

# EARTH HOT AT CORE

MOLTEN MASS FORTY OR FIFTY MILES BELOW THE CRUST OF THE GLOBE.

## HEAT MAY BE UTILIZED

From Planets Interior Supplies of Warmth Possibly May Take the Place of Coal and Oil—Notable Eruptions Are Told Of.

BY GEORGE FREDERICK WRIGHT, A. M., LL. D.

(Author of "The Ice Age in North America," "Man and the Glacial Period," etc.)

(Copyright, by Joseph B. Bowles.) It is perfectly proper to speak of the "crust" of the earth. The existence of volcanoes and the fact that the temperature regularly increases as you penetrate the rocks by borings or mining shafts prove that the interior of the earth is hot enough to melt all known mineral substances. In boring for gas or oil or water and in descending along the line of mineral veins or to reach deep-seated coal deposits it is found that the temperature increases about one degree for every fifty or 75 feet, so that it is a serious question with miners how far they can follow a vein into the earth before reaching a point where the heat will be so great that it would be impossible for workmen to endure it.

Taking the average increase of heat to be one degree in 50 feet, we should reach a point where water would boil at a distance of about 8,000 feet or a little over a mile and a half. It, therefore, would be a feasible plan to bore a hole to that depth, and by letting cold water into it by one pipe bring it up hot in another, thus making use of the heat of the interior of the earth to warm our houses. Very likely before the coal and oil are exhausted this may be the source through which to dispel in our homes the rigors of winter even in arctic climates.

At the same rate of increase we should have to descend only 30 or 40 miles to find a degree of heat which would melt any known substance and produce a molten interior. The only escape from the conclusion that the earth consists of this thin crust of

Jorule in Mexico is one of the most remarkable instances of intermittent volcanic action. Up to 1750 the site where the volcanic cone now stands was occupied by a fertile plain, surrounded by hills composed of very ancient rocks. In that year, amid earthquake shocks, a chasm opened in the plain, from which flames issued, and ashes and lava were ejected in sufficient quantities to form in a short time a mountain 1,600 feet high. Since then there have been no eruptions, and the lower flanks of the mountain are now covered with trees and the surrounding country is cultivated as formerly.

One of the largest volcanoes and one which has been most carefully studied, is Kilauea, on the island of Hawaii, the crater of which is 13,675 feet above the sea. The crater is nearly three miles in diameter, and is filled with boiling lava, which varies greatly in height at different times.

When visited by Prof. Dana in 1889 it lacked only 400 feet of being full, so as to run over from the top. In 1840 the lava had subsided, so that it was 1,900 feet below the rim. No recent eruptions have projected the lava over the rim, but at various times since the discovery of the island great streams of lava have burst out from the side of the mountain, 2,000 feet or more below the summit.

COST \$500 AN OUNCE.

Some of the More Rare Flower Seeds Are Expensive.

"Just as good as gold," remarked a young Boston suburbanite who thinks himself something of an amateur gardener, as he ran his hand through a sample bag of fine spring seed wheat in a South Market street seed store.

"Yes," said the seedsman to whom the remark was addressed, "but unlike the seed of some other farm and garden products we have in here it isn't worth its weight in gold.

"Every year there is a great variety of new flowers. The growers are continually at work hybridizing to produce fine strains of flowers. It requires considerable time and labor to do it, and this makes them very expensive.

"Take the petunia grandiflora, for instance, as a sample. It is an exceedingly beautiful flower. The packages of its seeds contain between 300 and 400 seeds each, but the seed is so fine as to be an almost impalpable powder. The package retails at 75 cents, but by the ounce the seed is worth \$500. An ounce will make about 5,000

# REAL CROSS-COUNTRY RUN

REMARKABLE NEW YORK - CHICAGO RELAY RACE BY Y.M.C.A. BOYS.



PASSING THE MESSAGE

ONE OF THE TWO THOUSAND

One of the most interesting and unique athletic events of the summer will be the 1,000-mile cross-country relay race which is to be pulled off by the Y. M. C. A. boys between New York city in the east and Chicago in the west. Two thousand trained, fleet-footed runners each in turn catching on the fly the message sent by Mayor McClellan of the eastern city and speeding it on its westward journey. The entrants for the race have been carefully selected from the fittest gymnasiums of the Young Men's Christian associations of New York and Chicago, and by those of the numerous other branches of the association which line the 1,000-mile route.

It will be a race against time, a contest between the flying feet of the young athletes and the fugitive hours. But although the race is against time there will be the zest of keen rivalry to spur the racers on. An automobile carrying official timekeepers will follow the racers over the entire route, making careful record of the speed of each relay. Besides this individual rivalry there is the rivalry of the numerous associations, each hoping that as a body its champions will show a higher average than the others.

The direct mail route to Chicago is 300 miles. The more winding highways that the boys will traverse is estimated at 1,000 miles. There will be nearly 3,000 boys in the race, and it is expected that it will be run well within five days.

The start will be made from the city hall of New York at nine o'clock on the morning of July 15. There the speediest runner of the Twenty-third street branch of the Young Men's Christian association will receive from Mayor McClellan a message addressed to Mayor Busse of Chicago. The message will be inclosed in a silver tube. The starter will give the signal, and the youth will sprint up Broadway, followed by the automobile which is to accompany the racers to Chicago.

The route will be up Broadway, and at a half-mile from the starting point the bearer of the silver tube will toss it to the fleet-footed youngster awaiting him there, and he in turn will set a flying pace to the next half-mile point where another eager youth will snatch the tube and after his half-mile race will pass it to the next in the relay line. So it will go day and night until the tube, which by the time it has reached Chicago will have passed through nearly 2,000 hands, is delivered to the mayor of that city.

"Owing to the continuous course of training which our boys undergo," said Mr. A. A. Jameson, boys' work director of the Twenty-third street branch of the Young Men's Christian association, New York city, "it would be quite possible for us to pull this race off in a week. We have extended the time of the start, however, because of necessary road arrangements and the appointment of district superintendents. Our tryouts have revealed the fact that the boys' average speed is about 2.48 for every half mile. Making allowances for possible bad weather and poor roads, it is expected that the average speed of the race of 1,000 miles or more will be about a mile in eight minutes. When you come to consider that the age limit of the contestants is 18 years, and as the majority of these will not be over 15 years old, the plan becomes a significant test in athletics. The time I have mentioned will undoubtedly be improved, and by rough calculation we assume that the race will be run in five days. The first part of the race will be from city hall, New York city, to city hall, Yonkers, a boy being stationed at that distance for every half mile. We average a distance from New York to Yonkers at 18 miles, which will be covered by 25 or 30 of our New York city boys.

"The schedule of our course from New York to Buffalo will be as follows: New York to Yonkers, Ossining, Newburg, Poughkeepsie, Rhinebeck, Catskill, Hudson, Albany, Troy, Schenectady, Johnstown, Little Falls, Utica, Rome, Syracuse, Auburn, Geneva, Canandaigua, Rochester, Batavia, Buffalo. The western division of the race will be in charge of Mr. M. D. Crackel, director of the West Side Boys' club of the Young Men's Christian association of Cleveland, O., who will direct the course from his town to the city hall in Chicago. Mr. Crackel deserves the credit of being the originator of this plan, as the outcome of the cross-country race he organized among his boys from Cleveland to Erie. Each boy will wear the athletic dress of the Young Men's Christian association, and will stand ready at his post to take the message from the hand of the boy who has just finished his half mile and dart off with it at full speed. An automobile will accompany each runner with an official timekeeper, who will register his time. In this automobile there will also be a relief runner, who in case of accident will jump out

and carry the message at top speed. We have tried to figure out all obstacles that might prevent a complete success of this race as a test trial of speed against time. We choose the week of July 15 in the hope that we shall have moonlight nights to help the boys along on their night runs, and every boy's department of the Young Men's Christian association which is on the route of the relay race from New York to Chicago is training every day for the contest.

Dr. George D. Fisher, the senior secretary of the physical department of the international committee of the Young Men's Christian association, will be the official starter of the race. He said that nearly 2,000 boys would take part in it. Each of these, he explained, will be a representative American boy and a representative association member—that is, he will not be selected because of physical fitness alone, but because he qualifies from a fourfold standpoint of fitness. In other words, he will be a representative boy in mental equipment, in moral attainment, and in character; thus it will be truly a race by representative American boys.

"I approve of this race for adolescents," Mr. Fisher added, "because each boy will run only the distance of a half mile. Each will be subjected to a physical examination, and to avoid undue exposure the boys will be taken care of before and after the race in automobiles.

"The race represents a test of achievement. It is a scheme which requires co-operation; each boy will have to observe the rules to the letter or the whole scheme is a failure. It will demand pluck; each boy will have to finish his own race, and will have entrusted to him the responsibility of carrying a message noble in sentiment from a high official of one great city to another. It will create interest in wholesome, clean sport in which the only aim is noble achievement, the eligibility rules like those of the Olympiad, and the service void of personal gain or individual prestige."

## HEALTH FADS NOT NEW.

Dietetic Vagaries Were Practiced by Our Grandfathers.

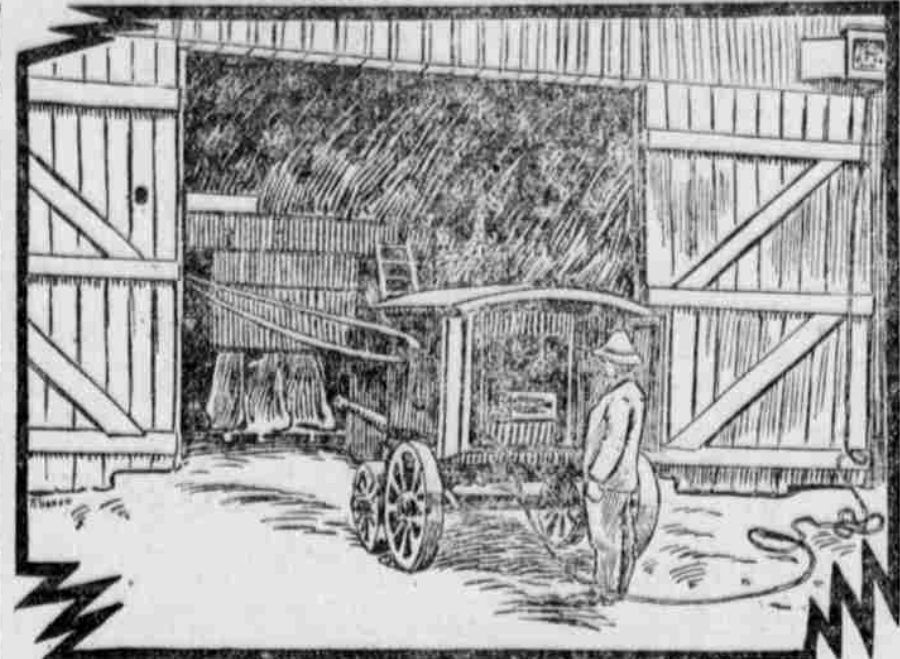
What's the use of trying to be original? What man does to-day, his notions, his fads, were practiced yesterday, in the dim past, and if they vary a little, the same idea animates them all. For instance, the "new" fad, Fletcherism and the one meal a day, were preached centuries ago. Books on hygiene were concocted in the time of Shakespeare. Have you ever read "The Breviary of Health," compiled by "Andrew Boorde, Doctor of English Phisickeian English man," printed at London, 1587? Because, in this quaint, black letter volume, are found many of the ailments which still afflict us, with the same advice that the specialist and the faddist bestow to-day upon a suffering woe. This "one meal a day" is advised by Dr. Andrew Boorde, but he calls it "abstinence," and also cautions the gentle readers to eat with slowness! He fails to mention, nevertheless, the advantage of going without one's breakfast, and would never approve of the well known western lawyer, who goes to his important labors daily without breaking his fast and is, nevertheless, a model of physical and intellectual vigor. "The Breviary of Health" must be numbered among the curiosities of literature, but it will not be found on the shelves of the Boston public library. This is the only copy in America as far as known, and was the property of a reverend country doctor in Plymouth county. It doubtless served to preserve the health of our pilgrim fathers, and to help the mothers bring up their families.—Boston Herald.

## Millions of Matches Used.

The civilized nations of the world strike 3,000,000 matches every minute of the 24 hours. Americans use up 700,000,000,000 a year. Some of the match plants are very large, one on the Pacific coast covering 240 acres, with 32 miles of railroad which supply the match machines with 200,000 feet of sugar pine and yellow pine logs a day.

# THE ELECTRIC FARM

A POSSIBILITY OF THE FUTURE.



Here is a picture of a twentieth century farm house when electricity will have come to its own as a power factor on the farm: It has a cool, clean kitchen, a laundry where all the hard work is done by an electric motor; good lights, with no lamps to fill; and a small vacuum cleaner run by electricity replaces the broom. A cleaner house and better food in half the time! The sewing machine is run by electricity and the incubator in the cellar is heated at an even temperature in the same way. The tank on the top of the house is filled by an electrically run pump and there is running water in the house. The woman who lives in this house has not the dull, tired look which we see so often now.

This is as Arthur W. Page, who writes of the "Age of Electric Servants," in the World's Work, sees it, and he proceeds to explain how the farmer is to procure his electricity to do these things. Down in North and South Carolina a company has been organized which utilizes the water powers of a district to produce electricity. The extent of the company's service covers more territory than many a state and the company stands prepared to sell power to farmers, mills and factories. It charges \$20 per horse-power a year, which is about the same as 8.10 of a cent per kilowatt hour, a rate which, if doubled, would still be as cheap as wood, coal or gas.

The region operated by this company is not exceptionally well supplied as to water power; and what is being done there may be done in many a part of Canada. There are indeed, few farming regions in this country that are beyond the reach of electricity generated by running water. Even in the arid and semi-arid regions the same water that is used for irrigation could often be made to generate power.

But electricity can be made to help the farmer as well as his wife. It is to make farming more profitable. An electric motor would save farm labor, and labor is now hard to get. It would supply energy to draw water, to run the milking machines, to thresh wheat, and to do a hundred other things. On a farm in Germany, near Berlin, is an

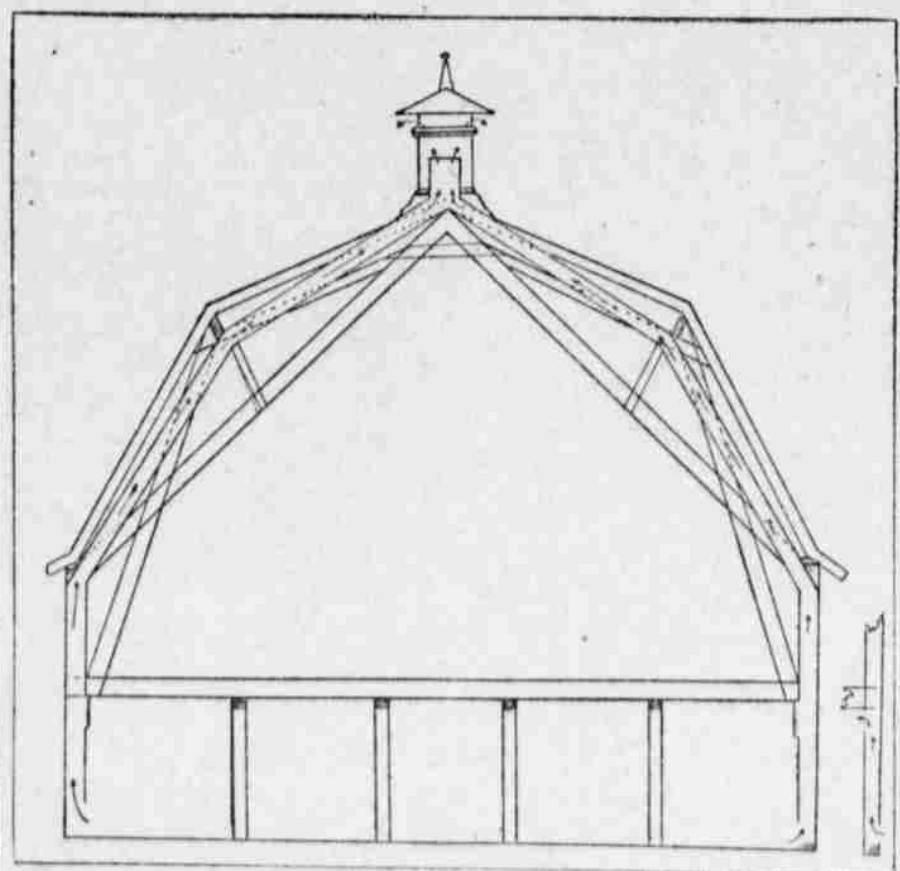
electric plow. It runs by a trolley wire which it automatically moves over three rows on every trip; it plows three furrows at a time and does the work of 15 horses. When the farmers see the uses they can make of electricity, if companies do not supply them with power they will build their own plants, as they have built their own telephone lines. A farmer living in an "electric" house, efficiently working his farm by electric power, loading his produce on the freight-cars of a trolley line, and settling its price with a purchaser a hundred miles away by telephone—perhaps by a wireless telephone, for there is already such a thing in existence—may seem a Utopian dream, but it is coming. He can send his photograph, if he wish, or sign a check over a wire. He may sit in his home and listen to music from a telharmonium in a neighboring city. All these things are possible with apparatus already made.

And these are commonplace achievements compared with the possibilities of electric development. The storage battery that electricians are working toward will eliminate the worst features of automobiles, take the trolley wires from the streets, and make most farm machinery electric. Sir Hugh Bell has predicted that a century hence, with little or no machinery aboard and scarcely any crew, ships will be sped on their voyages by electricity generated at Niagara Falls and transmitted wirelessly over the Atlantic. Either the invention of the storage battery or the discovery of wireless power transmission would be almost enough to insure a commercial flying machine. Yet, should no new electrical invention be made, we have already enough to make us far more comfortable and to enable us to save much time and lost motion.

Increase Grain Production.—If the farmers of this country could increase their production of grain only ten per cent, they would increase the nation's wealth \$214,000,000. In most sections of the country it is possible to increase the production fully 100 per cent. Are you doing your part to assist in the increase?

# VENTILATE YOUR HORSE BARN

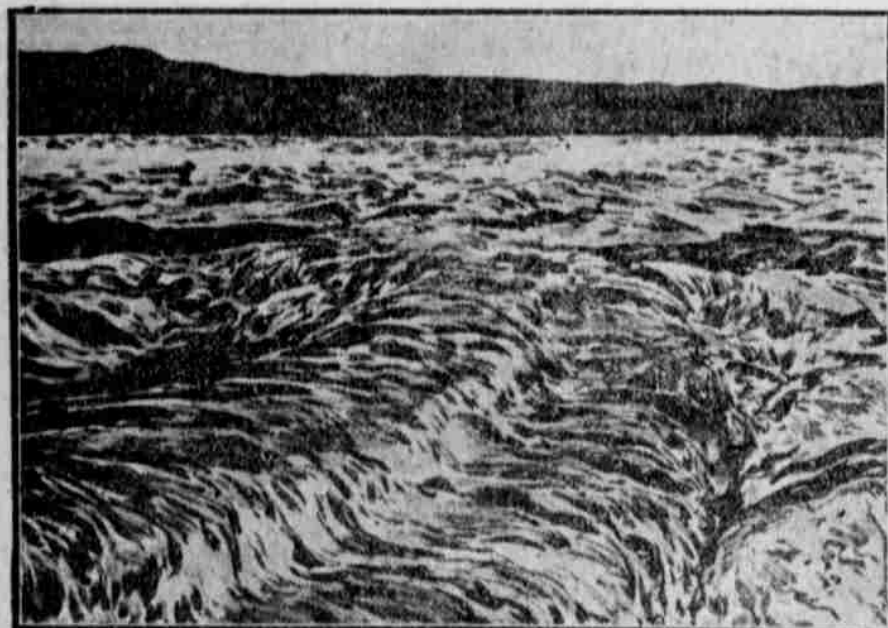
Proper Placing of Intake and Outflow Flues Important.



System of Ventilating Horse Barn.

Ventilation is a matter that should receive attention in preparing plans for stables and barns. The health of animals depends upon the supply of pure air they get when confined indoors. In the above illustration is shown the system adopted in a horse barn erected at the Michigan Agricultural college. For the removal of air there are four flues 12 inches by 21 inches, built of sheet-iron. These are set into the walls, two on a side and run up in pairs, each flue pairing with the one opposite it. The flues of a pair after passing up into the mow follow up just under the roof and meet under a cupola, unite and extend up into the cupola half way to its top.

These flues take the air from just above the foundation wall, but are provided with registers 18 inches by 18 inches just below the ceiling which can be opened when it is desired to remove the warm air from near the ceiling. Ten intakes are provided for admitting fresh air. These are six inches by 23 inches, are lined with sheet-iron and each occupies the space between the inner and outer walls and two adjacent studs. Each opens to the outside at the bottom and to the inside at the top as shown in the small diagram to the right of the illustration. The openings should be fixed to permit of their being closed partly or wholly on windy days.



Part of the Rim and Floor of the Crater of Kilauea.

consolidated material arises from the fact that the melting point of metals rises under pressure. For example, iron when subjected to very great pressure will remain solid long after reaching the temperature at which it ordinarily melts, so it is supposed that the pressure toward the center of the earth is so great that no amount of heat, or, at any rate, the intense heat in the interior of the earth, can make it assume a liquid form. This also agrees with the calculations of physicists, who affirm that the earth behaves like a solid, and therefore cannot have a liquid interior, as was formerly supposed.

But the many other positive indications of the existence of molten matter in the interior of the earth have led to a conclusion which satisfies all parties, namely, that after descending 40 or 50 miles from the surface the heat is so great and the pressure so limited that all substances are melted, so that there is a segment, probably many hundred miles in thickness, consisting of molten matter, while the interior nucleus remains, both intensely hot and at the same time solid.

One of the most striking positive indications that there is such a molten mass at no great distance below the surface of the earth is to be found in the volcanoes of the world, which are best explained as vent holes through which this molten matter escapes to the surface in response to the varying degrees of pressure from the crust of the earth over different areas. When, for example, through long-continued deposition of earthy material about the mouths of the great rivers, one portion of the earth's crust becomes overloaded, so that it presses with undue weight over a limited area, it would squeeze a portion of the molten material to the surface, just as if you press with your thumb upon the rind of an orange in one place it will crack the rind in another place and force the juice out through it. The slow contraction of the diameter of the earth, also, through its loss of heat by radiation, may result in the wrinkling up of the crust in such a manner that the molten matter will be forced out along the lines of great weakness.

packages. You can easily see, then, how the seed is worth even more than its weight in gold.

"An ounce of high-priced seed may represent the entire product of a season's work by the grower on one particular variety. We have frequently paid a French hybridist as high as \$60 an ounce for a special variety of pansy seed, that retails for a great deal more than that an ounce. Packets of it sell for 50 cents each.

"In the matter of vegetable and grain seeds, the market gardener or the farmer must pay prices for these that sometimes gives him a shock. Take one of those mammoth squashes, say, that weighs 200 pounds or over. The seeds obtained from a big squash like that actually sell for four cents apiece, or four dollars an ounce. Then there is the seed of a new variety of lettuce that sells for three dollars an ounce, while some kinds of beet seed bring at retail from \$2.50 to three dollars a pound. Even a new variety of parsley is high-priced, the seed of one kind selling at two dollars a pound.

"Not long ago a Vermont man brought in to us a new variety of oats that he had been working to produce for three or four years. It was a very fine product, and it retails at seven dollars a bushel for seed. There are some other kinds of oats that sell for five dollars a bushel, and the enterprising farmer pays that price for his seed, as he knows that it will double the market value of the output of an oat field.

"Some varieties of celery seed are also high priced. Boston market celery is the king of all the celeries raised in this country. It sells at six dollars a pound."

When the South Market street seedsman had finished with his talk on high priced seeds, the amateur gardener bought a few five and ten-cent packages of ordinary flower seeds and left the store with a thoughtful countenance.—Boston Globe.

## Shrewd Anna.

"Has Anna many friends?" "Yes, but she's only calling on those who own automobiles or summer cottages, now."—Detroit Free Press.