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Contents:

(Illustrated articles are marked with an asterisk.)

OUR PLANS FOR 1869.

The SCIENTIFIC AMERICAN will enter upon a new volume on the first of January next, at which time we shall introduce such changes and improvements as will enable us to give a largely increased amount of reading matter and illustrations.

We want and intend to have at least fifty thousand subscribers with the new volume, and there is no reason why we should not have a hundred thousand. We think it no egotism to say that the SCIENTIFIC AMERICAN is a marvel of cheapness in these times of comparatively high prices. The unprinted sheets of paper necessary for a years subscription, could not be purchased at retail for less than $3. We give two volumes of 416 large quarto pages full of valuable reading matter and fine illustrations for $3, or when sent in clubs of ten or more the price is but $2.50 per annum. Mechanics, inventors, manufacturers, chemists, engineers, and all others who take interest in the industrial progress of the world, we appeal to you to assist the circulation of our journal. You will find the volumes for 1869 far more interesting and valuable than any that have preceded it. We cannot at present enter into any particulars but we pledge ourselves to give every subscriber his money's worth.

NATURAL GAS---THE EARTH A GASOMETER.

What the interior of this globe of ours holds, whether it is a solid, a void or vacuum, or a seething mass of molten rocks, a globe of liquid fire, we do not really know. The phenomena of earthquakes, volcanoes, boiling springs, etc.; the increasing heat as the earth is penetrated; the fact that the temperature is greater at the surface of the earth, or the sea level, than above it, and the escape of inflammable gas from artesian wells, seem to point to an internal *inferno* of fire. Centuries ago, these phenomena were noticed, and their existence used as an evidence of a hell, the locality of which was the center of the earth. Still, no one of these, nor all taken together, is absolute proof of an incandescent interior.

We have never yet penetrated the crust of the globe, nor even probed the crater of a volcano and reached the great internal cavity. If the crust is, as has been estimated, about thirty miles thick, the amount of force necessary to raise the tuns of liquid lava to the orifice of a mountain is simply inconceivable, and its effects on the surrounding walls and the surface would be sufficient to materially change the physical characteristics of the country for hundreds of miles around. So, if the earthquake receives its impetus of motion and its almost incalculable power from the agitation of an internal sea of liquid igneous matter, confined within a crust of thirty miles in thickness, and the throes of this sea are transmitted and communicated through this mass to the surface, would the most disastrous earthquake known to history or tradition be sufficient to account for the exercise of such a power? The force that could move, or break, or shake the crust of the globe would be sufficient to turn our continents into bottomless seas and our oceans into mountainous deserts. At most, we have a shaking of the surface, a superficial disturbance of the ocean; but no disappearance of the sea through some cavity reaching the molten center of the globe, and no vomiting forth of a consequent mass of steam, vapor, and lava sufficient to destroy all animal life, and to make the earth a desert. Volcanoes and earthquakes may be accounted for without descending to so great a depth. If the earth's crust is thirty miles thick, there is ample room for the reservoirs of all the power-generating materials necessary for the production of eruptions and earthquakes. That this crust is not solid or homogeneous is not only proved by theories based on analogous truths, but is actually demonstrated by mining, well-boring, and the existence of immense caverns, with plains and hills, and lakes—a subterranean landscape. The increasing heat of the earth below the surface no more demands a vast internal furnace for its existence than does the superior temperature at the earth's surface over the inferior temperature of the cloud line or the mountain tops. Both may be assigned to the same, or a similar cause, that of weight or pressure, or both combined. What other occult or unknown causes, as electricity, magnetism, galvanic agencies, the nature of which we do not understand, it is immaterial now to inquire. Suffice it to say, that we *know* that the earth's crust (to use a familiar term without assenting to the theory of the believers in the igneous philosophy) is not solid, and that it contains explosive and inflammable gases which may be sufficient in quantity and powerful enough in explosive and dangerous quality to produce all the phenomena of volcanic eruptions and earth shakings. The difficulty of accounting for the extended character of these latter phenomena—earthquakes—is no greater than if the theory of an internal globe of liquid fire be accepted, as is evident by the statements made by the supporters of that theory of the thickness of the earth's crust.

That the earth (not merely its interior, but the crust of the globe) is a gas holder, it would be nonsensical to deny. All our coal, whether bituminous or anthracite, contains inflammable gases; coal mines are infested with it and many of the delvers in their depths annually lose their lives by its explosion, either from accidental causes or spontaneous ignition.

No one who is at all acquainted with the business of boring for oil will deny that emissions of inflammable gas are a necessary concomitant to well boring. In the oil regions this gas is frequentntly and extensively used as fuel for driving the engines, or rather for generating steam. A notable instance is one we mentioned twenty-one months ago, in No. 10, Vol. XVI., page 157, SCIENTIFIC AMERICAN. In that article we spoke of a large manufactory in Erie, Pa., the machinery of which was driven and the buildings lighted by the gas from an unproductive oil well. The establishment is that of H. Jarecki & Co., brass workers. For more than two years they have led gas by means of three-inch iron pipe from an unsuccessful oil well 1,200 feet distant from the manufactory, and used it as fuel for their boilers and as lights for their works. The flow is never stopped, never changed in amount of pressure; the gas is of good lighting properties, and when at night or on Sundays the works are stopped, the gas still comes; at night being lighted at the mouth of a pipe of two or two and a half inches diameter situated near the top of the main building. This light is sufficient to illuminate several streets and squares in every direction, and the escaping gas makes a noise as of escaping steam, that may be heard at a long distance, while the gas flame is not less than four or five feet high.

CHEAP ICE HOUSES---A GOOD PLAN.

As the time for securing the harvest of ice is rapidly approaching, a few hints looking iceward may not be amiss. We remember when the ice business was unknown; only some enterprising householders or wealthy men thought of such a luxury as an ice house. Yet as ice has slid out of the category of luxuries and become a comfort, if not a necessity, it is within the power of all living in the country and having access to a pond or a stream to provide themselves and possibly their neighbors with a sufficient supply of this comfort to assist in preserving perishable articles and to temper their beverage of water. In cities and large towns men singly or in companies undertake to provide the dwellers with ice, a crop that costs nothing to plant, tend, or raise, but only to gather and store, but yields handsome returns. But in the country the convenience of daily delivery of the gelid luxury is impossible and inconvenient. To our country readers, therefore some suggestions on the construction of ice houses and the preservation of ice may not be amiss.

A family ice house need not be an expensive structure. It may be built cheaply, subserve its object excellently, and add to the attractions of a homestead by being a sightly object. A building of twelve feet square and eight or nine feet high is sufficient for the wants of the most exacting family. It may be a frame building, entirely above the surface of the ground, and better if supported on posts, elevated a few inches, to be certain of good drainage. Built of joists, two by three inches, with an outer boarding, having inside another series of uprights, also boarded, from six to ten inches removed from the outer shell, with a solid floor of plank, the space between the two walls filled with tan, sawdust, straw, or chaff, and a roof of good pitch, the ice house is complete. A drain for water should be made from the floor, and the space above the uprights, between a loose floooring and the pitch of the roof, filled with straw, hay, or some similar dry, porous material. On the roof should be a ventilator, the top defended from the rain or snow.

The ice should be packed in one solid mass, the sides not reaching the inner walls of the building, but allowing a space of from six to twelve inches all around. The top of the ice should be covered with straw, and the door should be like the sides of the building, or double doors should be made, one in the outer and the other in the inner wall. Plant morning glories or any climbing plant around the building and induce them to creep up the walls and over the roof as an additional defence against the fervid sun of summer.

Two workmen, if not practical carpenters, can put up such a building in one, or at most, two days, which if taste and judgement is used will prove to be a sightly addition to the attractions of a country home, and a useful adjunct to the farm, its contents being convenient and comforting in health and invaluable in sickness. Such an ice house would prove also convenient as a refrigerator or a large scale, preserving food of various kinds and the products of the dairy.

WHAT AN AMERICAN HAS DONE ABROAD.

Mr. F. Watkins, of the London Works, Birmingham, England, arrived in the *Scotia* a few days ago, and will make a tour, before his return, through the Western and Southern States, on business connected with his manufactures. Mr. Watkins was born in the United States, where he resided until 1856, when he went to England to introduce his patent machine for making bolts and nuts. His object in going abroad was to sell his patents, expecting to realize a large sum on them. In this he was disappointed, and after spending some $25,000, and much effort, he abandoned the hope of disposing of his patents, and commenced, on a small scale, the manufacture of bolts and nuts under the title of The Patent Nut and Bolt Company. At the expiration of two years, the demand for his machine-made goods had become so great that Mr. Watkins' time and energies were tested to their full extent in augmenting the number of his machines, and extending his works until they covered some five acres, and the number of hands employed to about five hundred; the product of which was about fifty tuns of bolts and nuts per day. The works of our enterprising American have continued to be enlarged, and now they cover an extent of twenty-four acres in the city of Birmingham, and the hands employed number about twenty-five hundred—producing one hundred tuns per day of these small goods. The capital stock of the London Company, which has so quickly sprung from such a small beginning, under the management of our energetic countryman, is now $2,000,000. Mr. Watkins informs us that his shipment of cotton-bale ties to this country will reach this year the enormous quantity of six or seven thousand tuns.

The prime object of Mr. Watkins' visit at this time is to establish agencies and to receive orders for railroad supplies, of which he is undoubtedly the largest manufacturer in the world.

Mr. Watkins' taste for inventions has not abated since he first took out patents some fifteen years ago; and notwithstanding his immense business cares, when he visits this country, which is about once a year, he brings with him several new inventions on which he obtains patents, making oath to the papers as a citizen of the United States. The career of Mr. Watkins is a remarkable example of Yankee enterprise and success.

A GAS INIMICAL TO ANIMAL LIFE.

Carbonic acid is noxious to animal life although it contains two equivalents of oxygen, the life-giving gas, to one of carbon, also necessary to life. It is generated or disengaged from decomposing vegetable and animal substances, is given off in respiration, and is artificially produced by a mixture of sulphuric acid and carbonate of lime (marble). All effervescent liquids, as fermented liquors, the so-called soda water, and even well and spring water, hold more or less of this gas.

When contained in a liquid used as a beverage it forms a grateful drink to febrile patients, allaying thirst, lessening nausea, and acting as a mild diuretic and anti-emetic. But breathed as a gas it is highly noxious. Owing to its specific gravity, greater than that of the atmosphere, it settles at the bottom of distillery tanks, caves, wells, etc., especially if either of them have contained any animal or vegetable substances.

From these facts in regard to the nature of this gas it is evident that care should be used in exploring caves, cleaning cisterns and vaults, and descending into wells. Life is simply combustion, and where a candle cannot burn a man cannot breathe and live. From this it is evident that to insure safety it is a necessary precaution before descending into a well, cistern, or vault, to lower a light or some article of fuel in a state of combustion. If the flame is extinguished there is no certainty for life. Now, to remove this heavy noxious gas. If a well, containing water, draw out or pump up the water, and, the well, being uncovered, dash the water back by the bucketfull. In its passage down it will absorb sufficient air (oxygen) to neutralize the gas. A better plan, and one applicable to all cases, is to set some quickly-burning substance on fire, as a bundle of straw, or rags saturated with benzine, and drop it into the well. The object is to rarefy the heat sufficiently to raise or lift the heavy noxious gas. If the flame should be extinguished on reaching the stratum of noxious gas, the heat, by repeated trials, will be sufficient to raise the gas and render the well safe.

So many deaths have occurred from descents into vaults, cisterns, and wells, for the purpose of cleaning them, that some attention should be drawn to the danger and the necessary and simple precautions. Some twenty years ago we saw two men killed within a few minutes by descending into a vat in a distillery from which the liquor had been drawn the day before. The second lost his life by his generous attempt to save the first, and not until these two perished did those in charge of the works seem to think that any precaution was necessary. Subsequently the writer, in descending a well to recover a lost bucket came near losing his life, and was saved merely by the accident of deep water and the timely interference of the bystanders at the mouth of the well. Most of these accidents, generally fatal—occur through ignorance, and therefore we draw special attention to the simple precautions we recommend which are neither costly nor troublesome.