the Swiss and other descriptions of condensed milk, which are now so largely sold, cannot be taken by delicate infants or by persons of weak digestion, owing to the large amount of sugar contained in them. One pound of gelatin is dissolved in one gallon of fresh milk at a temperature of from 130° to 140° Fah., the whole being allowed to set into a jelly, which is dried. The dried jelly is then dissolved in another gallon of fresh milk and allowed to set and dry as before, the operation being repeated with fresh milk until the original pound of gelatin has taken up eight gallons of milk or more. Consommé of meat may in like manner be condensed until one pound solid shall represent thirty times its weight of fresh beef. As may be readily guessed, the process may be carried on without any of the expensive plant and troublesome manipulation involved in the usual modes of condensing milk and making Liebig's extract, besides which, in the latter case, the whole of the nitrogenous parts of the meat is preserved intact.

From a hygienic point of view, the lime fruit juice biscuits ought to be admirably suited for use in the navy. Without entering into the question as to whether it is the citric acid, or the phosphatic salts, or the potash contained in the lime juice that is the real anti-scorbutic agent, it is sufficient to say that the 40 per cent of Montserrat lime fruit juice preserved by Dr. Morfit's process, and incorporated with the biscuits, has preserved all its properties without any change for more than a year, and, *a priori*, there is no reason to suppose that it would not keep good for ten or twenty times that period. It may be mentioned, in conclusion, that the different jellies may be dried into hard tablets or flakes at a uniform temperature of from 38° to 40° C., and sent into the market in this convenient form, as well as under the more bulky guise of biscuits. A few cases of lime fruit juice tablets, prepared according to Dr. Morfit's method, would probably have saved the lives of several brave men during the late expedition to the Polar regions.

Speaking from a purely scientific point of view, and judging by the results we have already described, the principle of Dr. Morfit's invention seems to be theoretically a sound one. These results we must regard at present as tentative, and it only remains to the inventor of the process to confer a large benefit on the community by extending its application, thereby notably increasing our not too abundant stock of hygienic and alimentary products.—*Chemical News.*

M. GARRIGOU has lately discovered that the salts dissolved in mineral waters have special properties which render their chemical reactions different from those of the same salts under ordinary conditions.

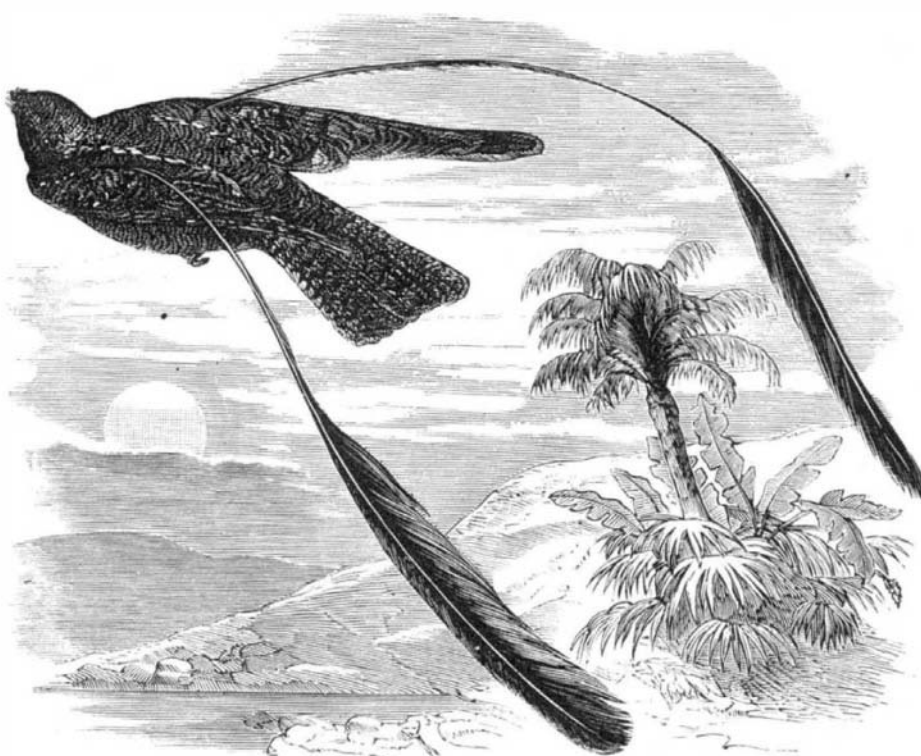


CURIOUS HEDGE FIGURES.

hard case of the makers and sellers of beer which cannot be sold in quantities satisfactory to its producers unless they are allowed to drug it with enough salt to render their customers inordinately thirsty!—*Lancet.*

Dr. Morfit's Method of Preserving Animal and Vegetable Food.

We have received a number of biscuits and other preparations containing preserved solid and liquid food, both animal and vegetable, which are the practical results of a new process lately patented by Dr. Campbell Morfit. They include substances of the most diverse nature, such as milk, cream, cheese, beef, garden rhubarb, cabbage, tomato, pork sausage, and a variety of other alimentary products, all of which are perfectly savory and toothsome, in spite of their being more than a year old. It is, however, more with Dr. Morfit's process than with its present results that we have



now to deal, for we must look upon his discovery as being as yet in its infancy.

Dr. Morfit's experiments, which he has prosecuted uninterruptedly for the last two years, seem to prove that ordinary gelatin, when it is once thoroughly diffused through a vegetable or animal substance, and dried in and with it, will protect it from decomposition or other alteration for a prolonged period, in spite of atmospheric or climatic changes. This is clearly proved by the samples submitted to us, which—although they have been exposed to the constant changes

The Ring of Fire, and the Volcanic Peaks of the West Coast of the United States.

The Pacific Ocean is not alone remarkable in being the largest body of water on the globe, but also on account of those volcanic phenomena which manifest themselves throughout the whole extent of its boundaries.

Beginning in the southern waters of this great ocean, we find the first noteworthy evidences of volcanic activity in the smoking cones of New Zealand, Tongariro, and White Islands. North we have the Feejee Islands group, with its numerous craters and its thermal springs. Crossing the South Sea at this point, in an oblique direction from the islands of Juan Fernandez, a branch unites with the principal chain passing round the coasts of Australia and New Guinea. Next come in succession the volcanoes of the New Hebrides, the Archipelago of Santa Cruz, and the Solomon Isles, connecting the Feejee group with the region of the Sunda Islands. From Papua to Sumatra, every large island, including Timor, Flores, Bali, Lombok, Sumbawa, and Java; then to the east, Borneo, Celebes, Amboina, Ceram, Gilolo, Mindanao, and Luzon, has one or more volcanic outlets in a state of full activity. This region is the great focus of lava outflow of the globe.

Northward of Luzon the volcanic belt curves, and follows a line parallel with the coast of Asia, and embraces the island of Formosa, the Loo-Choo Archipelago, the islands of Japan, and the Kuriles. To the east of the peninsula of Kamschatka, which possesses no less than fourteen volcanoes in a state of activity, the range of craters describes a graceful curve across the Pacific to the peninsula of Alaska, embracing in its extent thirty-four smoking cones. With a direction first eastward, then south, the volcanic belt extends along the whole western seacoast of North America. In Guatemala and the republics of South America, thirty volcanoes, much more active and terrible than those of Mexico, rise in two chains—one parallel to the coast, and the other crossing the isthmus of Nicaragua obliquely. Some of these mountains of fire have become famous for the appalling disasters which have followed their eruptions.

Still further south the depressions of the isthmus interrupt the volcanic chain, which reappears with the peak of Tolima, 17,716 feet high, in Colombia. South of this and the plateau of Pasto (where there exists a crater) stands the magnificent group of sixteen volcanoes, some extinct, some smoking, over which towers the celebrated Chimborazo. This group occupies an elliptical space, the longer axis of which is only 112 miles long, and includes the well known volcanoes Tunguragua, Carahuago, Cotopaxi, Antisana, Pichincha, Imbabura, and Sangay. South of Sangay, which is said to be the most destructive volcano on the earth, the chain of the Cordilleras offers no volcanoes for a distance of about 930 miles. The series commences again in Peru, where outlets of eruption, among extinct volcanoes, are here and there seen still in action. The smoking peaks of the mountains Antuco, Osorno, and Villarica, in Chili, terminate the series of the great American volcanoes, but volcanic activity is manifested in less elevated craters, all down the coast to the extremity of Terra del Fuego. The South Shetland Islands, in the Southern Ocean, in a line with North America, are also volcanic in their character. From these, if a circle be swept round through the polar regions, the line will come out along the coasts of Victoria Land, on which are situated the towering peaks of the volcanoes Erebus and Mt. Terror. From this region northward, the line, extending over various small islands of the Antarctic, again touches New Zealand, from whence we started; and thus is completed the great volcanic circle which girdles the Pacific, and which has very aptly been termed the "Ring of Fire."

Although the volcanoes of the greater portion of this circle of 22,000 miles are actually active, those of the United States which are embraced in its limits are at present extinct; and to these, rendered more interesting to us from the light shed on the subject by government explorations, we will now direct our attention. The principal outflows of volcanic rocks, properly so-called, which have taken place within the limits of our country, occurred in the Tertiary period, or that epoch in the world's history which immediately preceded the advent of man on earth. These rocks are mainly confined to the western portion, included in the great elevated region of the Rocky Mountains, and cover a great proportion of the Territories bordering the western coast.

The region embraced in the scene of these volcanic phenomena represents an extent of coast line, north and south, of about 900 miles, and includes the greater part of California and Nevada, all of Oregon and Washington Territories, and a small strip of Idaho.

The western border of the great elevated region included in the Rocky Mountain system is formed by the Sierra Nevada and Cascade ranges, which run in a direction parallel to the coast. The Sierra Nevada rises for a distance of fifty miles, in long gentle slopes, from the plains of California on the west; and on the east presents an abrupt wall overlooking the desert valleys of the interior or Nevada basin. Its highest points are in the region of Mt. Whitney, which reach an elevation of nearly 15,000 feet. From here its crest diminishes slightly to the north; and, where it is crossed by the railroad, its peaks are about 9,000 feet above the sea. In the northern part of California its continuity is broken, and from Lassen's Peak, for nearly 100 miles north, it is broken into ridges and isolated volcanic peaks, which stand regularly interspaced, and rise above the snow line. In Northern Oregon and Washington Territory, the Cascade range occu-

pies a topographical position corresponding with that of the Sierra Nevada.

The Cascade Mountains, however, are of a more recent geological formation, and rise to heights of only 4,000 to 7,000 feet above the sea level. Along the crests of these mountains extends the line of snow-capped volcanic cones. The more prominent of these are Lassen's Peak and Mt. Shasta, in Northern California; Mt. Pitt, the Three Sisters, Mt. Jefferson, and Mt. Hood, in Oregon; and Mts. St. Helen's, Adams, Rainier, and Baker, in Washington Territory.

Lassen's Peak is the most southern of the volcanic peaks, and forms the northern extremity of the Sierra Nevada crest. To the geologist this is especially interesting, and it was through its study that Von Richthofen gathered the facts which led to his classification of the relative ages of volcanic rocks—facts which were embodied in a paper published under the auspices of the California Academy of Sciences in 1868. Here are found remnants of ancient craters made and destroyed ages ago, and abundant traces of long continued activity. The last outflows from these craters were basalt, which has covered an immense extent of country north and east.

Proof of still remaining internal heat is found in its numerous solfataras and hot springs; these are concentrated in the basin of an old crater, called, in the vernacular of the West, "Bummers' Hell." Here are also found the so-called mud volcanoes. Mt. Shasta, one of the grandest and most accessible of our volcanic peaks, stands comparatively isolated. Its summit, carefully measured by the barometer, reaches a height of 14,440 feet above the sea level. On the west of the summit is a beautiful crater, almost perfectly circular in form, nearly a mile in diameter, and with a rim 2,000 feet lower than the main summit. Its interior, about a thousand feet deep, contains a central cone, formed, like the rim, of broken masses of lava. The rim of the crater is a mere knife edge of rock, so narrow that when the parties attached to the government survey visited it and remained over night, they found it necessary to break away the rock with their hammers to make a place wide enough to sleep upon. On the highest point of this rim the lava masses are perforated curiously with holes similar to those made by worms, and these are lined with a green glass, the result of a melting of the rock by lightning, for which this place seems to present great attraction. The main summit is separated into two peaks by a little gorge about 100 feet deep, at the bottom of which is a hot spring. One of the attractions of this peak are the still active glaciers found on its northern slopes. Along the western slope are the remains of hundreds of little volcanic cones. A larger one to the southwest, called Little Shasta, is a miniature reproduction of the larger one, although it is nearly equal in height to Vesuvius. Mt. Pitt, a volcanic peak of beautifully regular outline, is about 60 miles north of Shasta, in Oregon. It is less than 10,000 feet high, yet its summit is crowned with snow most of the year. It likewise shows traces of a crater structure, which is broken down on the northeast side. Throughout the region to the northeast of Shasta, in Eastern Oregon and Northwestern Nevada, immense tracts of country are covered by flows of basaltic rock, popularly known as "Lava Beds." These are cut through in all directions by a network of gorges and ravines, with perpendicular sides, and abound in natural fortresses and caves, and are usually traversed by streams. It was in such hiding places that a handful of Indians, during the late Modoc war, were able to keep at bay all the military force that could be brought against them.

East of Mt. Pitt are numerous lakes, fed largely by springs issuing from volcanic rocks. Most interesting of these is Crater Lake, which fills an ancient crater, eight miles in diameter. The showers of ashes which once issued from this crater can easily be traced, in the peculiar character of the soil, for a distance of about 28 miles east and 10 west of the lake. The volcanic peaks of the Three Sisters and Mt. Jefferson, north of Mt. Pitt, are little known and of small importance, though they form a beautiful feature in the scenery of Oregon.

Mt. Hood, with an outline far more graceful than that of any of the other volcanic peaks, rises out of the very crest of the Cascade Mountains to a height of 11,225 feet, and is considered one of the most beautiful peaks in the world. What was once its crater has long since disappeared, and its summit at present consists of a single block of lava a few feet square only, from which one may look down nearly perpendicularly for thousands of feet. From the fact that clouds frequently collect (even on a cloudless day) around the mouth of what was once a crater, on the north side, frequent reports are made of an eruption on this peak; but an examination has shown to a certainty that no eruption has taken place within the memory of man. Twenty-five miles north of Mt. Hood we find the Columbia river. The region hereabout presents some of the grandest and most picturesque scenery of the United States. Here may be seen, under peculiarly favorable circumstances, volcanic phenomena both of massive eruptions and of crater cones, which attain in this locality an enormous development. This river, which drains an area of 200,000 square miles, has cut its channel transversely through the Cascade Mountains, almost down to the level of the sea, and thus gives us the means of determining the geological age of the period immediately preceding the building up of the basaltic range at this point. This was the Miocene Tertiary—a time when a tropical climate prevailed over our whole continent, and even far up into the Arctic regions.

North of the Columbia river, in Washington Territory, rise two other volcanic peaks. Of these, Mt. Adams, to the east of the summit of the Cascade Mountains, presents a broad, flat summit; and, if it has a crater, it must be of small size. Mt. St. Helen's, to the west, is remarkable for its regular conical shape. It is stated, on pretty good authority, that this cone was in active eruption in the winter of 1841-2. Neither this nor the preceding peak has ever yet been explored or measured, though their altitude has been estimated at 10,000 feet.

Mt. Rainier (the "Techoma," or "Great Snow," of the Indians) is the grandest single peak in the United States, and for grandeur is probably surpassed by very few mountains in the world. Its height is 14,444 feet. Its peak has three summits, of which the central one is a small crater, while the other two are remnants of the walls of a former immense crater, which, if restored, would nearly double the present size of the mountain.

An immense system of glaciers, presenting all the peculiar phenomena of the glaciers of the Alps, flow down from the steep northeastern slopes of this peak, and unite to form the White river, one of the largest streams which flows into Puget Sound.

Mt. Baker, in the extreme northern part of Washington Territory, although but little over 10,000 feet high, is extremely imposing in appearance. It is much nearer the sea than Mt. Rainier, and from its more northerly position has a proportionately greater snow mass. It has been ascended by an Englishman named Coleman, who published an account of his trip in *Harper's Magazine*.

This completes the list of the volcanic peaks of the Cascade Mountains. Going back now to the Sierra Nevada proper, which was elevated above the sea long before the Tertiary period, we find that volcanic activity has been confined rather locally to a few small volcanic vents along its eastern base, and to flows of basaltic rock on its western slopes, covering, in many cases, the gold-bearing gravels of the Tertiary.

Mono Lake, a beautiful sheet of water, 14 miles long, lies at the eastern foot of the Sierras, opposite the Yosemite Valley. The mountains form a precipitous granite wall 8,000 or 9,000 feet high on its western shores, while to the east extend the flat deserts characteristic of the great basin of Nevada. In the midst of the lake is a small island, which contains a crater, and which abounds in hot springs. To the south of the lake extends a line of volcanic craters, forming a low ridge, which are very unimportant as compared with the lofty peaks of the Sierras, since their highest point rises only 2,700 feet above the neighboring valleys. They are extremely remarkable for the black glass-like rock of which they are formed, and which is known to mineralogists as obsidian. The craters are usually surrounded by a "cinder cone," or circular ridge of loose scoriae and volcanic ashes, and within this are piled up irregular masses of gray glass and white frothy pumice, the latter so light that it floats on water.

Mr. S. F. Emmons (of Clarence King's Geological Survey), to whom we are indebted for the facts in regard to the volcanoes of the Pacific coast of the United States, remarks that this whole region "must have been the scene of terrific exhibitions of volcanic phenomena, in comparison with which the catastrophes of modern times would sink into insignificance. In the upper basin of the Columbia and Snake rivers, tens of thousands of square miles were covered with continuous sheets of volcanic rock, often many hundreds of feet in thickness. As the massive eruptions of volcanic material gradually ceased, and the gaping fissures in the earth's surface were covered over, we may imagine along the western coast of that time a line of volcanic vents, like beacon fires, lighting up the rocky headlands, and from which issued continuous clouds of steam and sulphurous gases, accompanied by frequent showers of rock and ash, and outflows of hot lava, which gradually built up around the orifices immense mountain masses. At what time these eruptions ceased we have now no means of definitely determining. In the cold, white peaks of to-day, however, scored and carved by glaciers, so that in many cases only traces of their former structure are left, the casual observer would scarcely suspect that he was looking on these ancient fiery mountains. And yet even now there slumbers within their mass a spark of the ancient fire, which may some day break forth into a conflagration."

To Imitate Ground Glass.

Put a piece of putty in muslin, twist the fabric tight, and tie it into the shape of a pad; well clean the glass first, and then apply the putty by dabbing it equally all over the glass. The putty will exude sufficiently through the muslin to render it opaque. Let it dry hard and then varnish. If a pattern is required, cut it out on paper as a stencil plate, and fix it on the glass before applying the putty, then proceed as above; remove the stencil when finished. If there should be any objection to the existence of the clear spaces, cover with slightly opaque varnish.

RAILROAD BIRDS.—A water wagtail has built her nest for two years beneath the roof of a third class carriage on the London and Southwestern Railway. The carriage is in constant use, but the bird does not appear to be in the least disturbed by the noise or jolting of travel, but complacently accompanies her brood. The cock bird is philosophic, and when his spouse departs on a trip quietly awaits her return.