

**India-rubber in Brazil.**

In the early morning, men and women come with baskets of clay cups on their backs, and little hatchets to gash the trees. Where the white milk drips down from the gash they stick their cups on the trunk with daubs of clay, moulded so as to catch the whole flow. If the tree is a large one, four or five gashes may be cut in a circle around the trunk. On the next day other gashes are made a little below these, and so on until the rows reach the ground. By eleven o'clock the flow of milk has ceased, and the *seringueiros* come to collect the contents of the cups in calabash jugs. A gill or so is the utmost yield from each tree, and a single gatherer may attend to a hundred and twenty trees or more, wading always through these dark marshes, and paying dearly for his profit in fever and weakness. Our *mame-luca* hostess has brought in her day's gathering—a calabash full of the white liquid, in appearance precisely like milk. If left in this condition it coagulates after a while, and forms an inferior whitish gum. To make the black rubber of commerce, the milk must go through a peculiar process of manufacture, for which our guide has been preparing. Over a smouldering fire, fed with hard nuts of the *tucuma* palm, he places a kind of clay chimney, like a wide-mouthed, bottomless jug; through this *boiao* the thick smoke pours in a constant stream. Now he takes his mould—in this case a wooden one, like a round bladed paddle—washes it with the milk, and holds it over the smoke until the liquid coagulates. Then another coat is added, only now, as the wood is heated, the milk coagulates faster. It may take the gatherings of two or three days to cover the mould thickly enough. Then the rubber is still dull white, but in a short time it turns brown, and finally almost black, as it is sent to the market.

The mass is cut from the paddle and sold to traders in the village. Bottles are sometimes made by moulding the rubber over a clay ball, which is then broken up and removed. Our old fashioned rubber shoes used to be made in this way. Twenty million pounds of rubber, valued at 6,000,000 dollars, are annually exported from Para in the dry season; many thousand people are engaged in gathering it. But the business altogether is a ruinous one for the province, as Brazilians themselves are fully aware. The *seringueiro*, who gains two or three dollars for a single day's gathering, has enough, as life goes here, to keep him in idleness for a week; and when his money is spent, he can draw again on his ever ready bank.

The present wasteful system is spoken of as follows: The half wild *seringueiros* will go on submitting to impositions and dying here in the swamps, until Brazilians learn that by purchasing this land from the government and planting it in rubber trees they can insure vastly larger profits, and do away with the evils of the present system. It is what must eventually be done. The rubber gatherers, in their eagerness to secure large harvests, have already killed an immense number of trees about the Para estuary; they have been obliged to penetrate farther and farther into the forest, to the Tocantins, Madeira, Purus, Rio Negro, and eventually even these regions must be exhausted, unless they are protected in some way. The trees, properly planted and cared for, will yield well in fifteen years, and, of course, the cost of gathering would be vastly reduced in a compact plantation; half the present labor of the rubber collector consists in his long tramps through the swampy forest.—*Dominica Dial*.

**Swiss Labor Statistics.**

The most recent report of the Department of the Interior states that there are in Switzerland 8,642 factories and workshops under legal supervision, 1,472 of which are worked by machine power. Of these, water furnishes the movement to the amount of 41,316 horse power, steam to the amount of 18,064, and gas to the amount of 117. The number of operatives employed is 134,862, of which 70,364 are males and 64,498 females. There are 10,402 children between 14 and 16 years of age, 14,590 between 16 and 18, and 109,810 over the latter age. The textiles, such as cotton, silk, woolen, and linen, occupy 1,619 factories, with 85,705 work people; 68 establishments carry on tanning, leather dressing, hair weaving, etc., with 3,753 hands; there are 6,636 hands employed in 143 food preparing shops; 2,749 in 102 chemical works; 4,950 in 150 printing shops. There are also 111 wood working establishments, occupying 2,913 hands; 353 for clock and jewelry making, with 24,988 work people; and 96 for glass making, etc., with 3,170.

**A Lure for Trout and Black Bass**

Is suggested by one of the writers to a sporting periodical that is somewhat novel. He says that he has used it for thirty years, and never saw its equal as a bait. The skin of the neck and the head of a fowl, with speckled and red feathers, cut into narrow strips with the feathers on, makes a most enticing bait, and it may be used fresh, or be kept pickled in salt brine from fall till spring. He says:

"When on the hook it is a most enticing bait, and being tough hangs on well and looks bright. I have caught a basket of trout with one bait. Sometimes you may want a bait like a bug or grasshopper, or a large miller; this you can closely imitate by leaving on one or two feathers. Sometimes by cutting from the wattles near the bill, with a feather or two, or a piece of the comb and a piece of the little feathers attached, will lure a trout when nothing else will."

**SPRING WHEEL FOR TRACTION ENGINES.**

Difficulty has always been experienced in the use of traction engines, on ordinary roads, on account of the rigidity of the wheels and the injury to the machine by jolting, for lack of sufficient elasticity. The general idea of using elastic spokes in wheels is an old one. But the particular form here shown seems to be especially adapted to traction engines, and has proved highly successful in practical operation in England, where traction engines furnished with these wheels have been run for between two and three thousand miles with great satisfaction.

Engines of this construction were shown by J. & H. McLaren, of Leeds, at the recent agricultural show at York. The rim of the wheel is made of strong iron rings and steel cross plates. The wheel hub has wrought iron ribs to which the spring spokes are bolted. The springs are made of the best steel, nine inches wide by half an inch thick. When the weight of the engine comes on these spokes, those nearest



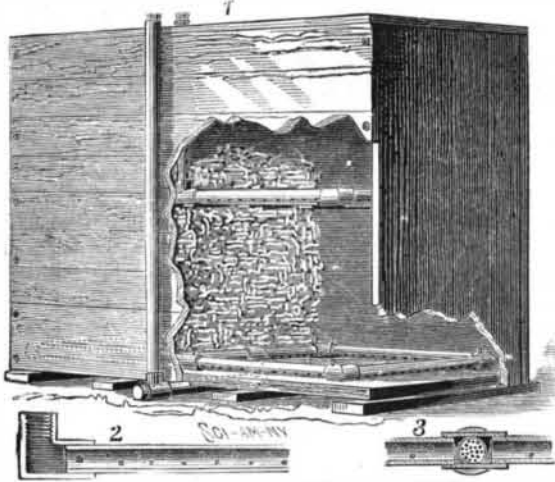
**SPRING WHEEL FOR TRACTION ENGINES.**

the ground are compressed a little and those at the top elongated. The driving strain is sustained by an arm attached to the rim.

**METHOD OF PRESERVING ENSILAGE IN SILOS.**

To preserve corn or other vegetable matter in silos it is necessary for its preservation to remove all air before heating or fermentation sets up. This has been done in a very imperfect manner by placing heavy weights on boards covering the top of the ensilage, the air escaping through cracks between and around the boards; but as silos are from twelve to twenty feet deep, a large percentage of air will remain in contact with the ensilage, especially in the central and lower portions, when treated in the ordinary way. The heavy pressure commonly used has a double disadvantage, inasmuch as the walls of the silo must be made very strong, to resist lateral pressure, and ensilage under pressure ferments much more rapidly than it would were the pressure slight, as the juices of the ensilage are expressed, and finding their way to the bottom of the silo are readily attacked by fermentation.

The improvement shown in our engraving has been patented by Mr. Samuel M. Colcord, of Dover, Mass., and is



**PRESERVING ENSILAGE IN SILOS.**

designed to preserve the ensilage in a sweeter and more wholesome state than is possible by the ordinary method. This improved device not only removes atmospheric air from the silo very speedily and perfectly, and with much less than the usual pressure, but it permits of a ready examination of the contents of the silo, and affords a means of applying chemical preservatives for preventing or arresting fermentation.

By reference to the engraving it will be seen that the silo is provided with a frame of perforated metal pipes at the bottom, connecting with one or more pipes leading out of the silo and upward to the surface. Juice or water accumulating at the bottom of the silo may be removed through the hori-

zontal pipe, and the condition of the ensilage at the bottom of the silo may be determined by the odor rising from the vertical pipes, or by dropping a sensitive thermometer into either of the pipes. Figs. 2 and 3 show the pipes in detail.

A second set of pipes is supported upon a skeleton frame half way up the silo. The number of these sets of pipes may be increased, and of course the number of pipes in each set may be varied.

The pipes and the skeleton frame supporting them may be readily removed when reached in the operation of discharging the silo.

This apparatus may be readily applied to silos of the old style already in existence.

This useful invention will be readily understood without further explanation, and further particulars may be obtained by addressing the inventor as above.

**A Study of Leprosy.**

Dr. G. H. Fox, the lecturer on cutaneous diseases at the College of Physicians and Surgeons, New York city, has recently made a trip to a leprosy lazaretto at Tracadie, Province of New Brunswick. In an interview with a representative of the *New York Sun*, Dr. Fox gave some interesting information about this disease, which is less understood than its terrible character seems to demand. Dr. Fox says that leprosy is not absolutely and always incurable, and suggests that a wealthy man who would endow a bed in the Skin and Cancer Hospital, so that lepers would come there, would be greatly facilitating the study of this disease. Nearly all the patients at Tracadie are descendants of two sisters, who, about 100 years ago, are said to have contracted the disease by washing clothes for sailors. In the beginning of the century there were about 100 cases in the neighborhood of Tracadie. A hospital was built on Sheldrake Island, not far from Tracadie, especially for lepers. Dr. Fox found a woman 80 years old in the lazaretto, who came there as a leper when a child. She was discharged as cured thirty years ago, but subsequently returned with fresh symptoms of the disease; but, in the doctor's opinion, she will die of old age rather than of leprosy.

Many of the patients have the worst form of leprosy—tubercular leprosy or leontiasis—so called because large bunches often form over the eyes, giving the patient a lion-like, brutal expression. It is frightful to be in a room surrounded by such lepers. The macular lepers merely have bronze patches over the body. The disease is hereditary, but not contagious, except by inoculation. To illustrate this phase of the disease the doctor said:

"A priest who visited the lazaretto caught the disease; but I heard from Babineau that this priest, in a spirit of bravado, would take a pipe from a leper's mouth and smoke it. So he caught the disease from inoculation."

Dr. Fox does not think that the disease is infectious. If he is correct, the story of the origin of it in Tracadie must be rejected, and the infection of the women by washing the clothing of diseased sailors be treated as a myth. But the most important portion of the doctor's revelations must be that he knows of "six cases of leprosy in this city," and believes that "cases of leprosy exist in the Chinese quarter of New York, housed with other people and perhaps intermarrying."

**Extreme Minuteness.**

When vision is not aided by any magnifying process, there is a point of minuteness, as all know, when an object will make no impression upon the retina, and will not be seen by the unaided eye. But when the object is viewed by means of a microscope, it becomes visible. There is a question, however, that remains unanswered, which is, whether any object may become so attenuated that it cannot be made visible by any means. Not many years ago, less probably than twenty-five, there were lines that could not be resolved by any microscopic lenses then in existence, which can be exhibited now without any difficulty; but, at that time, makers of lenses had not attained to the skill of making them with large angles of aperture, but now they are made with the highest angle that is possible, and consequently the capacity of such objectives can only be increased by greater skill in their manufacture. But the limit of angle of aperture having been reached—no opportunity remaining of increasing capacity in that direction—is it not reasonable to suppose that, with present appliances, no greater skill in manufacture can be expected? Sir Royston Pigott, recently, at a meeting of the R. M. S., stated that he had seen globules of mercury, made by smashing a minute particle of mercury with a watch spring, less than  $\frac{1}{1000}$  of  $\frac{1}{1000}$  of an inch, or less than the millionth of an inch. Another member replied that he was not aware that there is any limit of visibility in the microscope other than that imposed by the sensibility of the observer's retina, the correction of the objective, and the illumination.—*The Microscope*.

**Coated Tongues.**

Among the various substances which have been found on the human tongue, as shown by the microscope, are the following: Fibers of wool, linen, and cotton; fibers of spiral vessels; fibers of muscle, in one case eight hours after eating; starch grains; cheese mould; portions of potato skin; scales, moths, etc.; hairs from legs of bees; hairs from legs of spiders; pollen of various flowers; stamens of various flowers; hairs of cats, quite common; hairs of mouse once only; hairs from various leaves; wing of mosquito once; fragments of the leaves of tobacco, of chamomile flowers, etc.

**Analysis of Feldspar.**

On comparing the results of the analysis of feldspar by Vauquelin and Chenevix, both of them chemists of acknowledged ability and scrupulous accuracy, it is impossible not to be struck with surprise at the remarkable difference that appears between them. That potash should appear in one analysis and not in the other is no extraordinary circumstance, because without a particular examination for this very object the potash would remain undetected and its amount would be transferred to the general account of loss; the loss, therefore, in Mr. Chenevix's analysis ought to be equal both to the loss and potash in Vauquelin's; but the amount set down as loss in both cases is nearly equal, therefore the difference between the earthy and metallic products of the two analyses amounts to 13 per cent, being the proportion of potash as ascertained by Vauquelin. In order to obtain some clue to account for the difference, the methods of analysis pursued by these chemists have been compared and examined, but without obtaining much satisfaction.

Mr. Chenevix, after finely pulverizing his feldspar, treated it with caustic potash in a silver crucible, and the whole was then brought to a limpid solution by muriatic acid. 1. The liquor was evaporated to dryness, and the saline residue digested in a slight excess of muriatic acid; a white powder remained insoluble, which was silic. 2. The muriatic liquor with the washings of the silic was then mixed with ammonia, and a copious precipitate was obtained. 3. This precipitate was then dissolved in muriatic acid, and afterward boiled with an excess of potash, by which the iron was deposited; and the addition of muriate of ammonia then threw down the alumina. 4. The ammoniacal liquor No. 2 was treated with carbonate of potash, by which carbonate of lime was procured. This method of analysis appears quite unexceptionable as far as the earthy and metallic contents are concerned, and, if carefully performed, there appears no reason why its results should not be considered as giving the true proportions and quantities of the earths and oxides of iron contained in feldspar, proper allowance being first made for the inevitable errors to which the most accurate analysis is necessarily subject.

The method employed by Vauquelin was the following: Having fused the feldspar with caustic potash, he dissolved the mass in dilute muriatic acid, and evaporated the whole to dryness. 1. The saline residue being drenched with water and filtered, the silic remained behind as a white insoluble powder. 2. The clear liquor being treated with ammonia, produced a copious white precipitate. 3. This precipitate was digested in caustic potash and left behind the iron; muriatic acid was then added to saturation, and afterward carbonate of potash threw down the alumina. 4. The liquor No. 2 gave no precipitate with carbonated potash or sulphuric acid, but oxalic acid occasioned a precipitate of oxalate of lime, which, when calcined, was considered as carbonate of lime, whence the amount of lime was estimated according to the usual proportions. The only exceptionable part of this analysis relates to the method of procuring the lime, and this on two accounts. In the first place, oxalic acid would not separate the whole of the lime from the liquor, which consisted of the muriates of lime, potash, and ammonia; and in the second place, the oxalate of lime which was precipitated ought by no means, after having undergone calcination, to be considered as carbonate of lime, but as lime in a semi-caustic state. It is further a singular circumstance, and contrary to general experience, that carbonate of potash should have been unable to throw down the lime from the solution which was decomposable by oxalic acid. But even if we allow the utmost possible weight to these objections, and in consequence raise the amount of lime in Vauquelin's analysis to an equality with that of Chenevix's, there still remains a difference of 11 per cent unaccounted for. That potash is really contained in the Siberian feldspar appears also from a subsequent analysis by Vauquelin, in which he used caustic soda as the primary solvent, and afterward obtained crystals of alum by the addition of sulphuric acid. It is, however, worthy of notice that the account of Vauquelin's experiments is not written by this eminent chemist himself, but is contained in a paper read at the *Societe Philomatique* by Le Lievre, and in consequence is not in the most authentic form.

With regard to the opposite analyses of adularia by the above mentioned chemists, it is difficult to form any satisfactory opinion, as the details of Vauquelin's analysis are not published. It may, however, be remarked that in the amount of silic they actually correspond, and that the proportion of alumina as determined by Vauquelin approaches much nearer to the statement of Chenevix than in the former instance. The chief difference is the proportion of lime, but if, as is probable, the same method was used by Vauquelin on this occasion as was practiced by him on the former one it may be suspected that Chenevix's estimate approached nearer to the truth. The water of crystallization, amounting to 1.75 according to Chenevix, is wholly neglected by Vauquelin; and it is obvious that the proportion of potash as given by this chemist is from mere estimation, and is reckoned at 14, because just so much was wanted to complete the original 100 parts that he operated on. The iron obtained by Chenevix is perhaps only a casual ingredient of adularia, so that making the requisite allowances for each analysis, the quantity of potash can hardly be estimated at more than 6 per cent. It is greatly to be regretted that Klaproth or Hatchett did not undertake anew the full analysis of this important mineral in all its varieties and subspecies.

Some further interesting particulars respecting feldspar are contained in a memoir by M. Gerhard. Common feldspar when heated to incandescence loses 1 per cent (probably water). After being calcined it is readily acted on by sulphuric acid, and the product is a little selenite and much alum, the silic remaining unaltered by the acid. From an analysis conducted in this manner M. Gerhard states the constituent parts of feldspar at, silic 64, lime 6, alumina 30, total 100.

Here it is worthy of remark that the presence of potash in this mineral is fully ascertained by the copious production of alum when it is treated after calcination with sulphuric acid, and this is the less liable to suspicion as the memoir was published long before the necessity of potash to the crystallization of alum was suspected. Consequently we find in M. Gerhard's analysis no mention of potash, and perhaps it is somewhat in favor of the reduction which we have made in the proportion of alkali as given by Vauquelin, that this reduced proportion, namely, 6 per cent, added to the quantity of alumina found in common feldspar by Chenevix, namely, 24 per cent, exactly corresponds with the amount of alumina as stated by Gerhard. In the proportion of silic he also agrees precisely with Chenevix, and in the quantity of lime differs only in the ratio of 6:25 to 6.

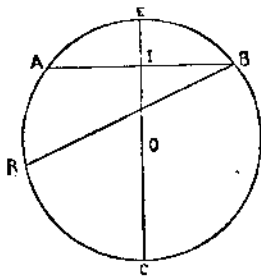
Common feldspar inclosed in a crucible and exposed to a full melting heat, is converted to a milk white semi-transparent mass resembling quartz. The addition of silic diminishes its fusibility and renders the mass more opaque. Four parts of feldspar and one of chalk form a clear, transparent glass of a slight yellowish green color; but a much more beautiful glass may be obtained by calcining separately one part of sand, four of feldspar, and two of chalk, and then fusing them together; this glass is however harder and more difficult to anneal than common glass, and the metallic oxides only communicate to it dull, muddy tinges of red and brown, except cobalt, which gives it a purer blue than common glass is capable of acquiring.—*Glassware Reporter*.

**FROM PARIS TO RIO JANEIRO IN 42 MINUTES AND 11 SECONDS.**

Mr. E. Colligan, in a paper read before the French Association for the Advancement of Science, discusses the possibility, were the thing practicable, of reaching any point whatever of the earth's surface in 42 minutes and 11 seconds. This would be effected by means of a perfectly straight tunnel connecting the two termini of the line.

Supposing such a tunnel to have been excavated, "lay the rails," says the author, "do away with the locomotive, lubricate the journals, and let go. That is all! Whatever be the points of the globe that you join in this way by a tunnel, you will go from one end of the line to the other in 42 minutes and 11 seconds.

"Should such a tunnel traverse the sphere from one side to the other, in passing through its center, things would occur just the same.



"Excavate such a tunnel to as great a length as it would be possible to make it in a straight line; throw yourself with confidence into this tube, and you will arrive, without shock, and with the slowness with which you departed, at the south of New Zealand, if the mouth were at Paris, and always in 42 minutes and 11 seconds.

"It would be well to throw yourself in head foremost, so as not to reach the terminal station feet upward. It would be well, too, to have a friend there to hold you. . . .

"These facts, which are absolutely true, are based upon theories analogous to those that rule the oscillations of the pendulum. We know, in fact, that if a mass attracted to the extremity of a thread is oscillating in space, the duration of such oscillations will be the same, whatever be their extent, if the arcs do not exceed a few degrees.

"Clockmakers have reaped great advantage from this principle, and it is due to it that a clock remains none the less well regulated although the pendulum in motion varies from double to simple.

"Were it possible to attach a pendulum at such a height that an arc described between Paris and Versailles, or Paris and Saint Cloud, did not perceptibly differ from a cycloid in form, these two distances would be traversed in the same time, and, an impulse once given, it would only be necessary to keep up this immense tic-tac in its extent.

"But let us draw a figure like the one annexed, where the circle, A B C, represents the circumference of the earth; B, Paris; A, Rio Janeiro; and A B, a tunnel joining them.

"If a train be left to itself at B, it will descend slowly toward I, but will soon acquire a velocity that will reach its maximum at the latter point. This velocity, of which the sum of 42 minutes will give some idea, changes gradually and returns to zero when the train touches the extremity of the tunnel at A.

"The only question now is that of locking the wheels on arrival, in order to prevent the whole from making a second descent before landing the passengers. If the train were left to itself without such a precaution, it would go on in definitely from A to B, and from B to A, and always in 42 minutes and 11 seconds.

"From B to R, as well as from E to C, things would occur just the same."

But the reader may raise objections. There are many, it is true, and one especially that outweighs all others, and that is, that if such a supposed tunnel were excavated, the traveler once under way would have to undergo pressures whose immensity may be seen from the following figures:

"Thus, supposing that the point, I, were situated at the fifth part of the terrestrial radius, E O, the pressure there would be 34,547 atmospheres multiplied by 10 raised to the 58th power. It would take 63 figures to represent such a quantity.

"Were E I one and I O four, we should have, for pressure at I, 168,600 atmospheres multiplied by 10 raised to the 71st power—an amount composed of 78 figures. Were I at the center of the earth's radius, the pressure would be 194,240 atmospheres multiplied by 10 raised to the 175th power (132 figures); and, finally, at the center of the earth, the pressure would become 320,000 multiplied by 10 raised to the 169th power, or 175 figures. This is formidable!

"If we reduced the question to a pressure of three atmospheres, the greatest that man can support, we should scarcely be able to go further than from Marseilles to Calais by such a method, making, be it understood, no account of the resistance of the air, which, moreover, would prove an obstacle to a realization of such a project.

"But why excavate a tunnel? asks an enthusiast. Tangent to the surface of the globe let a bridge be built, whose termini shall be at the same altitude, and we shall no longer have to support so enormous pressures. It would take longer to make the trip, that is all. We might go thus from the Canigou to the Yungfrau, which are at the same altitude.

"Such an improvement, we answer, might cause a rise in the stock, but it would also raise the traveler to disagreeable altitudes, and the stations would not be within reach of everybody."—*La Nature*.

**Mutuality Between Employer and Employee.**

An article recently published editorially in the *New York Times* suggests one of the ready, or at least feasible, means of uniting the workman and his employer, and suggests also the fact that the more and the closer these ties, the less need there will be of autocratic trades unions and similar defensive combinations. The article refers to an association among the employes of the Baltimore and Ohio Railroad Company, which is "a mutual insurance association, to whose fund the company itself made a substantial contribution, and which is kept up by a monthly payment by each member proportioned to the salary or wages he is receiving. The benefit to be received holds a corresponding proportion to the payments. Out of this fund each member receives a stipulated sum per day during any sickness or disability while in the service of the company, and in case of death his family receives a substantial benefit. It is an absolutely safe form of mutual insurance against sickness, injury, or death, and one in which there is no expense for management. To this plan the Baltimore and Ohio Company has added the feature of a savings fund, on which 4 per cent interest is paid to depositors, and from which they may borrow for building purposes at 6 per cent."

Except the savings fund department, the Pratt & Whitney Company, of Hartford, Conn., has had in operation, for ten years, a similar mutual benefit association, and the officers and board of directors are chosen both from the "office" and the "shop." Mr. F. A. Pratt, the President of the Pratt & Whitney Company, says, in relation to the *Times* article: "I think the savings fund feature a good one. I would also add a reading room and library, in which the men could assemble evenings, read, talk, and hear a lecture occasionally. My ambition is to have all this, and we have drawings of an office building, that may be built before a great while, that will embrace such improvements. I believe that in our class of work it will not only be a help to us, but has almost become an absolute necessity."

**Subaqueous Troubles in Lake Michigan.**

In Grand Traverse Bay recently, at some distance out in deep water, between Traverse City and Marion Island, the water began to boil and surge, and presently rose in vast jets to the height of from 10 to 20 feet. Being observed from the shore no details could be given on account of the distance; but the same thing has taken place years before, and some two years ago, according to an account given by the *Herald* at that time, parties in a boat were so nearly on the spot that they were obliged to hasten out of the way. They described the water as apparently boiling up from the very bottom of the bay, which in that place was nearly or quite one hundred feet deep, bringing up with it vast quantities of mud and other substances and emitting an intensely unpleasant sulphurous smell. The area of the eruption, if it may be so called, was about twenty feet in diameter and the time about half an hour. At intervals the water would subside into calmness and then the commotion would begin again. It is said by old settlers that the same thing has occurred in other years.—*Grand Traverse Herald*.